

The Impact of Network Modeling on Prices in Power Markets

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In the project for coupling the day-ahead power markets of The Netherlands, Germany, Belgium and France, two types of network models are considered: Available Transfer Capacity (ATC) and Flow-Based (FB). An ATC network model is a standard capacitated network flow model. In a FB model, the net export positions of the markets are limited by general linear constraints.

A FB model, being more general, allows to represent capacity utilization more accurately. That in turn allows better usage of the network while guaranteeing the same level of security. However, under a FB model, small markets might see their price volatility increase compared to ATC, or even compared to the absence of coupling. Since the market sizes are the results of political decisions without economical grounds, this can be seen as a fairness issue.

We will discuss examples of such situations before proposing a solution: use the FB model with additional constraints that guarantee the “nice” price properties of the ATC network model. We show how to compute efficiently the resulting hybrid network model using matroid theory, and conclude with practical, theoretical and algorithmic open questions.