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MERCHANT ELECTRICITY TRANSMISSION EXPANSION – AN EUROPEAN CASE STUDY

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Overview

We apply a merchant transmission expansion model to the trilateral market coupling arrangement among the Netherlands, Belgium and France (**Errore. L'origine riferimento non è stata trovata.**). In this framework, the system operator allocates financial transmission rights (FTRs) to investors in transmission expansion depending on their preferences and revenue adequacy. We study the incentives for investors depending on the network topology. Till now the cross-border trade among these countries has been managed by explicit auctions, but from November 21, 2006, the daily auctions have been transformed to a market coupling arrangement (implicit auctions). This causes more efficient trade. There is a discussion of introducing FTRs as a part of the market coupling arrangement, and development toward flow based transmission and open/multilateral market coupling. The allocation of cross-border capacity is currently based on available transfer capacity (ATC) which in the case of flow based transmission will be based on power transfer distribution factors (PTDFs) and border capacities. The PTDFs take physical electrical flow paths into account and maximizes the use of transmission capacity. Conversely, a meshed network makes it more difficult to link the implicit and explicit auctions employed in the daily and monthly /annual auctions. Therefore, there might be a need for FTRs (including daily settlement in implicit auctions between power exchanges) and a clarification of the roles of transmission system operators and power exchanges. Likewise, appropriate risk-sharing and regulatory incentives are needed.

Figure 1. The trilateral market coupling arrangement the Netherlands, Belgium and France

Methods

This paper uses a bi-level programming of Hogan's proposal (Hogan, 2002; Kristiansen and Rosellon, 2006) for allocation of long-term FTRs to investors in small-scale transmission expansion in meshed networks. The problem structure

takes the form of a bi-level program that is analytically solvable by using a Lagrangian function approach. The Kuhn-Tucker conditions give the necessary conditions for a local optimum that we also find are a global optimum in the cases provided.

Results

We present expansion alternatives under different assumptions and demonstrate the use of FTRs and their impact on the market. Further we study the impact of linking the trilateral market coupling arrangement to the German market.

Conclusions

This paper has presented bi-level programming of Hogan's proposal for allocation of long-term FTRs to investors in small-scale transmission expansion in meshed networks including an evaluation of what the use of FTRs in the Benelux countries would be.

References

Hogan, W. W. (2002. Financial Transmission Right Incentives: Applications Beyond Hedging, presentation at Harvard Electricity Policy Group, (Downloadable from website http://www.whogan.com).

Kristiansen T. and J. Rosellon (2006). A Merchant Mechanism for Electricity Transmission Expansion, Journal of Regulatory Economics, Volume 29, Number 2, March 2006.