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## **Capacity market – ‘demand for coopetition’?**

### **Abstract**

The overriding purpose of implementing market mechanisms is to ensure sustainable development of competitiveness while ensuring secure operation of the power system. The fall in electricity prices in the wholesale market lowers the cost-effectiveness of investment, thus causing a lack of capacity reserves in the system. This implies taking steps to create investment incentives, both in the area of supply and demand for electricity. Drawing on the experience of the UK energy market, the paper presents a model of capacity market which already functions in the United Kingdom, highlighting those of its components which can be implemented in Poland. Additionally, the authors point out that such components could be implemented using a strategy of coopetition. Bearing in mind the long-standing experience of the energy market in Poland, with its current structure worked out on the basis of these strategies, the authors believe that transposing best practices onto the capacity market will provide tangible effects.

**Keywords:** coopetition, capacity market, strategies, management, DSM, DSR

### **Introduction**

The electricity market is determined by its specific mode of operation which in turn depends on the laws of physics, technical aspects, the principles of economics and legal regulations. In addition, the market with its sensitive segments is an ideal area for exploration given the way it evolves in the changing legislative and regulatory environment. What also makes the sector interesting is that it has gone through great changes while being adapted to the guidelines laid down by the European Union.

As they implement recommendations stemming from existing legislation, market players often need to act locally to achieve their objectives. Such actions may be carried out

by both regional players and international companies. Whether or not they bring positive results often depends on changes made to the existing model of mutual trade and investment policies. By observing the behaviour of companies which have previously been engaged in fierce competition, it was possible to identify a new strategy called *coopetition*<sup>1</sup>. The key changes taking place in the market illustrate the benefits of *coopetition* for its players on individual and mutual levels [Czakon, Mucha-Kuś, Sołtysik, 2015; Sołtysik, Mucha-Kuś, 2014].

The electricity market is shaped by a number of legal acts, decrees and regulations adapting the power sector to the requirements of EU policies while preserving the balance between the efforts to, on the one hand, support competition and liberalization, and on the other hand, take care of national energy security in the sectors of production, transmission and distribution of electricity. In this context, the key piece of legislation containing detailed provisions regulating the Polish power sector is the Energy Law Act of 1997 whose Article 1 sets out priorities and overriding objectives for the sector such as ensuring national energy security and developing competition.

Energy security is to be understood in its broad sense as a product of many factors related to ensuring adequate production capacity of the system, reliability and continuity of supplies as well as a transparent and competitive wholesale market. The on-going drive to harmonise market mechanisms in order to create a single community market is often fraught with the risk of implementing EU guidelines in separation from or contrary to the local market (meaning the national market). If promoted uncritically, the policies of energy efficiency and low- or no-emission solutions, especially as it concerns renewable energy sources, disrupt the previously stable structure of wholesale energy prices slowing down the already running investment processes aimed at building and rebuilding production capacity and putting on hold those which are in the pipeline.

The situation may be improved by putting in place investment stimulating solutions commonly known under the umbrella term of “capacity market”. The solutions include activities to boost supply besides those which support demand management. Active management of customer behaviour is a tool whereby the profile of electricity uptake and peak capacity demand in the system may be changed either temporarily or, if applied for a longer period, permanently. As such, the approach is desirable as a way to bridge the gaps in the capacity profile both during specific seasons and over shorter periods.

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<sup>1</sup> The term *coopetition* is a neologism coined from the words *cooperation* and *competition* and describes a situation where both these strategies come into play.

The paper discusses observable and measurable results of applying the principle of coopetition based on selected examples of behaviours displayed by market players. It also contains recommendations on how to implement the demand-side management and demand-side response solutions taking account of the experiences with implementing the mechanisms in the UK market.

