Towarzystwo Gospodarcze
Polskie Elektrownie

6 February 2013

European Commission Consultation Paper on generation adequacy, capacity mechanisms and internal market in electricity

TGPE response paper

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European Commission

A response to the European Commission Consultation Paper on generation adequacy, capacity mechanisms and internal market in electricity

Dear Sirs,

Towarzystwo Gospodarcze Polskie Elektrownie (TGPE) is the association of main electricity generators in Poland. We generate electricity primarily in condensation units and our production output covers approx. 70% of domestic demand. For over 20 years, we have conducted activities relating efficiency of electricity and heat production improvement as well as improving reduction of harmful impact on natural environment and climate. We have actively participated in the processes of creation of industry development programs and new industry regulations. All our activities are governed by the principle that all regulations must first and foremost support economic development and create equal opportunities to energy sector companies as well as production technologies. Our activities frequently contributed to considerable limitation of electricity production costs increase following the implementation of new environmental requirements. On our initiative, „The program of sulphur dioxide reduction in utility generation unit" was implemented in Poland in 1996 which facilitated optimization of the costs of adjusting utility generation units to the SO_2 emission standards. We have undertaken numerous initiatives in the area of innovation and development of new technologies to reduce pollution and CO_2 emissions. We have also undertaken initiatives to solve all issues material to the segment of electricity production and to the entire electric power industry.

In recent years, the problem of insufficient signals for the development of new generation units in conventional technologies has continued to grow. Due to this, on several occasions system short-term operating power reserves reached too low level. Ensuring continuity of electricity supply required that numerous generation units were overloaded, or low-efficient units had to be activated. Current support schemes are addressed only to renewable energy sources (RES) which in recent years have been developed very quickly. Unfortunately, development of wind-generation or photovoltaic technologies is not combined with the development of storage technologies or with other activities that could reduce the adverse effects of unstable operations of renewable energy sources. As a result, almost all fluctuations of RES generation are covered by conventional units belonging to entities gathered in our association. Production levels and capacity utilization rates of our units, primarily those coal-fired, has rapidly decreased. Poland does not have typically flexible units. Pumped-storage plants are treated as "blackout" tertiary reserve and are practically not involved in real-time balancing. Gas-fired units operate in cogeneration and benefit from support scheme dedicated to high-efficiency cogeneration. These units also practically do not participate in system regulation. In such circumstances, responsibility for real time balancing of system demand and fluctuations of variable wind generation (also photovoltaic in the future) is taken over by condensation units, mostly hard coal fired.

The demand for flexible units in the power system grows rapidly during the last few years. Therefore there is a need to take into account inflexible generation from wind and photovoltaic sources as well as the electricity demand growth. Unfortunately current market regulations are not appropriate for existing generation structure. There are not proper business conditions to operate existing capacity as flexible peak units as well as for investments in new dedicated peak units. Current energy only market disenable to generate revenues that would cover maintenance costs of flexible units.

The market of system short-term operating power reserves has developed only to non-considerable extent and total revenues earned by all operators of condensation units are not sufficient to maintain even two 200 MW generation units (the main electricity generation units in Polish power system). Maintenance of unprofitable generation units is not possible in the long-term. Many operators have prepared decisions concerning earlier decommissioning of some generation units and the numbers of such units are far greater than originally planned. At the same time, more investment projects in new generation units are stopped due to continuing market conditions that do not guarantee that generators would recover the investments made. In addition, typically flexible units, such as open cycle gas turbines, pumped-storage plants or compressor-storage generation units, are not developed due to inability to ensure the required revenues in the current regulatory-market conditions. It is therefore necessary that these problems are solved in order to mitigate the risk of system interruptions or the risk of slow-down in RES development or limitation of RES production. In current circumstances, the best possible solution would be implementation of capacity mechanisms that would guarantee appropriate and effective capacity independent of weather conditions.

The solutions associated with the capacity and power reserves markets have already been used in Poland. They ensured maintenance of generation adequacy, however, at that time there were no such challenges as we face today, where annual capacity increase at wind-farms approximate 10% of peak demand. In addition, similar processes are observed in neighbouring countries and they occur even at a faster pace. In addition, unplanned cross-border exchange escalates system balancing problems in Poland.

Based on our experience and analyses of current and forecast conditions, we believe that:

- there is an urgent need for implementation of capacity mechanisms,
- capacity market will be far more effective mechanism than the power reserve market.

Please find enclosed our response to the Consultation Paper of the European Commission on generation adequacy, capacity mechanisms and internal market. In the first part of our response, we present justification for implementation of capacity market and a short description of the proposed variant of a such market. In the second part of this document, we present answers to individual questions. We believe that the proposed model of capacity market does not have any material impact on the construction of common energy market in the EU and fulfils the majority of the proposed criteria. We hereby declare further cooperation in the matter of capacity mechanisms, preferably in the entire EU, and in combination with the entire energy market.

In case of any questions regarding this document please do not hesitate to contact us by our e-mail: zslyk@energoprojekt.pl, tgpe@energoprojekt.pl. Direct phone contact with respect to capacity market related issues is provided by Mr. Maciej Przybylski from Ernst & Young Business Advisory, the advisor of TGPE (+48 519 511 567).

Yours faithfully

President of the Management Board of Towarzystwo Gospodarcze Polskie Elektrownie
Jan Kurp

ZSlyk MPrzybylski

I. General comments

Our response to the questions presented in the Consultation Paper is preceded by general comments which justify the need to implement capacity mechanisms in Poland and in the majority of the EU countries. Elements of our justification were also presented in the cover letter. In addition, we present a short description of the preferred model of capacity market which fulfils most of the qualifying criteria presented in the Consultation Paper.

A. Need to implement capacity mechanisms in Polish electricity market

Polish energy policy has determined the following three main objectives for entire electric power industry:

- ensuring security of supply,
- sustained reduction of harmful impact on natural environment and climate,
- keeping the costs of electricity supply at reasonable level.

Ensuring energy security means the necessity to maintain appropriate capacity levels and interconnectors capacity to secure electricity supply at emergency situations. In addition, capacity structure should ensure system flexibility so that the load of generation units is adjusted to satisfy current demand, and to ensure the required quality and reliability of electricity supply.

Constant reduction of negative impact on natural environment and climate means primarily fulfilment of national, European and international obligations in the area of pollution reduction and climate protection.

Reasonable electricity costs should ensure that the pace of economic development is kept at the level that would allow us, Poland, to reach the average EU level within 20-25 years.

Achievement of these objectives requires optimisation of divergent activities, for example, environment-climate objectives require replacement of existing generation units, and this – in turn – increases electricity costs. Rapid pace of such exchange has already delayed the process of getting out of the financial crisis in many EU countries. Therefore the implementation of solutions to optimize execution of energy policy objectives has become imperative.

Electric power industry characterizes of high capital-intensiveness and this caused that for a few dozen of years it developed in monopolistic conditions. Competition in this industry has been introduced for more than twenty years now, and although the EU-wide energy market has been developed, achieving stable regulatory environment for that market is still well ahead. In recent years, energy market competitiveness has been disrupted by introducing to the system large volumes of subsidized RES energy. This had effect on shaping market prices and caused decrease in the production volumes by sources with highest variable costs. The replacement of fossil fuel fired units by RES should be maintained as result of environmental challenges. However, the problem of backup units for wind and photovoltaic generation should be solved. The RES development also increases the electricity cost via taxes or other quasi fiscal charges. In these conditions the market prices do not reflect generation costs in particular timeframes. Moreover, legal regulation schemes also suppress significant price increases making the operation of conventional units with low utilisation rates unprofitable. As a result, the number of decommissioned generation units has rapidly increased. If this trend is not stopped, capacity shortages will occur when electricity is not generated by wind farms or photovoltaic units. These problems have already occurred in many EU countries; in Poland, problems with own, unregulated

RES has just continued to grow and are deepened by unplanned cross-border RES energy flows from neighbouring countries.

Currently, Polish power system, which is based on coal-fired units, has sufficient available generation capacity to ensure appropriate level of security of supply in normal conditions, while in extreme conditions the risk of inadequacy has already occurred. However, the occurring changes create significant challenges for both the long-term security of supply and for stable operations of the system already in the next years:

- In the next couple of years, decommissioning is planned of more than 7,000 MW of installed capacity due to wear and tear of those generation units, termination of derogation period from the provisions of the LCP Directive (provided in the EU Treaty of Accession), implementation of stricter standards for pollution emissions, higher costs of CO_2 emission allowances.
- Despite relatively fast increase in energy efficiency, electricity forecasts show higher demand. Currently, Poland has recorded one of the EU lowest ratios of electricity consumption *per capita*.
- In accordance with the EU climate policy, Polish energy sector, until recently almost all coal-fired, is subject to the processes of partial decarbonization. An increase of RES capacity, dependable on weather conditions, such as wind-farms or photovoltaic units, has been recorded.
- Wholesale energy prices are considerably lower than long-term marginal costs (determining the level of „entry price" for new generation units) and do not generate appropriate investment signals. Coupled with regulatory uncertainty in Poland and in the EU, mainly relating to the costs of emission of GHG and RES support scheme (planned termination of support for co-firing), cause withholding of strategic investment decisions.

Due to the above problems, in Poland as well as in many other EU countries, a discussion has been conducted for many years on implementation of capacity mechanisms. The first conceptions were developed, but they have not become basis for any further work. The main reasons were doubts as to their concordance with the created EU-wide energy market. The Directive 2005/89/EC of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment allows implementation of capacity mechanisms provided that they will not have a material impact on energy market. Without EU-wide coordination of the process of implementation of market mechanisms, fulfilment of this requirement by Poland, though located in the continental part of the EU, will be rather difficult. Taking up this issue by the European Commission by way of development of appropriate documents and conducting wide consultations should quickly lead to development of effective capacity mechanisms, which directly support European energy market development.

