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Competition in the European electricity markets – outcomes of a Delphi study ☆

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ABSTRACT

Internal European electricity markets are a target set by the European Union (EU) and under development at present. This article presents the findings of a Delphi study focusing on the prospects of European electricity markets. The main aim is to report the obstacles that participants in the survey felt were the most critical ones affecting competition in the European electricity markets of the future. The respondents were European electricity market specialists, and the themes of the survey ranged from transmission networks and electricity trade to demand flexibility. One of the key findings was shared concern over the adequacy of transmission network capacity in Europe. It was considered that technical issues, such as existing transmission network bottlenecks, are most likely to form obstacles to creating common European electricity markets if new capacity is not built quickly enough. It was seen by the panellists that electricity trading arrangements, whilst important, are unlikely to form a barrier to the development of an internal electricity market. It was noted that electricity trading issues have recently been the subject of development work in the EU.

1. Introduction

Electricity market deregulation has been a global trend in the electricity supply sector over the past two decades. In Europe, the process has been driven by EU legislation, that is, the Electricity Market Directives and Regulations of 1996, 2003 and 2009. The fundamental goals of electricity market deregulation have been to reduce the governments' role in the sector, to introduce competition where feasible, and to increase participation from the demand side. The latter has meant, for instance, the free choice of a supplier for electricity users (Harris, 2006).

Electricity market deregulation has been characterised by replacing inefficient regulation of electricity generation and selling with competition-based practices. The electricity transmission and distribution sectors, on the other hand, have typically retained their natural monopoly positions. In general, competition is considered to increase efficiency, reduce costs and improve quality (Haas and Auer, 2006; Joskow, 2006; Littlechild, 2006).

A focal issue when considering efficient electricity markets is the competitiveness of the market. Internationally, electricity markets have been opened to competition with the specific aim of guaranteeing market-based investments in power generation without a regulation of price formation.

European electricity markets are in the middle of transformation. The first target of the European Union was to liberalise electricity markets in all member states, and this has been done during the last two decades. Now, the next step is to integrate national electricity markets to create common European electricity markets. The cornerstones of European electricity market policy are competition, security of supply and the environment; common internal electricity markets have been seen to reinforce these elements.

The results of a Delphi study examining the factors affecting competition in the European electricity markets of the future are presented in this paper. The participants in the Delphi study were European electricity market specialists from 15 different countries, and their job titles varied from advisor to vice president. The Delphi study consisted of two rounds of online surveys. The themes of the questionnaires ranged from transmission networks as a marketplace to storing electricity. The Delphi method proved to be a successful research approach for this study, facilitating the collection of opinions from experts representing different fields and countries and clearly showing the main issues affecting the development of European electricity markets.

The focal result of the study was shared concern over the adequacy of transmission networks for successful establishment of common European electricity markets. For example, greater

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regulatory co-operation and easier permitting procedures were seen as a solution for encouraging new transmission network investments. On the other hand, matters concerning electricity trade, for example, shared electricity price calculation algorithms, price formation principles and gate closure, were considered more easily solved than problems with transmission network investments. It should be noted that electricity trading issues have lately been the subject of development work in the EU.

The structure of the paper is as follows. Chapter 2 presents background information about European electricity markets. The Delphi research design is introduced in Chapter 3, and the results of the Delphi study are presented in Chapter 4. Discussion of the study results and implications for the European electricity markets are given in Chapter 5. Concluding remarks are provided in Chapter 6.

2. Background of evolving European electricity markets

Common internal markets for all kinds of commodities have long been a stated aim of the European Union. Development of European electricity markets is significantly influenced by EU energy policy, and the main policy target has been the opening of electricity markets to competition and the creation of a common European electricity market.

The EU has set the objective of establishing an internal electricity market through seven regional markets (Central West, Northern, the UK & Ireland, South West, Central South, Central East, and Baltic). To ensure that the regional markets can be connected to each other, there has to be a shared target model (Cornwall, 2008; Glachant, 2003). Haas et al. (2006) stated that, for example, adequate generation and transmission capacity, market structure, design of the marketplace and regulatory governance are needed to create common competitive European electricity markets.