### **What is coopetition?**

In some sectors of the economy, the structure of the market is determined by inter-organisational cooperation, its lines of demarcation running between groups of cooperating actors rather than individual companies. The electricity market is a good example in case as its players operate in a macroeconomic environment interweaving factors of political, legal, economic, demographic, social, environmental and technological nature. Coopetition takes place when market competitors enter into cooperation. It is an innovative strategy that may bring not only individual, but most of all mutual benefits which it would not be possible to achieve alone. However, studies into the problem have so far focused only on a one-sided dimension of the impact such actions have on the achievement of objectives while disregarding their broader context. The notion of coopetition was popularized by the American scholars A. Brandenburger and B. Nalebuff who used it in their book “Coopetition” published in 1996 and explained it on the basis of the game theory [Brandenburger, Nalebuff, 1996].

Coopetition is a strategy of cooperation among competitors in response to the market dynamics reflecting the actual behaviour of its players. In the management literature, it is presented from different angles depending on the adopted research approach. Nonetheless, all researchers in the field agree on its two characteristic features: (i) the coincidence of competition and cooperation and (ii) generating mutual benefits. Thus, in coopetition, competition and cooperation take place at the same time as a strategy designed and implemented to achieve better results over a long period thanks to collaboration with a competitor [Czakon, 2010, pp. 8-12]. It seems to be a promising way to ensure efficiency, its philosophy being that it is possible to have a situation where neither of the cooperating parties will lose out (a win-win strategy). Creating value is a quintessentially cooperative activity involving competitors, customers, suppliers and complementors at different stages of the value chain. Cooperation consists in pooling resources to generate more added value than it would have been possible if they had not been put together. In this way, the cooperating companies obtain benefits both individually and jointly as all the involved partners.

In classical economics, cooperation among competitors was perceived as a negative influence on the market or even as something destructive for competition [Vonortas, 2000, pp. 234-271]. Hence, we can find publications pointing out the anti-competition threat inherent in the fact of competitors cooperating. Judging from the opinions expressed by their authors [Vonortas, 2000], for them, this kind of cooperation is a form of undesirable collusion. The American Sherman Antitrust Act <sup>2</sup>clearly declared the act of monopolizing economic activity to be illegal. It was considered unlawful to enter into any arrangements or collusions which thwarted economic activity as well as any contract, trust, associations set up under a different form or a secret deal made in order to curb production or trade between individual states or other countries [Durrance, 2008]. To transpose that onto strategic management, cooperation with competitors may be directed against customers or suppliers to increase the bargaining power of the cooperating companies and so improve their competitive edge [Porter, 1980]. In other words, it is justified for competitors to cooperate in order to obtain larger economies of scale and extra market power compared to other operators. Competition among rivals also makes for stronger barriers to entry and may slow down the pace of innovation. However, this view is based on a zero-sum game and only focuses on the process of appropriating value whilst disregarding the entire process of value creation. Some of the cases of value appropriation are considered illegal or even banned. While it may be beneficial for some, cooperation among competitors is perceived as an activity which weakens competition and reduces market efficiency.

Coopetition undermines the established anti-trust view showing that, according to the game theory, companies may benefit both from competition and cooperation to the satisfaction of the customers. From this point of view, coopetition is different from collusion in that it also focuses on generating added value instead of just looking for the biggest piece of the pie. Previous studies into coopetition stopped at the level of individual companies showing how the practice can bring about individual benefits and have a positive impact on: corporate results [Morris, Koçak, Özer, 2007], financial performance of professional French football clubs [Robert, Marques, Le Roy, 2009], using resources in Italian operas [Mariani, 2007], increased share of LCD television sets in the market [Gnyawali, Park, 2009], growth in the banking sector [Czakoń, 2009] and innovation and efficiency of the Finnish wood processing market [Ritala, 2011]. Scholars demonstrate such results based on case studies as well as statistical analyses supporting the idea whereby it is beneficial to cooperate with a

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<sup>2</sup> The American act of 1890 was passed following a series of mergers of big American corporations.

competitor. It was also shown how companies in the wine industry can cooperate in the area of marketing to promote a new standard of closing wine bottles with caps [Choi, Garcia, Friedrich, 2010]. Still, the observations on cooperation do not focus on mutual benefits achieved by companies. The case study of the German car industry, on the other hand, looks at the activities in the area of supplies suggesting that network cooperation helps explore the influence of the supplier – supplier relation [Wilhelm, 2011]. In this context, it is worthwhile to focus on the actions undertaken to create value in order to investigate the impact they have on generating mutual benefits.