Polish condensation units has to provide required flexibility of the power system and have to adopt to the growing share of determined RES generation. For this reason, for many years TGPE has actively participated in debates on capacity mechanisms. The TGPE members own the greatest number of generation units which maintenance in current market and regulatory environment has become unprofitable. Decommissioning of generation units before termination of their scheduled life period is the problem for the owner, however, the conditions of operating such units explain retirement decisions. If, however, such situation is to continue, it will cause problems also for energy consumers. Periodic outages may occur and electricity prices may be far above reasonable levels. Entities gathered at TGPE indicate that they consider decommissioning of a greater number of generation units than that planned in the National Energy Strategy from 2009. At the same time, the numbers of discontinued investments have increased, for example, development of the

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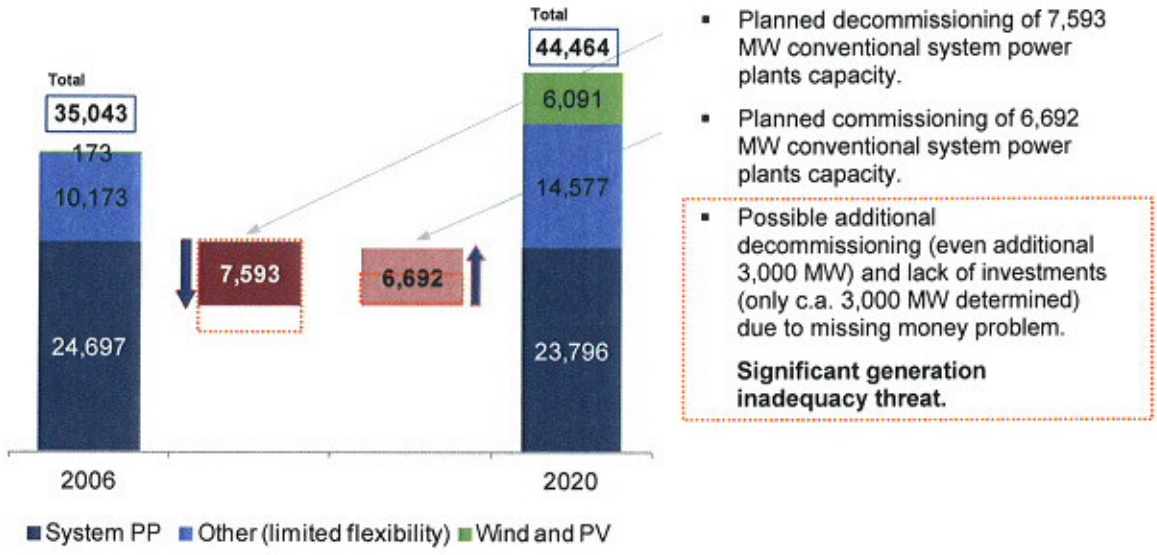
1,000 MW generation units in Ostrołęka, Rybnik, Opalenie and Łęczna was suspended. Several other investment projects have not received any formal decision, but in practice they have been discontinued. The main reason for investment discontinuation has always been the same – in the current market-regulatory environment, the investor risk was too high.

These conditions require immediate changes and implementation of capacity market is one of them; it is a justified change and may be introduced relatively quickly. Implementation of capacity market will facilitate maintenance of the required level of dispatchable system capacity at safe level and will assist to develop conditions for the construction of new generation units. In our opinion, it will help to build stable European energy market and maintain high pace of development of non-dispatchable RES. The proposed capacity market will not solve all issues of the energy sector, however, it will solve these that pose the greatest risk.

Capacity development between 2006 and 2020 assumed by national energy strategy [MW], visualization of expected generation inadequacy



Source: Polish National Energy Policy, own studies

In Poland, since the year 1989, i.e. after the transition from monopolistic practices in the electricity sector, certain capacity mechanisms were applied. Until 1999, capacity payments were used (capacity market with mid and long-term segment), and then until the year 2009 – reserve capacity market. Our proposals are therefore based on a long-term practical experience. We propose capacity market, which in current market and regulatory conditions would be more effective than the power reserve market. We believe that capacity market will fulfil its main task – it will ensure security of energy supply. We propose the model where the capacity market operates as an additional element preceding the energy market and the market of short-term operating power reserves. The main element of such market would be a contract-based guarantee, with appropriate advance period, of available generation capacity in dispatchable generation units in the amounts resulting from official forecasts. We propose the advance period of 4 years as it allows construction of new generation units in case of insufficient supply. In the following parts of this document we present description of the capacity market which, in our opinion, after detailed investigation, should be widely implemented in the EU. The main solutions are very flexible and allow system implementation in individual Member States.

The proposal relates to the countries which have already decided to operate the capacity market or power reserve market, or countries such as Poland where market-regulatory conditions force similar solutions. In that situation the next steps should cover standardisation actions by issuing the framework of non-obligatory guidelines by EC. Further, the implementation of common EU capacity market, basing on agreed standard market model, is proposed.

Evolutionary development of the common EU capacity market will allow to:

- Further development of RES without the necessity of energy storage solutions implementation,
- Further common single EU market without any significant interruptions
- Develop optimum target solutions

B. Description of main solutions of the preferred capacity market

General assumptions

Capacity market is a mechanism which ensures obtaining in advance of such volumes of capacity, which are required to cover demand for energy and to maintain short-term operating power reserves required to guarantee security of supply. Capacity market may be centralised where demand forecasts and capacity contracting are operated by single entity. With decentralized capacity market, each consumer or his supplier is obligated to guarantee capacity that would cover his peak demand and a 15-20% reserve, after accounting for certain system effects.

Operations of proposed capacity market is based on the following basic assumptions:

- Capacity contracting starts prior to energy sector investment process duration (e.g. 4 years).
- The contracted capacity volume required from obligated entities is determined based on the peak demand, after considering the diversity factors (e.g. calculated using demand forecasts determined and published by the Regulator based on the recommendations provided by TSO). These volumes are determined for defined periods of the year (months). Participants of the capacity delivery process may be dispatchable generation units which fulfil certain required criteria. They may be existing generation units as well as units that are planned to become operational in the contracted period. These could also include the dispatchable demand side response units (DSR). Enhancement of energy efficiency is accounted for at the level of forecasted capacity demand and will be additionally covered by dedicated support scheme in the form of white certificates.
- Capacity contracting should be executed in two forms of trading: voluntary bilateral trading and obligatory unilateral trading. Voluntary trading would be executed as bilateral or tender-based trading between the generators and obligated entities (end users or suppliers to end users). Obligatory trading will be conducted in the form of unilateral tenders organised by TSO or authorized system operator, where the demand is represented by capacity demand curve. The aim of the tender procedure is to close capacity balance and thus it relates to capacity volumes not acquired by the suppliers during voluntary bilateral trading.
- Capacity market operates as parallel to the energy market and short-term operating reserve market.

- Producers who sold capacity must offer it in the energy market and centrally dispatchable units also under operating reserve mechanism.

It can be considered at the stage of detailed market design process to transfer the capacity obligation on system operators which are best adopted to perform that role at the moment.

We assume utilisation of capacity forecasts in standard weather conditions. To ensure availability of capacity in extreme weather conditions, during numerous simultaneous outages or rapid increase in demand we recommend that the 'strategic reserve' mechanism should be applied. This is a specific form of short-term operating power reserve, which will not be used in standard conditions. Maintenance costs of the 'strategic reserve' are definitely lower as the reserve would be maintained mainly by old generation units earmarked for liquidation. In addition, one may analyse the participation of DSR who in extreme conditions limit their energy consumption, but with full control of grid operators. Excluding the capacity demand in extreme conditions from capacity market simplifies system functioning. Preparation for purchases under strategic reserve has already commenced in Poland.

