

Title: Bilateral Reliability Contracts: An Innovative Approach to Maintaining Generation Adequacy in Liberalized Electricity Markets

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Abstract

There is increasing evidence that liberalized electricity markets may be susceptible to the development of investment cycles, which periodically threaten the security of electricity supply. The electricity crisis in California in 2000 and 2001 first drew attention to the issue of generation adequacy. The shortages throughout Europe in the summer of 2003 further increased concerns about the degree to which liberalized markets provide sufficient and timely investment signals for generating capacity.

A number of policy options, which we call capacity mechanisms, have been developed to ensure an adequate level of investment in generating capacity. Unfortunately, none of the proposed systems qualifies for the particular – currently highly relevant – case of a European country, characterised by bilateral markets and significant exchanges with neighbouring systems, that wishes to take measures to enhance its security of supply, such as the Netherlands currently is considering. Of course, the ideal solution would be to implement a capacity mechanism for the Western European interconnected system, but this does not appear a feasible solution in the near term.

The only capacity mechanism yet implemented which produces reasonably satisfying results is the system of capacity obligations which is being used in the PJM system on the American East Coast. However, this system is not applicable to most European systems. PJM has a mandatory pool, which makes it possible to recall exports when the system is short of electricity. This ensures that the consumers, who in the end are the ones who pay for extra investment in generating capacity, also benefit from this capacity when there is a shortage.

In bilateral markets, such as most European electricity systems, the system operator has no control over the source and destination of electricity sales. This means that during a regional electricity shortage, high prices in neighboring systems will lead to exports, with as a result that both the price level and the reliability of supply will be the same in both systems. Consequently, a country's efforts to maintain generation adequacy do not necessarily enhance its actual security of supply. A method needs to be developed which ensures that those consumers who pay for measures that enhance generation adequacy also benefit. This method must be compatible with the European conditions of bilateral markets with significant volumes of trade between them, and it must be robust against neighboring systems having different market rules.

This paper proposes a new solution, called Bilateral Reliability Contracts, which is an innovative combination of the existing proposal of Reliability Contracts (which also are designed for a pool-based market) and a Capacity Obligation, adjusted for a bilateral market. The proposal at hand involves a system in which the load-serving entities are required to purchase a certain volume of call options. This way, not only investment in generating capacity is stimulated, but it is also ascertained that the resulting generating capacity is available to the load-serving entities who have paid for it when they need the electricity. The paper presents an analysis of this option with respect to a number of criteria, such as economic efficiency, feasibility, robustness against regional shortages when neighboring systems have different market structures, and strategic manipulation.

CVs

Laurens de Vries (1967) studied Mechanical Engineering in Delft, specializing in environmental and energy technology. After graduating in 1991, he moved to the USA. In Olympia (Washington State) he studied at The Evergreen State College, where he finished his Master of Environmental Studies Degree in 1996. In his studies there, he focused on environmental economics. In 1997 he left the USA, traveling through Asia for about nine months before returning to the Netherlands. He worked one year at an environmental consulting company before joining Delft University of Technology as a Ph.D. student in September 1999. His research subject is investment in electricity generating capacity, with a focus on the policy options to avoid investment cycles in imperfect markets.

Hamilcar Knops (1975) graduated from Leiden University in the Netherlands in theoretical physics (1998) and law (1999; cum laude). In 1998, he studied at Harvard University in Cambridge, Mass.. After his graduation he worked for the law firm Houthoff Buruma in The Hague, the Netherlands. In 2000, he joined the International Institute of Energy Law of Leiden University and the Delft Interfaculty Research Centre on Design and Management of Infrastructures of the Delft University of Technology to carry out a Ph.D.-research on the interaction between the technical and legal aspects of electricity supply.

Rudi Hakvoort (1966), received an M.Sc. degree in Applied Physics in 1989 and obtained his Ph.D. degree from Delft University of Technology in 1993. Since then he has been active in academic research at the Delft University of Technology, first in Environmental Management, and since 1995 in the interplay between energy technology and energy policy.