

Security of Supply in Competitive Electricity Markets: The Nordic Power Market

Abstract

Balbir Singh
Senior Research Economist
Institute for Research in Economics and Business Administration
Breiviken 40
5045, Bergen

e-mail: balbir.singh@snf.no

CV: Balbir Singh, is a Senior Research Economist and leads the Market Analysis and Design group at The Centre for Energy Economics, Institute for Research in Economics and Business Administration SNF, Bergen Norway. His main work addresses policy issues related to market-architecture, market-structure, regulation and governance in deregulated energy markets. In the recent past, he has been working on the issues related to handling security of supply in the European electricity and gas markets. He is or has worked in research and advisory capacity, for various Norwegian ministries (Oil and Energy, Environment, Finance, Industries, Foreign Affairs), European regulators, energy industry majors such as Statoil, Norsk Hydro, Statkraft, Sydkraft, research organisations such as the Norwegian Research Council, European Science Foundation and multilaterals including The World Bank, Inter-American Development Bank and Nordic Development Fund NDF. He has functioned as a technical referee for various journals and has published over 60 articles, technical reports monographs etc, in the areas of his research interest. Since 1996 he is the member of the executive board of the Norwegian Chapter NAEE, of the International Association for Energy Economics IAEE.

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Abstract

During the recent years much of the debate related to the restructuring of network industries such as electricity, gas and telecommunications has focussed on development of efficient wholesale and retail markets for these services. In comparison, less attention has been paid on the development of efficient mechanisms for provision of quality of supply through these newly created markets. Quality can be seen as a multidimensional attribute of a commodity and quality differences map a given generic commodity into a spectrum of commodities that although being similar, are not perfect substitutes as not all consumers value these attributes equally. It is well known that in the absence of a complete set of markets or under conditions of monopoly and imperfect competition, optimal provision of quality can not be taken for granted. Market set in the restructured frameworks is far from complete, physical networks per definition are natural monopolies and market-power issues are yet to be resolved under the restructured frameworks. Provision of optimal level of quality in the restructured markets is one of the important challenges facing policy makers.

Currently, there is growing concern about the ability of the liberalised electricity markets to efficiently provide adequate generation, network capacity or equivalent demand-side flexibility to ensure secure provision of electricity under the current market based frameworks¹. Technically, we may distinguish between three components of security of supply. The long-term issue is related to sufficiency of generation and network resources to meet system load. In the medium-term, the question is concerned with sufficiency of fuel, while in the short-term the issue is of availability of a “buffer” capacity to meet contingencies. The economic policy design challenge is to assure that the market institutions established under the restructuring process guarantee efficient provision of the commodity spectre that is needed to maintain security of supply across all the relevant times frames in the restructured markets. Failure of the restructuring process on this criterion would result in price spikes² and rationing with associated economic and political adjustment costs that can easily jeopardise the regulatory commitment to the liberalisation process. Efficiency gains from restructuring

¹ In Europe, the importance of the issue is emphasized in the new electricity directive¹ that explicitly requires member states to develop institutional framework and measures to monitor and ensure security of supply in the member countries. In other regions, such as in the US and in a number of countries in Latin America, various forms of incentive mechanisms supplementary to energy-only markets are already in use to enhance security of supply. In hydropower dominated systems, such as in Brazil, New Zealand and Norway and Scandinavia in general there is an additional focus on ensuring the *medium-term* fuel security; the so called “dry-year” energy security problem. In all the countries, the ability of the restructured electricity markets to maintain reliable deliveries at all times in face of short-term contingencies; in other words the *short-term* security, is the crucial issue

² It may be mentioned at the outset that prices are the most important signals for resources allocation in a market system and suppression of price peaks is not a legitimate policy goal in itself. In principle, if the markets function perfectly, security of supply from an economic view point is a non-issue. Price-peaks create the necessary incentives that maintain equilibrium in the electricity market. Policy interventions that impose exogenous constraints on price movements only delay the necessary adjustments to maintain the equilibrium and increase adjustment costs. On the other hand, if markets are imperfect, prices are distorted and so are incentives resulting from these prices. Policy responses around the world to the issue of security of supply are closely related to the beliefs that policy makers hold about the ability of the markets to provide efficient signals across all the time frames.

may be overestimated if the liberalised markets provide cheap electricity at a level of security that is not in line with the consumer valuations.

The main focus in this paper is on analysing the economic issues related to the handling of long-term generation and network capacity and medium-term fuel security problems in liberalised power markets. In particular the paper focuses on markets in which hydropower is an important generation technology, as in case of the Nordic power market. The paper is divided into four sections. In section one, we outline the various theoretical approaches to handling security of supply within a market framework. In section two, we relate the analyses in section one to the current proposals to handle security of supply in the Nordic market in general and the Norwegian price area in particular. It may be mentioned, that the Nordic market is one of the most mature electricity markets and consequently has also functioned as an important blueprint for a number restructuring frameworks in other countries. Section three, develops an alternative market architecture involving a “reserve energy certificates market” that provides the necessary incentives to handle medium and long-term supply security in a restructured electricity market. Section four concludes the analyses and outlines the main policy implications for the future.