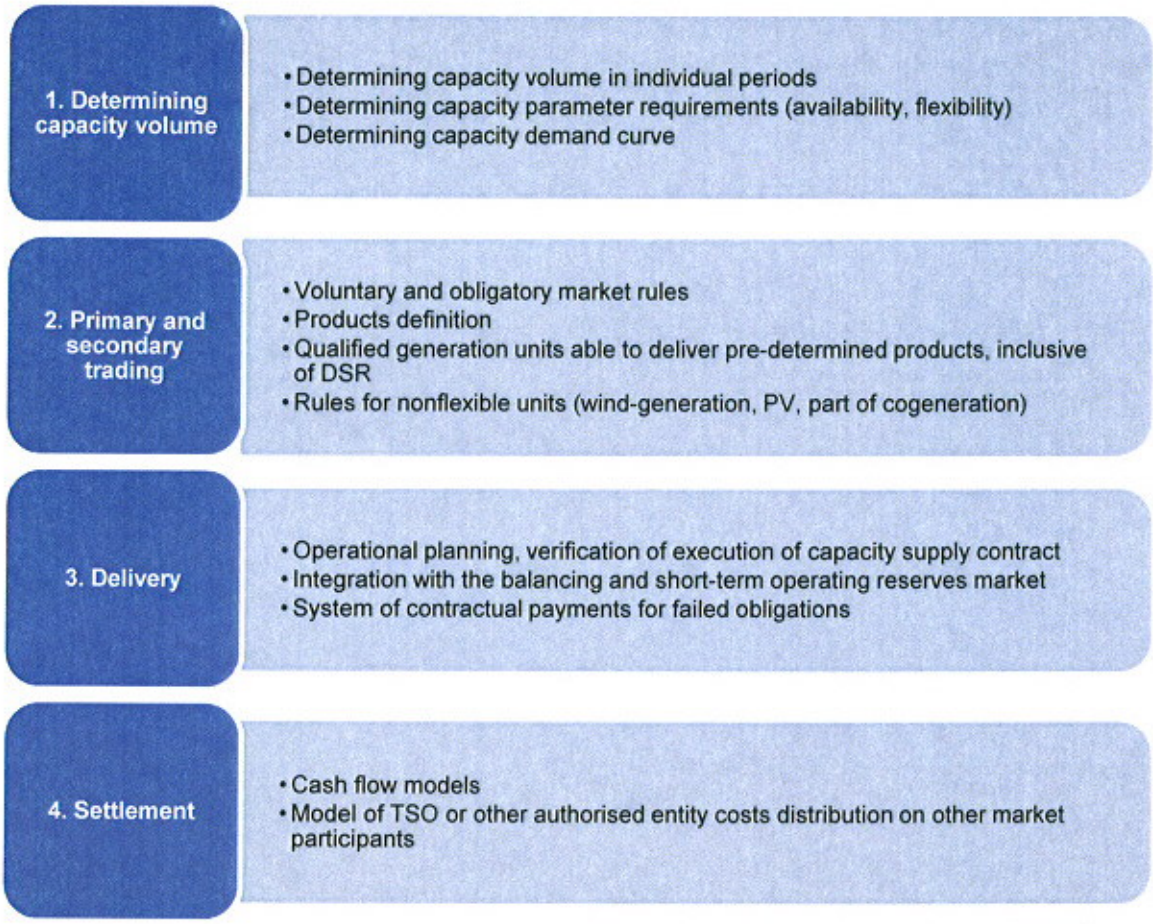
Timeframe of the capacity market

The capacity market should account for the periods of execution of new generation unit investment projects and thus it should be analysed from the perspective of a couple of years, with the 3 - 5 year period as the minimum. The 4-year period seems to be optimum for Poland. We assume that the capacity market could become operational in the year 2014 and conduct capacity contracting transactions with delivery for the year 2018.

We propose the implementation of partial purchase for earlier years to verify procedures and preserve generation units required in the standard weather conditions, but which could be decommissioned before the year 2018.

Zbigniew Mroczyński

Key processes of capacity market development and functioning



Determining capacity volume

The primary objective of the capacity market is to ensure appropriate capacity volume at minimum cost to end user. Basically, each customer should have secured capacity volume in the sufficient amount to cover its peak demand, increased by a pre-set reserve level. Since the peak demand occurs at various customers in various periods of time, it is necessary that diversity factors should be reflected.

In practice, system peak demand for the given period will be planned by the TSO for standard conditions in accordance with determined procedures. The forecasts will be verified and published by Regulator (the ERO President). Peak power capacity of end users (contracted capacity) serves mainly to split the forecasted system capacity demand to individual users. In this way, capacity obligations of end users or their suppliers are determined.

In addition, capacity cost/price curve will be developed and published, depending on capacity demand and the number of supply offers. In case of a shortage of supply offers, the price is determined based on the costs of new entry price of predetermined technologies. Where supply offers are in excess, the prices will fall to zero, with the pre-determined excess amounts. The curve will be used to determine prices in obligatory, centralized procurement of capacity at auctions organized to close the balance.

Capacity demand forecast at the purpose of capacity market volume should be made with respect to standard conditions (weather fluctuations reported in 7-10 years timeframe). Extreme weather

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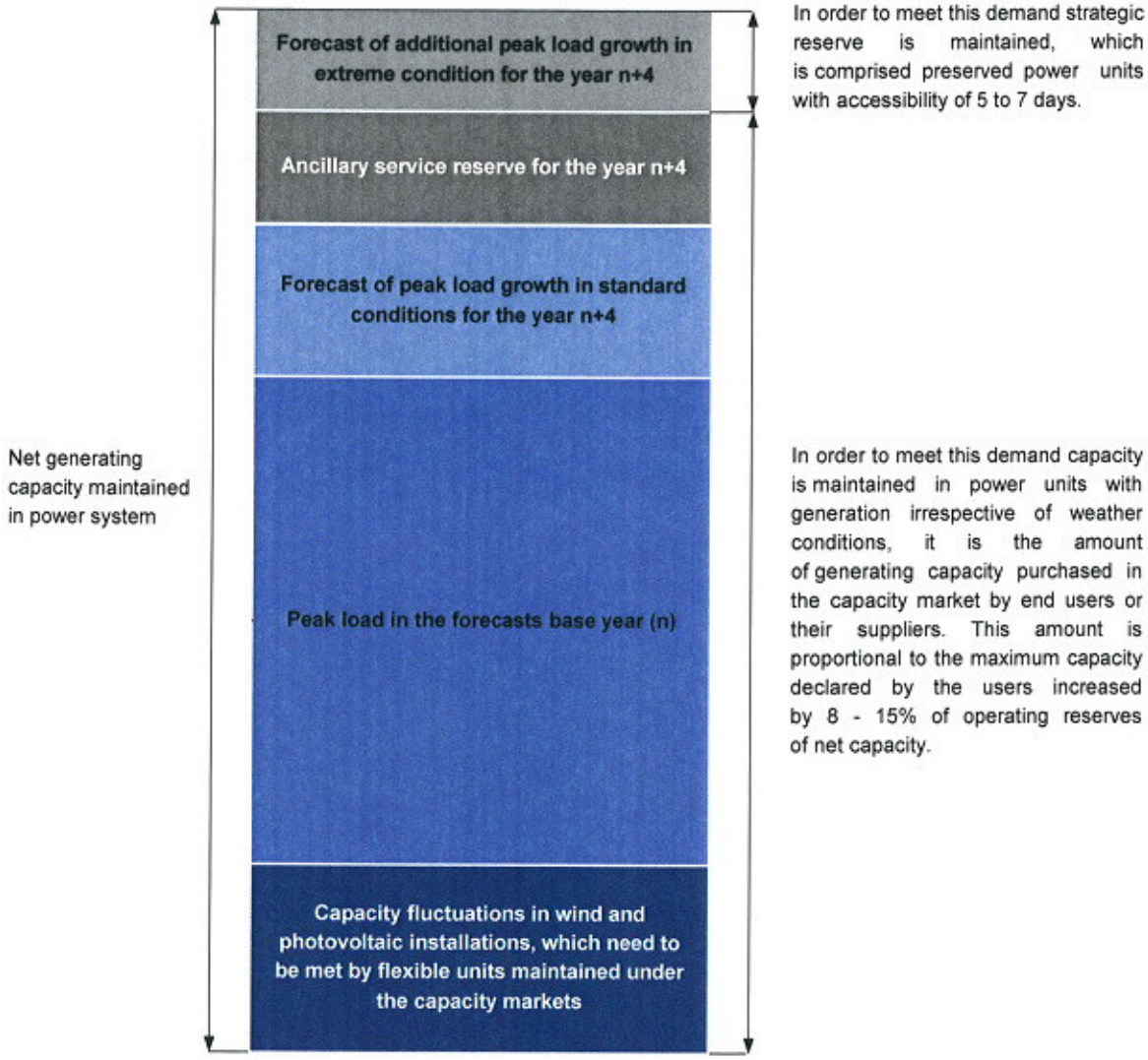
conditions (extreme deviations reported in 40-50 years timeframe) should be used to forecast the volume of strategic reserve, which should be parallel mechanism to capacity market.

Required capacities in power system



Source: own studies

Products and suppliers

The main product in the capacity market is available generation capacity of qualified generation units. Qualified generators must fulfil certain qualifying criteria, but first of all must be able to generate electricity irrespective of weather conditions. The qualifying criteria for capacity generators will be determined in regulations. Qualification procedure will be conducted by grid operators under the supervision of the ERO President. In designing detailed solutions, possible participation of cogeneration entities and run of the river hydro power plants will be determined. The seller is obligated to maintain such level of availability of his generation units as to ensure that he is able to physically deliver the contracted capacity in the given period. Preliminarily, we propose settlements on a monthly basis. Where generator lacks contracted/pre-sold capacity, he may be able to acquire missing volume from another generator who has spare capacity measured in qualified generation units.

An additional product of the discussed capacity market are qualified DSR which are fully or partly dispatchable. Detailed principles concerning the share of DSR in the capacity market are to be determined.

The offered products may relate to existing units or generators planned to be made operational before the year of capacity contracting.

The suppliers are operators of qualified units or qualified DSR. Principles will be developed concerning possible share of qualifying generation units connected to the grid of neighbouring power system.

Forms of trading

Based on the official forecast of capacity demand in standard weather conditions and contracted capacity of end users (determining peak power consumption) capacity purchase obligations will be determined for each end user. For new end users, appropriate reserve will be determined. Capacity purchases on the primary market will be made 4 years before the year of capacity supply. For new users, capacity reserve will be acquired by the TSO who will then resell the capacity to end users or to their suppliers. Trading in the secondary market will be continuous until the time of delivery.

Primary market trading could be conducted in the form of:

- voluntary trading realised under bilateral transactions or in various organised markets,
- obligatory trading under unilateral auctions with fixed demand representation.

Voluntary trading is conducted in the first phase, e.g. until 30 September of the contracting year. After that date, entities obligated to capacity procurement who do not have sufficient volume of capacity purchased, must participate in the auctions organized by the TSO or other authorized entity. If no sufficient supply is recorded during the auction, another auction will be organised to ensure that proposals will include new entities. Selection of auction model will be a subject to further works. The primary objective is to ensure cost-efficient solutions for end users.

Secondary market may function in different forms, but it should ensure free flow of the acquired capacity between suppliers and end users. In this way, implementation of capacity market will not make electricity supplier change difficult.

The capacity market will be a voluntary market for entities offering their goods for resale. It means that there is no obligation to offer capacity, but one must account for the fact that energy prices or prices of short-term operating power reserves may be determined after taking the capacity market into consideration.