Given the limited empirical findings<sup>3</sup> of the studies carried out so far, the identified research gaps and the implications of cooperation suggested in the literature [Czakon, Mucha-Kuś, Rogalski, 2014], it seems particularly timely and justified to research the problem. By following the strategy and drawing on the experiences of its practical application so far, we can obtain tangible and measurable results for newly created concepts of capacity market solutions, as broadly understood.

### **Cooperation in the energy market**

Cooperation-based relations have been widely pursued in the energy market starting from the stage of energy generation [Sołtysik, Mucha-Kuś, 2012] through drawing up detailed regulations on the principles of balancing to setting up balancing groups [Mucha-Kuś, Zamasz, Sołtysik, 2014], or cross-border exchanges [Mucha-Kuś, Sołtysik, 2011]. The energy market together with its sensitive segments, including in particular the balancing market, is an interesting field of study due to its evolving nature. The experiences of the practical implementation of cooperation in the balancing mechanism market are especially valuable today when the capacity market model is being developed.

Looking at the key changes which have taken place in the balancing mechanism market over a dozen or so years of its history as a result of competitors interacting to develop its operating principles, we may identify the benefits of pursuing cooperation at the individual and collective levels [Mucha-Kuś, Zamasz, Sołtysik, 2014] which have influenced market efficiency. The idea of market efficiency covers the aspects of optimizing the costs of

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<sup>3</sup>The hitherto research findings and papers regarding cooperation were gathered, followed by a thorough review of the literature. The first step in the analysis process was to develop a literature database, then frequency-of-occurrence analysis, citation analysis and content analysis were carried out, conclusions were drawn and recommendations regarding further studies were formulated. The literature database was created using, among others, the following international electronic databases: ISI Web of Knowledge, Ebsco, Elsevier/Springer, Emerald and Proquest. Potentially significant research papers (subjected to further selection), were identified according to the predefined criteria. Consequently, the first selection resulted in 523 articles, however only 96 articles were qualified for a detailed analysis.

participation as well compliance with the security standards related to the functioning of the power system. The analyses carried out demonstrate that what was especially important for the achievement of efficiency objectives was the change of the settlement model which introduced the option of group settlement of balancing costs. The solution yielded tangible results for the entire market reducing balancing costs by almost 80% [Czakon, Mucha-Kuś, Sołtysik, 2012]. Improved efficiency has also contributed to the reduction of the so-called “quality premium” which is a charge reflecting the cost of maintaining systemic standards of quality and reliability of current electricity supplies vis-à-vis the volume planned to be consumed by end users.

The fact that competitors cooperated to develop the balancing mechanisms also brought results at the individual level. Among other factors, this was possible thanks to establishing conditions for the setting up of the so-called balancing groups in 2007. These are groups of customers aggregated to pool and optimize their forecasted demand for energy as well as jointly settle the costs of deviations between the actual and planned energy consumption. Any fluctuations understood as differences between the forecasted and actual electricity consumption generate balancing costs related to such aspects as restricting production or ad hoc activation of production capacity allocated in centrally managed units. If they want to achieve individual benefits, market players are thus compelled to optimize the forecasting and settlement processes. One of the methods to do it was to create a group structure or enter an existing one. Within the group, the managing entity (trading company or an active consumer) provided services of aggregation and optimization of partial demand forecasts and was a party in the process of notifying schedules and settlements to the Transmission Grid Operator (TSO) in the name and on behalf of the associated entities. By cooperating to minimize participation costs in the balancing market, competitors achieved tangible, expected and statistically non-random results [Czakon, Mucha-Kuś, Sołtysik, 2012].

Given the positive experiences of pursuing cooperation, it is worthwhile to ask whether the practice can be transposed onto other areas of market players’ activity, including in particular the emerging capacity market.