The European Regulators Group for Electricity and Gas[1] (ERGEG, 2011) has published a target model for European electricity market integration. ERGEG (2011) has also drawn up guidelines for transmission capacity allocations and price zone definitions, and the day-ahead, intraday and forward markets.

The electricity market model defines operational procedures and activities in electricity markets. In Europe, the chosen market model is zonal pricing, in which the electricity transmission system operators responsible for the main transmission grid inform the power exchange about the transmission capacity available, and the power exchange calculates the price for electricity based on bids of the market parties (Oksanen et al., 2009). This model is consistent with the EU's target of creating large price areas to guarantee competition both in the wholesale and retail markets. A common electricity market model outside Europe is, however, the nodal pricing model (locational marginal pricing), in which the transmission system operator is responsible for both operation of the transmission grid and electricity price calculation (Hogan, 2001; Stoft, 2006). In addition to the energy component, the electricity price includes a transmission congestion fee and losses. The price of electricity is, thus, a local quantity compared with the zonal pricing model, in which the electricity price is uniform to the whole market area. Nodal price calculation is based on optimal load flow calculation in the transmission grid. The main difference between the zonal and nodal models is that in the nodal market model the generation plans (dispatching) are given for each production plant separately, whereas in the zonal model, no detailed plans for separate generators are given in the price calculation process (free dispatch of generators).

Nevertheless, certain problems exist related to the development of large price areas in Europe; for instance, transmission bottlenecks between countries hamper market integration. To address the problem, there are plans to increase transmission capacity in Europe. In grid investment planning, it is important to reinforce the grid according to the needs of the European electricity markets as a whole. As part of the EU's latest regulation (Regulation 714/2009) concerning electricity markets, the European Network of Transmission System Operators for Electricity (ENTSO-E) should elaborate and publish a European-wide, non-binding Ten-Year Network Development Plan (TYNDP), to be updated every two years. Regional and national grid reinforcement plans will be made on the basis of the TYNDP.

3. Research design

3.1. Delphi method

Futures studies can be considered as an activity that aims to support strategic future-oriented action. As regards policy making in the areas of science and technology, expert opinion is often taken into consideration to give new added knowledge on complex issues. Formerly, it was common to gather expert opinions in meetings or in-depth interviews. Nowadays, information-technology-assisted methods are more often used because they allow the sampling of opinions from fairly large numbers of experts, and they also avoid potential dominance by particularly persuasive individuals. The Delphi method is an example of this kind of a technique (Scapolo and Miles, 2006; Schwarz, 2008). It was originally developed in the 1950s at the RAND Corporation in Santa Monica, California and its use spread rapidly in the 1960s, particularly in technological forecasting and the evaluation of social problems (Blind et al., 2001; Landeta, 2006). It is a qualitative research method that typically entails two or more survey rounds in which the participating experts are provided with the results of the previous rounds from the second round on. The panel of experts is used as the source of information, and the questionnaires act as the medium of interaction. The key characteristics of a traditional Delphi study are iteration, participant and response anonymity, controlled feedback, and group statistical response (Blind et al., 2001; Chang et al., 2002; Gupta and Clarke, 1996; Landeta, 2006; Levary and Han, 1995; Rowe and Wright, 1999). The first aspect, *iteration*, means that the experts are consulted at least twice on the same question. As this happens *anonymously* there is no fear of losing face. On account of anonymity, the personality and status of the participating experts do not influence the responses, and undue social pressure can be avoided. The third feature, *controlled feedback*, means that the panellists are given feedback between the questionnaire rounds informing them of their anonymous colleagues' opinions. A study group coordinator controls this exchange of information. Fourth, the Delphi answers may be processed quantitatively and statistically in a *group statistical response*, and all opinions form part of the final outcome. These four key features are often considered necessary for a *Delphi* procedure (Chang et al., 2002; Landeta, 2006; Rowe and Wright, 1999). According to Rowe and Wright (1999), the Delphi method cannot be paralleled with statistical or model-based procedures. However, it is especially suitable in judgement and long-range forecasting (20–30 years) situations, when expert opinions are often the only source of information available, due to a lack of appropriate historical, economic or technical data (Blind et al., 2001; McLeod and Childs, 2007; Rowe and Wright, 1999).

[1] Agency for Cooperation of Energy Regulators, ACER, will continue the work of ERGEG in spring 2011.