Delivery and settlement

Generators who contracted available generation capacity for the given month, in order to meet their contractual obligations must declare available generation capacity determined as the sum total of the capacity engaged in electricity production and capacity offered under short-term operating reserves (centrally dispatchable units). Where no sufficient capacity volume is available, generator may acquire missing volume from another entity with spare capacity volumes in qualifying units. Supply of the contracted capacity is regulated by the TSO with the assistance of DSO for entities connected to the grid. If generator does not deliver the contracted volume of capacity in the given settlement period, he pays substitution fee to the TSO in the amount exceeding capacity rates determined based on capacity cost/price curve for supply shortage conditions. Any excess of financial resources will be allocated to customers.

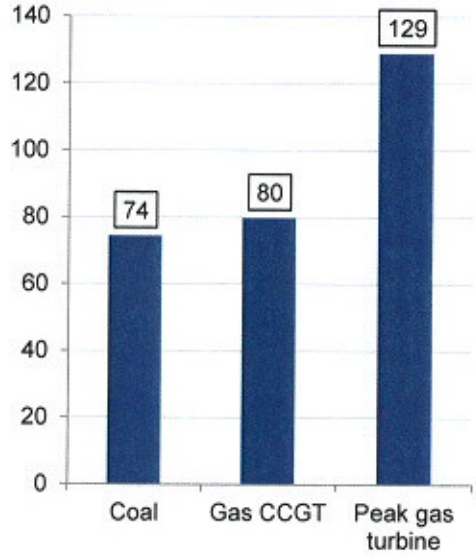
End user or his supplier settlement of the acquired capacity volume will be made in two stages. In the contracting year, the existing customers will be required to report capacity purchases to the TSO or other authorized entity, and such reports must be consistent with capacity sales reported by generators. The second stage of verification will be made in the month preceding the month of supply; such arrangement will facilitate settlements upon supplier change. Verification at this stage will be the basis for buyer-generator settlements.

II. Response to questions forwarded by the European Commission in the Consultation Paper

1. Do you consider that the current market prices prevent investments in needed generation capacity?

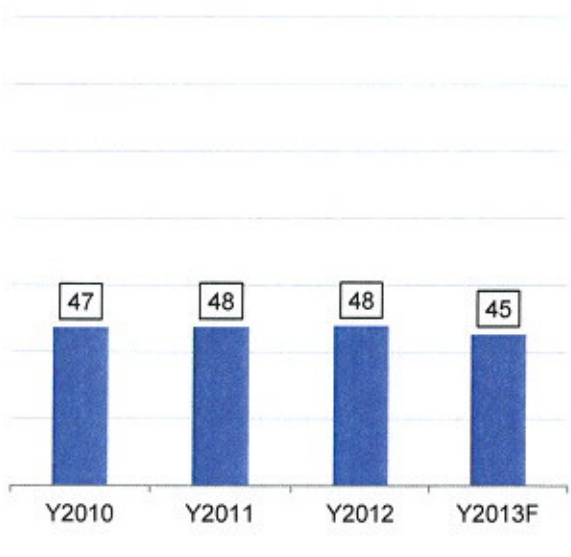
New entry price of new generation units are currently far below market prices level [1] The charts below show current prices (both forward and spot markets) compared to new entry prices in selected technologies. Electricity prices presented in the chart below are electricity prices in the power exchange market, where majority of physical trading is carried on the Polish Power Exchange.

Current entry prices of new generation units in selected technologies [EUR/MWh]



Source Own studies, entry prices were calculated on the assumption that the current prices of fuel and emission allowances are at EUR 9.5 per tonne.

Power exchange energy prices [EUR/MWh][2]



Source: Power Exchange – weighted average on spot and forward markets (as at the end of November 2012)

Current level of market prices does not ensure appropriate signals for investments in dispatchable generation units. Even entities with portfolio of varied-age generation units thus with average capital costs far lower than those of the new units identify problems with reaching investment decisions.

[1] Entry price shall be understood as hypothetical energy price at which investments in the given generation source become profitable. Revenues from energy sales must in this case cover operating and investment-related costs, including return on equity.

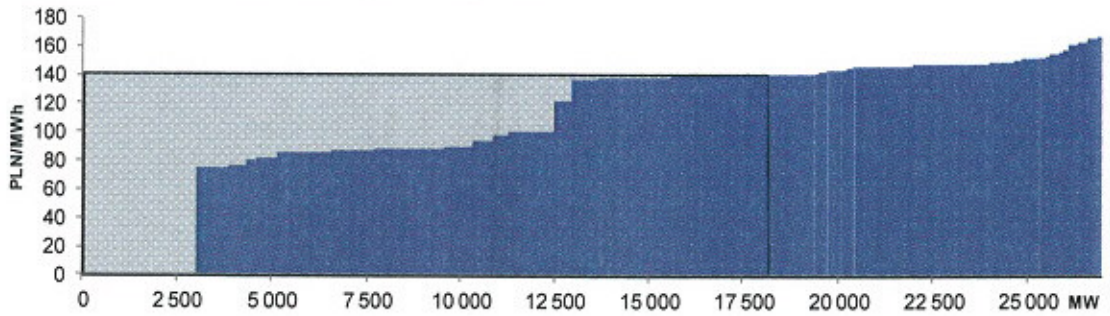
[2] Power exchange prices in the years 2010-2012 are average prices from the forward and spot markets. For the year 2013, these are the prices from the forward market based on the transactions physically concluded by December 2012. These transactions account for approx. half of forecasted electricity consumption volume for the year 2013.

In Poland, the example of the abovementioned market conditions may be the EdF's decision to suspend the construction of a 900 MW generation unit in Elektrownia Rybnik. It was earlier justified by assumed additional benefits, i.e. revenues from biomass co-firing classified as RES-generation. In addition, an assumption was made that investment expenditure could be the basis for the settlement and free of charge emission allowances allocation as in Article 10c. of the EU ETS Directive. The increasing risk of obtaining these additional benefits has caused a decision to suspend the investment. It means that even large enterprises like EdF (its generating portfolio in Poland comprise several thousand MW) has problems with financing construction of a large generation projects. As a result of high risk levels, more entities take decisions to suspend or discontinue development of thermal gas- or coal-fired power stations. Currently, no open-cycle gas turbine operates in the Polish power system.

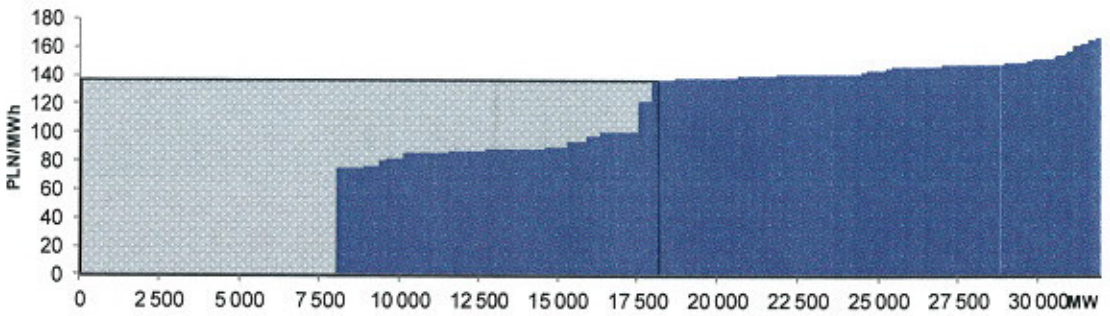
Merit order (variable unit costs based) depending on different RES determined production levels

It was prepared based on the data for 2012, average power demand level was assumed at level of 18,100 MW and average load of CHP and industrial generation units was estimated at 3,000 MW.

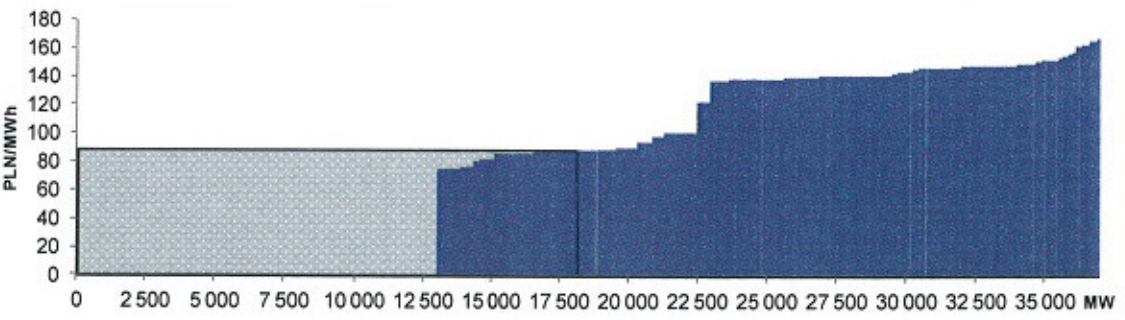
RES – 0 MW; marginal variable cost 141 PLN



RES – 5,000 MW; marginal variable cost 137 PLN



RES – 10,000 MW; marginal variable cost 89 PLN



2. Do you consider that support (e.g. direct financial support, priority dispatch or special network fees) for specific energy sources (renewables, coal, nuclear) undermines investments needed to ensure generation adequacy? If yes, how and to what extent?

In case of Poland, significant investment support stimulating investment decisions relates to RES only and partially to cogeneration sources. Conventional generation units fired with fossil fuels do not receive any significant investment support. Nuclear power industry is at its preparatory stage and the first nuclear power generation units will be ready within not less than 10 years.

There are several forms of support for RES energy in Poland, such as, among others:

- investment subsidies under European and domestic programs,
- certificate schemes – property rights for renewable energy sources,
- obligation to acquire the entire volume of generated energy at determined prices,
- priority dispatch,
- exemption from excise tax,
- part of system connection fee is covered by system operators.

As a result, investments in RES are characterised by high profitability and relatively low risk. High profitability of RES causes allocation of the majority of capital to these investments. Conventional generation units ensuring security of supply are definitely less attractive for investors under current regulatory-market conditions.