### **Capacity market - the concept**

Capacity markets are commonly associated only with the need to create mechanisms stimulating investments into rebuilding and building new production capacity. However, the origin of the term suggests that its definition must be extended to include the setting up of mechanisms designed to motivate electricity consumers to actively participate in the energy

market, especially when it comes to providing the service of demand-side response. Hence, in their essence, capacity markets are about creating a range of incentives to support and promote production units as well as actively manage demand. The overview of the age and technical condition of the facilities in Polish production sector as well as the existing “energy mix” shows that the segment is particularly endangered and requires that intervention and aid mechanisms be created. Considering the problem from the perspective of ensuring energy security which is identified in the existing legislation as an overriding and priority objective, it is necessary to, first, undertake and intensify actions to support production facilities with high unit costs of production whose presence and operation in the system is of key importance for its security, and second, to build new capacity using technologies ensuring long-term prospect of operation. Although such actions stimulate and optimise the structure and supply of electricity, they do not contribute to rationalizing the level of energy consumption and optimising its profile. The lack of relevant regulations and incentives on the side of demand creates serious discrepancies in the capacity profile which increases deficiency of peak and sub-peak capacity in the system. The situation could be remedied by a wide-scale deployment of services of demand-side management (DSM) and demand-side response (DSR).

Using as analogy the American market and the model adopted in the PJM area, we may conclude that, using a mechanism with correct parameters, it is possible to guarantee that the capacity profile can be regulated at the level of 10% of peak demand translating into about 2500 MW [Baker, Bayer, Rączka, 2015]. The introduction of mechanisms stimulating energy supply in the capacity market is inseparably linked with the supply of capital to the production sector, the costs of which will be covered each time by the end user to improve security and stability of energy supply. To minimize the costs, it would be therefore useful to implement mechanisms which guarantee similar results, but put the customer in a position of a beneficiary rather than a sponsor. As the process is very complex and long, before such mechanisms can be implemented it is first necessary to (i) draft legal and regulatory provisions covering such areas as the structure of dynamic tariffs, (ii) adapt metering/ billing infrastructure (smart meters), (iii) improve the quality of grid infrastructure, reliability indicators and the quality of energy supply, (iv) introduce a system of stimuli and incentives for customers, (v) set up a system of monitoring and control over the provision of DSR services and (vi) develop tools to aggregate small customers.

So what can cooptation be used for? What are the things competitors can develop together which can then become added value and be used as objects in a competitive game? What are the sources of best practices and experiences? How and where to begin the process

of implementing the capacity market? These are just some of the questions about the problem which it is worthwhile to answer.

The problems of demand-side management and ad hoc demand-side response are studied by the research community and the industry itself. As an example, we could mention the initiative to carry out the studies as part of the Energy Market Workshop held under the auspices of the URE (Energy Regulatory Office) and PSE (Polish Power System) in 2012 [Sołtysik, Mucha-Kuś, 2013]. The main objective of the exercise was to provide methods to implement technological, organisational, sales and marketing solutions ensuring energy supplies which are economical and secure for customers. The work was carried out by several task forces which focused on (i) the general concept of exchanging metering data and settlements prepared on the basis of the data, (ii) information security, (iii) mechanisms supporting investment into smart grids, (iv) actions supporting the development of “smart” solutions and (v) implementing pilot projects of demand management. The work was based on cooperation relations on many levels, the most important of which were the following: (i) developing joint positions both at the level of individual workshop participants (which were mainly industry associations) as well as task forces, (ii) developing common standards for data, knowledge, experience and information exchange, (iii) competitors approaching institutions financing “smart” projects and solutions as joint applicants. The developed concepts found their practical application in pilot projects which were a kind of a training ground to gain new experiences and a fountain of practical knowledge.

The main focus of the workshop, i.e. “smart” solutions, was explored first by concept development and then by pilot studies. The results may contribute to the discussion of the desired shape of the capacity market seen from the perspective of demand optimisation. The experiences gained during the project could be reinforced by the solutions introduced in the United Kingdom. The mechanism which functions there is based on the system of four-year and one-year ahead auctions. Four-year ahead auctions offer the following contracts: (i) one-year long for existing capacity which does not need to be modernised and for demand-side resources, (ii) three-year long for existing capacity which requires modernisation and (iii) fifteen-year long for the purpose of building new capacity. The other group of contracts offered under one-year ahead auctions is related to capacities which do not require modernisation as well as demand-side resources [Baker, Bayer, Rączka, 2015]. Structured like that, the mechanism of promoting demand-side management and response, if correctly parameterized, may send a clear signal to the customer that it is justified to try and develop a detailed concept of providing a regulatory DSR service both in a long-term perspective and



also on an ad hoc, short-term basis, a strategy which would make for an optimal scenario from the perspective of the TSO. We must be careful, however, because if auction parameters are set incorrectly, especially as it concerns volume restrictions as well as under- or overestimating the allowable levels of border prices, there can be disproportions, limitations or, in extreme cases, a lack of interest among customers to provide DSR services. In the context of following best practices and gaining experience, it is worthwhile mentioning the details of the first auction held in December 2014 in the UK market. The auction attracted 15 customers/aggregators who only offered 0.2 GW as guaranteed capacity for a four-year period which amounted to the mere 0.3% of the total pool of offered capacity. Due to the fact that the prices offered were high and there was no possibility for beneficiaries of another system supporting DSR in the UK to join the auction, the demand-side resources finally obtained 13 contracts whose total capacity amounted only to 174 MW which means that the resources would not be fully used.

The experiences from the British market are very valuable also from the perspective of compliance between the implemented solutions and community legislation and guidelines. The market model of this structure was approved by a decision issued by the European Commission. At the same time, the Commission identified minor irregularities related to the conservative assumptions of the share of cross-border interconnections in capacity, low indicators of carbon and gas sources availability and, most importantly for the topic discussed, conservative assumptions of demand-side share in providing peak capacity. Thus, the Commission put emphasis on the important role played by electricity consumers in optimising capacity demand.

## **Summary**

The energy market in Poland is developed, liberalized and focused on the sustainable promotion of competition while taking care of the secure operation of the power system. During the dozen or so years of developing market, legal, regulatory and organisational mechanisms, it was possible to work out some tried and tested best practices which should be used as a foundation for the introduction of further mechanisms, including the capacity market. This could be modelled on the principles of cooperation in which market competitors jointly develop detailed rules governing the functioning of the market. Given the need to maintain transparency and optimise the objective function, it is vitally important to involve representatives of all sector institutions and opinion leaders in the process of concept

development in order to have a full panorama of perspectives and conclusions related to the topics discussed.

It is worth pointing out that co-opetition was widely used in the process of setting up the energy market including its balancing mechanism. Given the dynamics of the balancing mechanism market, it is clear that all the stakeholders in the energy market need to reach an agreement which of course includes those in a relationship of direct competition. Importantly, the principles developed through co-opetition improve market competitiveness and enable its participants to implement new and more efficient strategies yielding tangible benefits. Co-opetition has also been pursued in the operation of balancing groups which means that the experience can be very much used in the case of such processes as adapting the functioning of existing aggregators of DSM and DSR services to the concept of the capacity market. Another important element that needs to be highlighted is the potential of DSM and DSR services to reduce the cost of setting up the capacity market. Judging from the American experiences, the costs can be reduced by as much as several dozen percent as was the case with the cost reduction from USD 179/MW to USD 16.5/MW which took place in the PJM market [Baker, Bayer, Rączka, 2015].

To conclude, the authors believe that the questions related to the structure of support for mechanisms and tools aggregated in the capacity market will have to be decided in the near future. The developed model must take account of and balance the interests of all stakeholders focusing on supporting both supply and demand. Given the British experiences, it seems that this approach, combined with the correct parameterization of the model, will be accepted by the European Commission and stands a good chance to be implemented.

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