In addition, in current regulatory-market conditions, rapid increase of electricity volume generated in wind-farms and in photovoltaic units hasten decommissioning of existing units. RES energy is entered into the system with no limitations. RES are the sources with determined operations characteristics, and in fact do not incur any significant balancing costs (among others, the costs of necessary offset of large swings in their production volume) as settlements of their market position is made according to generally binding principles. As a result, these are the conventional generation units that to a greater extent fulfil regulatory functions, whilst their load factor is reduced. At the same time, one cannot expect that in a short- or medium-term these functions will be executed by demand response. Production decrease is accumulated in a group of entities with highest variable costs; in Poland these are hard coal–fired condensation units. Price fluctuations in the energy market are suppressed by various factors and thus do not reflect actual costs. With decreasing volume of energy sold, low energy prices and the lack of other revenues, e.g. from capacity mechanisms, maintaining many generation units becomes unprofitable. Many operators consider decommissioning of generation units which originally were planned to be retired after the year 2020. Based on Polish Energy Policy related analysis conducted in 2009, approx. 7,000 MW were forecasted for decommissioning till 2020. The majority of decommissioning was supposed to occur in 2016 and 2018, however, currently most of operators intend to execute those plans three to five years earlier. Moreover, decommissioning of additional 1,000 MW is being considered and for next 1,000 MW analyses of further operations profitability are being conducted. On the other hand, relatively low prices during peak periods as well as period of decrease of wind generation do not create conditions for peak-regulatory sources, e.g. gas-fired units.

In our opinion, Polish market demonstrates lack of harmonious development of various technologies which would ensure security of supply. The RES, as a result of extremely strong support, record exceptionally dynamic development thus restricting development of conventional generation units and hasten process of decommissioning of existing generation units. Unless appropriate steps are taken, problems of supply continuity will occur within the next couple of years. As a result, RES development will also slow down and the existing RES generation units will be required to limit their production.

3. Do you consider that work on the establishment of cross-border day ahead, intraday and balancing markets will contribute to ensuring security of supply? Within what timeframe do you see this happening?

In our opinion, the main effect of markets integration will be improved efficiency of markets' operations, in respect to trading activities. It will relate to:

- Price unification – markets convergence as a result of effective utilisation of interconnectors transmission capacity. One should note that this convergence means price reduction in the regions where they are currently high, and price increase - where they are low.
- Lower risk of unexpected energy price changes following trading area expansion. Geographical expansion of the market causes that it will be more resistant to local price fluctuations (system limitations, climate and weather conditions and other accidental circumstances).

Development of cross-border markets occurs mainly as trading or commercial integration based on the existing technical infrastructure. Ensuring security of supply relates to system balancing and is of technical character only. Therefore it seems that the creation of markets without accompanying technical infrastructure development has a limited impact on the improvement of security of supply. In our opinion, market integration will slightly improve this situation, but will not eliminate altogether the problem of maintaining the required levels of generation capacity and the lack of price signals for investments in new generation units. In addition, in the neighbouring countries, situation in the area of capacity balance is similar and sometimes even generates negative effects in the Polish system. Problems connected with decreasing production in Polish condensation units are amplified by non-planned power flows from RES located in Germany (including so-called loop flows). Supply of energy from abroad will have insignificant effect on the security of supply in Poland for at least several years.

4. What additional steps, if any, should be taken at European level to ensure that internal market rules fully contribute to ensuring generation adequacy and security of supply?

In current conditions, ensuring security of supply through improvement of the energy market operations principles is challenging. It would require serious changes in the RES support schemes and in the principles of their operation in the energy market and power system. Probably the pace of RES development would materially decrease and in addition significant stranded costs would originate. It would be far more difficult to achieve pre-determined objectives in the area of GHGs reduction.

In our opinion, improvement of security of supply requires implementation of capacity mechanism such as capacity market. Development and implementation of effective capacity market would pose greater challenge without coordination and harmonization of activities at the EU level. Therefore, we believe that the European Commission should be engaged in this process.

We propose that a standard model of the energy and capacity markets should be developed at European level, similarly to the existing solutions, e.g. in the US. It would facilitate introduction of uniform and internally consistent principles of capacity market operations. It would also solve many current problems, including those which hinder development of an internal energy market.

As a part of standard model development, a discussion should be held on both direction-oriented solutions such as selection of capacity mechanisms, and on detailed operations model of the selected mechanisms (organizational and process structure). Despite the fact that we suggest the capacity market, we are aware of the existence and of the operating terms and conditions of other mechanisms. Poland had already introduced capacity mechanisms which was later followed by the power reserve market. In the capacity mechanisms introduced by many Member States we see considerable discrepancies as regards the shape of the considered solutions. Also in Poland various models of capacity mechanisms have been analysed, and these ranged from well-developed solutions, e.g. PJM in the US, to simple ones. We suggest a relatively simple solutions, under which the capacity market would supplement the energy market. If such simple model were adopted at European level, it would be possible to swiftly coordinate their implementation. Development of consistent policies in the form of standard market model is the best solution to ensure security of supply. While European level solutions are being prepared, all Member States should be entitled to implement individual capacity mechanisms to ensure security of supply. We think that it is possible to implement it without hindering the process of internal energy market creation.

5. What additional steps could Member States take to support the effectiveness of the internal market in delivering generation adequacy?

In our opinion, Member States should actively participate in the activities aimed to develop and implement a common model of energy market, including capacity market. Governments of Member States should facilitate proper data acquisition (by TSOs) that are required for generation and capacity adequacy outlooks as well as assessment of security of supply in different market conditions. The acquired data should include 4-years and 10-years plans which will allow TSOs and ENTSO-E to prepare reliable forecasts for both national and European level.

During development of standard market model, countries encountering generation adequacy problems are entitled to undertake preventive actions. Introduced capacity mechanisms should include future solutions standardisation. These actions should be considered by EU as pilot projects with full exchange of experience. It will enable development of the most effective market model and acceleration of implementation process. Moreover, individual market condition may be identified in some countries which need to be included in future. Introduction of several capacity mechanisms, as strategic reserve maintained in case of extreme market conditions which require electricity supply, do not affect energy market operations.

In several EU Member States, including Poland, in current regulatory-market conditions, there is a high risk regarding possibility of ensuring security of supply. It requires urgent actions both on the EU and national level.

6. How should public authorities reflect the preferences of consumers in relation to security of supply? How can they reflect preferences for lower standards on the part of some consumers?

Historically, power systems were designed with assumption of limited possibility of meeting various consumer preferences regarding security and reliability of supply. Currently, technological solutions enable consumers active participation in system balancing by its consumption profile regulation consumption or by system disconnection for a defined period of time. Legal regulations should account for the functioning of such consumers in the system, which to some extent has also operated in Poland. Currently, DSR related services may be offered by large consumers, however implementation of smart grids will facilitate that a greater number of consumers will be able to be active in the electricity market.

Our proposed capacity market assumes flexible demand, where decrease in electricity consumption by customers may be steered by grid operator. In addition, consumers would be able to reduce their own peak demand by managing own consumption scheme and thus would be able to reduce contracted capacity and capacity payments. However, we believe that the above solutions will help to solve the problem of generation adequacy only to a small extent.

At this stage, diversification of quality-reliability standards should not be implemented for individual consumers due to the lack of appropriate technical solutions.

7. Do you consider that there is a need for review of how generation adequacy assessments are carried out in the internal market? In particular, is there a need for more in depth generation adequacy reviews at:
a. National level
b. Regional Level
c. European Level

In our opinion, the review is required primarily at the level of individual power systems. Transmission System Operators (TSOs) in collaboration with Distribution System Operators (DSOs) should be required to develop generation adequacy outlooks after considering plans of generation units which are connected to the grid. National regulations should facilitate gathering appropriate data, plans and information. Currently, this issue is not fully regulated in individual Member States. At the level of transmission systems, detailed reviews should be made of generation adequacy after considering possible exchange with other systems. Generation adequacy should not account for the generation units whose generation capacity may fall to zero, depending on weather conditions. Accounting for interconnectors capacity should be confirmed by operator of the given system. In addition, appropriate transmission capacities should be reserved on interconnectors. The capacity accounted for in the generation adequacy balance of one system should not be accounted for in the generation adequacy balance of another system.

At the regional level, during planning stage, reviews of generation adequacy outlooks and balance in individual systems, and then coordination and optimization of outlooks and balances for the entire region should be conducted, yet attention should be paid to power flow problems.

Analyses and generation adequacy balances should be reviewed at the European level to ensure exchange optimization between individual markets and possible exchange with non-EU areas.

8. Looking forward, is the generation adequacy outlook produced by ENTSO-E sufficiently detailed?
In particular,
a. Is there a need for a regional or European assessment of the availability of flexible capacity?
b. Are there other areas where this generation adequacy assessment should be made more detailed?

In terms of quantity, the level of detail of generation capacity outlooks developed by ENTSO-E is sufficient, still should be supplemented as regards capacity structure. In addition, considerable variances are possible due to incomplete data source. Outlooks are based on the data received from individual TSO. Not all Member States have ensured access to full data and outlooks of consumers and generators. Development of distributed generation escalates this situation. In our opinion, this issue should be quickly resolved e.g. by EU Regulation.

In addition, future generation capacity outlooks will be based on non-binding information provided by energy generators. Without contractual obligations, they may decommission their generation units earlier. Revision of plans for individual systems/countries should account for the probability of such capacity inadequacy depending on: pace of demand growth, flexibility of a power reserve, regulatory and market conditions. In addition, data should be published on the structure of peak hour capacity as well as on the ability to replace photovoltaic and wind generated capacity at the time of unexpected change in generated volumes.

At the regional and European level, the ENTSO-E analyses should first of all verify data and outlooks prepared by individual TSO. At this level, the analysis is required of energy flow at peak generation at photovoltaic and wind-based generation units. The results of these analyses should be a significant signal for development or modernization of the grid and interconnectors. In addition, analyses of generation adequacy outlooks and energy flows in operating conditions should be used to develop standards for interconnection settlements.

Detailed outlook analyses and adequacy assessments of capacity level and structure should be conducted at the level of individual systems. In addition, risk should be assessed of additional capacity inadequacy in the circumstances of the lack of capacity mechanisms. Also, capacity mix should be determined to ensure keeping energy quality and continuity of supply, whilst considering the possibility of grid operator-regulated decrease in energy consumption by certain consumers, or supply interruptions.

9. Do you consider the Electricity Security of Supply Directive to be adequate (2005/89/EC)? If it is to be revised, on which points?

Current provisions of this Directive allow for capacity mechanisms, but on the condition there is no interference in the energy market. It is a difficult condition to be met, yet certain capacity mechanisms can already be implemented. However, there are no regulations concerning security of supply in the long-term. In our opinion, the provisions of the Directive 2005/89/EC should be amended in this respect. The amendments should account for gradual implementation of a common model of electricity market with capacity mechanisms. To this end, appropriate amendments should be made to the Preamble and Article 5 of this Directive.

Capacity mechanisms are referred to in point 10 of the Preamble as the means that may be used to maintain appropriate generation adequacy reserve levels. We propose that this point is supplemented with the following wording: "Member States may implement capacity mechanisms, including capacity markets. The solutions deployed should account for future standardization at the European level and/or at the level of regional energy markets". Article 5 of the Directive relates to maintenance of balance between electricity supply and demand. In accordance with the current provisions of this Article, Member States "encourage the establishment of a wholesale market framework that provides suitable price signals for generation and consumption; require transmission system operators to ensure that an appropriate level of generation reserve capacity is available for balancing purposes and/or to adopt equivalent market based measures". Moreover, they may take additional steps including, among others, regulations ensuring new generation adequacy or entry of new generators into the market. We propose that the said Article 5 *directly* refers to the possibility of launch of the capacity market at national level with the option of future standardization at the level of regional and European markets. Adoption of this solution is necessary as the already taken initiatives of many countries to ensure security of energy supply go beyond binding regulations.

Ensuring security of energy supply will always be treated as priority issue by Member States. In case of threats, they will take appropriate counter-measures in order to secure generation adequacy and continuity of supply. One of primary measures is introduction of capacity mechanisms. Currently, the risk of security of supply is vital in many of EU Member States and there are no possibilities for improvement. In this case coordinated approach for implementation of capacity mechanisms is the best solution. EU regulations should include solutions for such situations.

Implementation and operations of capacity mechanisms in EU Member States is a fact thus next step should be development of standardisation frames by European Commission guidelines. Development of the standard energy market should be initiated including capacity market in the long-term perspective. Problem with variable RES generation will not be solve in the following years by energy storage technologies or increased demand elasticity.

10. Would you support the introduction of mandatory risk assessments or generation adequacy plans at national and regional level similar to those required under the Gas Security of Supply Regulation?

The Directive 2005/89/EC relating to activities aimed to ensure security of supply does not solve potential issues that may arise in the following years. It therefore should be replaced by appropriate Regulation, as in the case of gas market. The Directive 2004/67/EC (gas market related) was replaced by Regulation 994/2010. Certain mechanisms included in this Regulation should also be implemented in the energy market. In addition, some specific energy-market regulations should also be introduced which relate to insufficient energy storage facilities. For example, analyses should be performed concerning continuity of supply with fast changes in production volume at photovoltaic and wind generation units, as well as risk analyses of higher capacity inadequacy at flexible units.

Direct regulations by appropriate Regulation should ensure standardization of data and analysis methods, and hence, improved reliability of generation adequacy outlooks. Basic analyses and plans should be made for the power system, which for the most of Member States is equivalent to national system.

11. Should generation adequacy standards be harmonised across the EU? What should be that standard or how could it be developed taking into account potentially diverging preference regarding security of supply?

Unification of generation adequacy standards is a natural requirement to operate interconnected energy systems. Full integration of markets is possible on the condition of process harmonization in the entire area of regional market. This also takes place in case of generation adequacy assessment.

We have analyzed diverging models of the assessment of generation adequacy and capacity mix in individual Member States. These relate to the following areas:

- Manner of capacity treatment at generation units with determined generation characteristics – mainly at wind farms and photovoltaic generation units. One may say that the capacity generated by such sources can be used for system balancing purposes because there are means to reliably predict weather conditions. The opponents indicate that even good planning does not protect from unexpected generation decrease, even to zero, produced at these units. To secure continuity of supply, without development of energy storage facilities, it is necessary to secure operating generation capacity of generation units independent of weather conditions at the level of full system demand.
- The manner of calculating available generation capacity of interconnectors – different methods of calculations are visible in allocation of transmission capacity for trading purposes. In principle, this capacity can be determined in two ways: using the method of *available transmission capacity* (ATC) or *flow based* (FB) method with utilization of common grid model. No common principles of determining transmission capacity have been implemented to date that would be applied in the same manner by all operators of the given regional market. Therefore, it is necessary that the calculation methods are promptly standardized.
- The manner of accounting for other elements such as demand price elasticity.

In our opinion, the applied assessment methods of generation adequacy should be standardized both at the level of individual systems and at regional level. Inter alia, regions were created to facilitate such standardization and enable faster markets integration.

The issue of standardized generation adequacy assessment should be regulated at the European level, with the exemptions, if any, allowed for peripheral or non-synchronized systems.

12. Do you consider that capacity mechanisms should be introduced only if and when steps to improve market functioning are clearly insufficient?

Having analyzed energy market situation in Poland and in other EU countries we believe that current energy market circumstances justify the decision to implement capacity mechanisms. We do not see any possibility for these circumstances to change quickly. At the beginning of this document we presented the arguments for capacity market implementation in Poland. These arguments stem from current market signals:

- low, wholesale prices of electricity – lack of signals for investments in new generation units,
- sustained increase of the share of RES with determined characteristics of electricity generation,
- increased number of decommissioned generation units,
- outlooks showing sustained demand for electricity.

This means that the prerequisite conditions for the implementation of capacity mechanisms have already materialized. Security of supply will be under threat in the next couple of years which force to take appropriate actions now. The threats referred to above relate in majority to quick development of subsidized RES, however, this issue cannot be solved quickly. Improvement in the energy market operations without solving RES issue will not guarantee security of supply. Capacity market as the element supplementing energy market may be implemented without material effect on the internal market development, and in current market conditions – may even have positive effects. We propose a 4-year advance capacity market, and with considerable supply, capacity payments will not be high. If, however, capacity shortage is recorded, additional funds will be available to balance the market. The above solution will allow quickly solve the issue of generation adequacy, even with high shares of RES in this market and high volumes of cross-border flows caused by unplanned production. We also draw attention to the fact that any non-balancing signals will be generated by the energy market with considerable delay, especially under current regulatory - market conditions.

13. Under what circumstances would you consider market functioning to be insufficient:
a. to ensure that new flexible resources are delivered?
b. to ensure sufficient capacity is available to meet demand on the system at times of highest system stress?

In current regulatory – market conditions, the energy only market does not generate sufficient signals to construct mid-merit and peak units, which would balance RES production. Moreover, signals are generated for earlier decommissioning of existing capacity, which for a long time could effectively serve as generation units. They could also cooperate with the RES and generate electricity when RES do not operate for weather related reasons.

Given the current prices of gas and liquid fuels in Poland, these sources are far cheaper than dedicated mid-merit and peak units. If proper financial conditions appear to maintain those sources, then the majority of expenditure, originally earmarked for conventional investments, could be redirected to RES development. In addition RES development will be to a less extend limited by the need to ensure security of supply.

The mid-merit and peak units operate for a relatively small number of hours during the year. To secure profitable revenues, these units should quote high prices for the energy sold. Unfortunately, current regulatory-market conditions do not support high energy prices even with insufficient system short-term operating power reserve. It is due to many factors with the most important being regulatory environment. In Poland, as in many EU countries, a number of limitations are applied that impact energy market prices. Most often these are limitations caused by doubts against using market mechanisms to create excessively high prices. Price fluctuations are considerably lower than the corresponding costs fluctuations. As a result, price gradients between peaks and valleys do not generate appropriate signals for the construction of mid-merit and peak units.

Currently, market prices are hardly able to justify construction of primary sources, planned for almost continuous operation during the year with very low variable costs. For entities operating for a very small number of hours, market revenues at this level and structure of prices often do not even cover operating expenses.

Rapidly growing RES production causes the decrease of generation (units capacity utilization factors), in extreme cases - even to zero. In such conditions, activities are taken aimed to decommissioning of such units. Dates of the decommissioning of ca. 7,000 MW of installed capacity originally planned till 2020 are hasten. Moreover, decommissioning of additional 1,000 MW is being considered and if market conditions are not change it will cause liquidation of additional 1,000 MW. With the lack of perspectives for the change in the current situation on the price market, new generation units are not created. As a result, the threat of the lack of continuity of supply grows at a fast pace. Therefore, in many countries, capacity mechanisms have been implemented.

In Poland, problems with balancing generation adequacy are additionally increased by the necessity of decommissioning of many generation units which adjusting to the requirements of the Directive on industrial emissions would be too capital intensive. Hence the works related to implementation of capacity mechanisms in Poland have been conducted for a number of years.

14. In relation to strategic reserves:
a. Do you consider that the introduction of a strategic reserve can support the transition from a fossil fuel based electricity system or during a nuclear phase out?
b. What risks, if any, to effective competition and the functioning of the internal market do you consider being associated with the introduction of strategic reserves?

The strategic reserve is to ensure energy supply in irregular conditions, basically in extreme weather conditions or during considerable system disruptions. Implementation of a strategic reserve should reduce the number of generation units maintained in regular system operation, mainly coal-fired. We assume that construction of units dedicated to the strategic reserve would not be feasible. One should consider replacement of part of generation adequacy maintained in the strategic reserve with DSR units, which could be disconnected at set weather conditions.

We propose that the strategic reserve is one of the first capacity mechanisms to be implemented with coordination at the EU level. The required level of the strategic reserve should account for weather conditions. In order to determine the generation adequacy level maintained in the strategic reserve, variances occurring once in 40-50 years should be taken into account. Mid-term plans should be developed for regular conditions i.e. should account for weather variances occurring in the periods of 7-10 years.

In Poland, such reserve would be created for many years by coal-fired units, already used up or earmarked for decommissioning. Implementation of strategic reserve would therefore reduce the number of coal-fired units maintained at regular exploitation. The mechanism of strategic reserve has already been used in Poland for a couple of years and no negative effect on energy market was observed. Compared to the experience in other countries, one may state that it is the mechanism which may directly support proper operations of the energy market. The necessary condition is that the capacity locked in the strategic reserve is used for electricity production only in extreme weather conditions or during catastrophic power system interruption. The time of the use of strategic reserve should be the shortest possible and should be based on standard criteria. Reduction in energy prices in extreme weather conditions or at system disruptions should be the side effect, with the security of supply as a main objective. If the strategic reserve is to be used to reduce energy prices at the market in regular conditions, then it would be another disrupting factor, and such situation should not take place.

15. In relation to capacity markets and/or payments:
a. Which models of capacity market and /or payments do you consider to be most and least distortionary and most compatible with the effective competition and the functioning of the internal market, and why?
b. Which models of capacity market and /or payments do you consider to be most compatible with ensuring flexibility in a low carbon electricity system?
c. Are there any models of capacity mechanism the introduction of which would be irreversible, or reversible only with great difficulty?

There are various forms of capacity mechanisms. Presented below are the most popular of them, grouped into partial or full capacity mechanisms. The target solutions to be implemented may include elements of various capacity mechanisms.

Partial capacity mechanisms are addressed to selected generation units.

In general, they secure short-term operating power reserves and are steered partially automatically. The main objective of these reserves is real time balancing of system generation and demand. Short-term operating power reserves are most often determined as 7-15% of the current production output. The special type of these reserves is the strategic reserve which has been described in more detail in the answer to the preceding question. The short-term operating power reserves, although an indispensable element of the energy market, have rather limited impact on the maintenance of flexible generation adequacy in the system. The strategic reserve may be a valuable supplement which will allow maintenance – at low cost – of the capacity used only in exceptional situations.

The short-term operating power reserve in the system may be increased by the volume required at times where no electricity is produced at wind farms or at photovoltaic generation units. In this way, supplementary revenues may be secured for generation units losing the possibility to generate electricity to RES. This solution does not interfere greatly with the energy market. However, the main drawback of said units is that they generate signals stimulating construction of new generation units at the same time the energy market does, and without appropriate advance period facilitating execution of new investments. These signals are, as a rule, smaller and may turn out to be too small to effect any strategic investment decisions. In Poland, similar solutions were used for almost 10 years, starting from the year 1999.

Full capacity mechanisms are addressed to all generation units fulfilling the determined criteria. They may be implemented as the capacity market operating as supplementary to open energy market or as element of organized markets in the form of pool. The pool-related capacity market would require re-construction of the European energy market. It may be analysed as solution implemented in a longer perspective. If appropriately designed, it may ensure effective investment signals and maintenance of generation adequacy and of appropriate capacity mix (e.g. PJM).

In Polish and European conditions, implementation of capacity market is preferred as supplementation of the energy market and the market of short-term operating power reserves. The capacity market operates with an advance period of several years, which guarantees appropriate strong investment signals. This market may be introduced in individual Member States and, in the coordinated manner, in the whole EU. Some Member States have been introducing similar mechanisms thus next step should be the EU level coordination of such implementation.

The capacity market of this type is addressed to all entities fulfilling certain determined criteria, and operated according to consistent policies. Advance (we propose a 4-year advance period) purchases of planned capacity volumes allow of generation of advance investment signals. The more detailed description of this model, extended to include the strategic reserve, was presented in part I – General comments.

The mechanism of the extended short-term operating power reserves market, together with the strategic reserves, allows of maintenance of appropriate generation adequacy in the system, but does not create advance investment signals. In this model, it is difficult to stimulate investments in low-emission generation units, but stable generation adequacy permits high share of the RES. Interference in the energy market is slight; in addition these are reversible mechanisms.

The mechanism of the capacity market described in Part I of this document generates strong, advance investment signals. These may be directed to low-emission sources, and this hasten construction of flexible, low-emission electricity systems. With appropriate design and implementation, it does not clash with the construction of internal energy market, even if it is implemented in individual Member States separately. We do not see any major problems with irreversibility of these mechanisms. The capacity market is the most effective mechanism and, in our opinion, it should be implemented on an EU-wide basis, and most certainly in Poland.

16. Which models of capacity mechanisms do you consider to have the have the least impact on costs for final consumers?

The model of the capacity market with advance investment signals ensures the most stable development of a generation sector. It facilitates maintenance of the optimal level of adequacy as well as structure generation structure in the system. In the long-term perspective, it is the most financially effective solution i.e. the solution ensuring the lowest impact on electricity prices. It results from the fact that only this solution allows of recognition, in the complete and coordinated manner, of all aspects of economically feasible energy supply, inclusive of optimization of generation unit development, together with grid development. The key issue is the possibility to conduct economic analyses at the stage of planning capacity demand in a couple of years, and then conducting capacity purchases on a competitive market. In the short-term, other solutions may be cheaper than the capacity market, however, the lack of analytical-market-type optimization in the mid-term will result in higher inefficiency margin.

Solutions with capacity reserve market do not amplify investment signals in comparison to energy market. There are no strong enough investment signals when high discrepancies of the energy market connected with variable generation from wind and photovoltaic units occur. Capacity reserve market does not solve the problem of wind and photovoltaic sources, RES can only allow

for maintenance of existing capacities. Introduction of climate policy will require constant increase of RES energy share hence these problems will occur for a long period of time. Unless appropriate market segments, which create effective investment signals, are introduced threat for security of supply will be increasing. In extreme situations, power outages or direct government intervention (in form of construction of new capacities or state aid for investors) will appear. In principle these solutions are more expensive and less efficient than construction of new units by energy sector companies based on competitive market investment signals.

Competitive capacity market, operating with several years advance period, creates strong enough investment signals enabling constant adjustments of capacity level and structure in each system to extent of RES development, energy efficiency improvements and increase of demand elasticity. In the long term, energy prices set in these conditions are optimal for end-users.

17. To what extent do you consider capacity mechanisms could build on balancing market regimes to encourage flexibility in all its forms?

Our proposed capacity market offers simple solutions and will be functioning as an element supplementing the markets of energy and short-term operating power reserves. It does not interfere with the functioning of balancing markets/mechanisms.

Unification of balancing markets/mechanisms and capacity markets should occur as part of creation of internal energy market in future.

We draw attention to the fact that the proposed model of the capacity market has its own balancing mechanism in the form of obligatory purchase of missing available generation capacity on the central market. Generation adequacy balance is prepared 4 years in advance of the year of electricity supply. Purchases are made by existing consumers or their suppliers (system operators as capacity purchasers may be considered). The capacity required by new consumers is purchased by the TSO who then resell it. This way the original capacity market is closed for the period of 4 years prior to the year of electricity supply. The required capacity is secured well in advance and therefore is does not have any effect on the energy market operations, including balancing market. In our opinion, the energy market, the short-term operating power reserves market, the strategy reserve market and balancing market may operate simultaneously with capacity market.

Based on Polish experience with capacity mechanisms, we do not see any threats to the proper functioning of balancing markets.

18. Should the Commission set out to provide the blueprint for an EU-wide capacity mechanism?

We propose that the activities of the European Commission are executed in phases, since introduction of capacity mechanisms have already been in progress in some Member States. Due to this, the non-obligatory guidelines with basic principles and criteria should be implemented without unnecessary delay. This will allow to begin process of standardisation and to avoid any major clash of the implemented capacity mechanisms with the developed internal energy market.

Next step may be the replacement of the Directive 2005/89/EC on security of energy supply with appropriate Regulation, as in the case of gas market. This Regulation should include elements of standard energy market, including the capacity market.

To develop target solutions, initiatives should be taken concerning comprehensive standard energy market model. Experiences of Member States, which implemented capacity mechanisms, should be taken into consideration. Various capacity mechanisms should be analysed, including well developed capacity mechanisms as the US-based mechanism which operates on several markets (e.g. PJM).

19. Do you consider that the European Commission should develop detailed criteria to assess the compatibility of capacity mechanisms with the internal energy market?

In some countries capacity mechanisms are in operation and few next are in advanced stage of development. Problems arising from capacity imbalance will probably accumulate and then capacity mechanisms will have to be implemented as emergency measures. Better option would be to avoid such scenario.

In these situation, the European Commission in the first phase should introduce basic standardisation of existing solutions. We propose that in this phase non-obligatory standardisation criteria will be introduced which should not be too detailed. This construction will allow Member States for search for the best solution. The implemented capacity mechanisms in individual Member States should serve to practically review various solutions. Detailed criteria, without implementation and analysis of pilot solutions may prevent from achieving the expected effects. It would be far better if a such scenario could be avoided.

We propose that the European Commission work in phases and in the second phase the European Commission should develop energy market standards of operation which also includes capacity market.

20. Do you consider the detailed criteria set out above to be appropriate?
a. Should any criteria be added to this list?
b. Which, if any, criteria should be given most weight?

At the current level of capacity mechanism implementation, too detailed criteria should not be set out. Criteria included in the Consultation Paper are already too detailed.

The potential capacity imbalance may arise in some Member States, including Poland, and thus do not allow for postponing implementation of capacity mechanisms. We propose that the European Commission should provide guidelines with framework operating policies of capacity mechanism and criteria of compatibility with common energy market. Certain criteria included in the Consultation Paper can be used as basis for these guidelines.

We propose to develop concept of the EU energy market model with capacity market as significant element. This model will enable stable growth and structural changes of generation capacities with high growth rate of share of non-dispatchable RES units. We suggest to analyze capacity mechanism model described in Part I of this document. In our opinion, the capacity mechanism will solve problems with balancing generation adequacy and it does not clash with the construction of internal energy market. We are prepared to cooperate and support capacity markets development in the EU.

We would like to present our comments to presented criteria with respect to capacity market solutions proposed in this document.

(1) The necessity for a capacity mechanisms should be clearly established in the context of:

a. The potential of the identified needs being met in the normal operation of the internal energy market, in particular:
- increased interconnection and in particular the completion of identified projects of Common interest.
- steps to encourage effective competition by addressing the position of dominant undertakings.
b. Alternative, less distortionary measures which could be taken, for example steps to improve energy efficiency or reduce electricity demand.
c. Removing barriers to the effective participation of demand in the electricity market.

The abovementioned criteria were provided to assess if current situation require capacity mechanism introduction. This sort of criteria are difficult to define and their interpretation may vary. Currently, many Member States introduced capacity mechanism, hence adaptation of this criteria would be difficult. Nevertheless, we believe that this criteria are fulfilled in Poland, consequently capacity market should be introduced.

Part I of this document includes the reasons for capacity mechanisms implementation on the Polish energy market. It emphasizes that the necessity for capacity mechanism is already established due to current market conditions. The increase of interconnection capacity needs long term investments. Currently only single project – LitPol link is being developed and it will not significantly increase the generation adequacy level. Further projects are in their preliminary development phases and will be commissioned in approx. 10 years. In our point of view current generation adequacy problems require more immediate actions.

The increase of competition level will be possible in case of new interconnection capacity development. No cases of market power abuse have been yet reported at the Polish market.

We observe significant energy efficiency increase in Poland during the last few years. We would like to emphasize that Polish electricity consumption rate per capita is slightly more than a half of EU average. We cannot expect the decrease in power demand due to energy efficiency activities. Available forecasts assume that Poland will have one of the highest demand growth rates within the EU. We consider DSR units as the capacity market participants however taking into account our previous experiences we do not expect significant and prompt results.

End users responsible for 2/3 of domestic electricity consumption are active market participants since many years. The market full liberalization plans assuming the removal of current tariffs for households are being implemented. It will allow to activate the last group of users, however, even today households are changing the suppliers rejecting tariff regime.

(2) The effectiveness of the capacity mechanism addressing the identified market failure should be demonstrated and that it is additional to what would have occurred under normal market rules.

In our opinion, adaptation of this criterion would be challenging. Increasing production volumes of electricity in RES generation units forced by climate policy implementation cause many problems. This situation will not change in the following years, hence, in our opinion, it will be better to adjust model to this conditions.

The currently used market model was developed with imperative of public administration diminishing impact on energy sector. At present, due to expansion of the regulatory environment and administrative decisions impact regarding climate policy, additional compensation mechanisms should be implemented. Instead of state aid we propose market mechanisms. The model of capacity market described in this document is a pure market mechanism.

The situation in Poland confirms some problems with current model functioning. The numbers of discontinued investments have increased, as well as decisions with respect to earlier and additional generation units decommissioning. As a result, Poland may suffer generation inadequacy in 2016 already. If adequate prevention measures, e.g. implementation of described solutions, will be undertaken, the security of supply will be maintained. Moreover, providing framework that stimulate investments in new generation units and enhance maintaining flexible units will enable rapid non-dispatchable RES development.

(3) The duration of the application of the capacity mechanism should be clearly limited and clearly specified,

a. the impact on the market of the introduction of capacity mechanisms should not make it difficult to reverse that decision in the future.
b. the necessity of retaining reinstating a capacity mechanism should be subject to review.

Determining capacity mechanism planned duration is difficult in the current regulatory conditions. The EU Energy Road Map 2050 which in practice includes energy sector decarbonisation. This goal requires significant RES generation units and new zero-carbon technologies development. Without support mechanisms, it will be necessary to introduce more market segments which operate due to subsidies. In our opinion, model of support which do not disrupt energy market as much as current RES support scheme should be developed.

We propose capacity market model which ought to support RES generation units and zero-carbon technologies development. Potential future decision regarding withdrawal from the introduced capacity mechanisms would be taken when energy market will not be disrupted by subsidized segments or excessive regulatory environment. With an assumption that withdrawal from capacity market period is equal to the capacity contracts period (approx. 4 years), we do not consider significant difficulties with capacity market liquidation.

(4) Any capacity mechanism should be open to electricity undertakings operating in other Member States, to the extent they are able to make the electricity available in markets to which the capacity mechanism is established.

In our opinion, this criterion has a material impact for common EU energy market development process.

The proposed model indicates the capacity market as the mechanism that works before energy only market processes. We assume that generation unitsoperating in other power systems will be allowed to participate in particular capacity market when overcapacity in the parent system is recorded. Moreover they should be qualified as capacity market participants so they are limited by the interconnectors capacity. Energy-only market will remain its current structure as well as international trading rules.

(5) Any capacity mechanism should not act as a barrier to cross border trade or competition in the internal market by

a. artificially altering trade flows or the location of production, in particular by:
- restricting the ability of electricity undertakings in the Member State to sell their electricity to customers elsewhere in the internal market, (i.e. capacity physically located in a Member State should not be reserved for that Member State).
- distorting the commercial behaviour of generators in the day ahead and intraday markets.
- distorting investment signals in the internal market leading to inefficient locational choices.
- distorting investment signals in the internal market leading to the displacement of new investment from one Member State to another.

b. distorting dynamic incentives/crowding out;
- The incentive on consumers or generators to respond to high prices at periods of scarce capacity should not be diminished.
- The mechanism should not undermine incentives on the electricity market to deploy new techniques for demand reduction or electricity storage and generation.

c. Creating market power or exclusionary practices;
- The mechanism should not strengthen or maintain the market power of incumbent firms.
- The mechanism should not act to maintain inefficient market structures or undertakings, acting to deter new entry.

The abovementioned criteria are genuinely detailed and some of them duplicate general competition rules. We propose not to introduce too detailed criteria or adjust them to current situation. Due to the fact that regulatory intervention to energy market is not acceptable and may diminish market signals for market participants, capacity mechanisms are implemented. It is crucial that implemented mechanisms will not further reduce this signals.

The proposed capacity market model meets these criteria, thus issues with abiding them during detailed design and implementation stage will not appear. Nevertheless, in our opinion, establishing detailed criteria is not necessary.

(6) To be non-discriminatory a capacity mechanisms should

a. be allocated after an open competitive bidding process.
b. allow demand response and energy efficiency solutions to bid into capacity markets on an equal basis to generation.

In our opinion, first of the abovementioned criteria is adequate and should be used. The implementation of the second one will be difficult, as energy efficiency which result in lower energy consumption do not have a direct impact on capacity demand. Notwithstanding, if energy user plans energy efficiency activities which reduce capacity demand, change in the connection agreement (with TSO or DSO) should be made. This would decrease the capacity purchase cost.

The proposed model introduces competitive capacity market. We consider dispatchable DSR units in the described model. Energy efficiency activities will be taken into account at the stage of preparing energy demand forecasts and determining capacity obligation of each consumer.

(7) Not be confined to any particular generation technology, i.e. being tech. neutral (insofar as the mechanism is directed towards security of supply concerns – this may not apply if other objectives are also being pursued).

Capacity mechanisms are introduced inter alia to balance RES generation units which are non-dispatchable. Therefore non-dispatchable RES generation units would not participate in the capacity market. Apart from these units, we do not see any other limitations. Depending on the individual condition of each Member State, the qualification criteria for participating in capacity market will be established. The most important reliability criterion is independence of weather conditions.

In our opinion, proposed model provides security of supply and is neutral to any particular generation technology.

(8) Capacity mechanism should be at least cost:

a. The direct costs imposed on suppliers or others electricity undertakings must be kept to the minimum necessary.
b. Persons providing capacity under the obligation must not be overcompensated.
c. Any selection process in the mechanism should be conducted in a transparent, open and non-discriminatory way which is market based.
d. The duration of any compensation to generators under the mechanism should be clearly justified

These criteria are addressed to capacity mechanisms which are introduced due to administration decisions and may contain state aid elements. We propose a model without such arrangements.

The proposed capacity mechanism introduces the competitive and transparent capacity market that works before energy-only market processes. We assume competitive participation of DSR and interconnected generators which will effectively optimize the market. We do not plan any extra compensations for generators.

(9) Costs associated with capacity mechanisms should be allocated to the beneficiaries of secure energy supply with different classes of consumers being treated in a non-discriminatory way.

Similar to previous, this criteria are addressed to capacity mechanisms which are introduced due to administration decisions and may contain state aid elements. Administration segments, where costs and revenues allocation algorithm is required, are not proposed in our capacity mechanism model.

We assume that cost of capacity will be allocated to end-users according to their peak demand. We assume voluntarily primary capacity market and obligatory auctions. It will ensure impartial cost distribution. The end-users will be mostly represented by the suppliers. The suppliers revenue will be a result of fulfilled contracts.

Appendix

We propose RES and low-carbon technology support schemes standardization. In our opinion, the best possible solution are contracts for difference (CfD) with feed-in tariffs (FiT). In this model, the operator may receive higher revenues if actively participates in the energy market and at least partially adjust to flexible demand. It will ensure development of technologies which do not disrupt energy market as various support mechanism currently used. Basically, energy produced by RES generation units should, apart from micro-sources, be introduced to market on general rules. This is the case of Poland with respect to CHP units with constrained output levels. Despite approx. 20% share in electricity production, the production output of such units do not have a material impact on market signals for consumers, generation unit operators and investors.