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TOWARDS A MORE EFFICIENT USE OF INTERCONNECTION CAPACITY IN THE EUROPEAN POWER SYSTEM

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Overview

The increase of cross border electricity exchanges in Europe is determining increasing congestions on several interconnection corridors. Due to the difficulties to reinforce these corridors, the existing transmission and, especially, interconnection capacity is becoming a scarce quantity, which must be allocated as much as possible in an efficient way.
After a brief overview of the main market-based methods for interconnection capacity allocation, the full paper will focus on the "Coordinated Auctioning" approach and will simulate its application to the European transmission system of UCTE.

Methods

In Europe several methods have been proposed to solve the congestion management problem: allocation of NTCs (Net Transfer Capacities), market splitting, and re-dispatching. Market splitting method is applied in Nordic countries, whereas allocation methods based on published NTCs are mainly applied in the synchronously interconnected UCTE (Union for the Co-ordination of Transmission of Electricity) system [ETSO 2006]. Therefore, in Europe there is not a unique method for transmission Congestion Management (CM).
According to EC Regulation 1228/2003 [European Commission 2003], CM methods must be non discriminatory and have to give efficient economic signals to the market participants and transmission system operators. According to its recent amendment [European Commission 2006], CM methods shall be market-based in order to facilitate efficient cross-border trade. For this purpose, capacity shall be allocated only by means of explicit (capacity) or implicit (capacity and energy) auctions.
One of the proposal which comply this requirement is the first method proposed by ETSO in April 2001 [ETSO 2001], which suggests to allocate the transmission rights on the interconnection corridors following a multilateral explicit auction, the so-called "coordinated auction". The auction assigns the capacity to the bids that value it more, till the attainment of the transfer capacity limits, calculated by means of the so called Power Transfer Distribution Factors (PTDF) approach. To illustrate the approach adopted in the procedure developed by the authors, Fig. 1 shows PTDFs for a transaction from Central France to Belgium.
The procedure considers a set of cross border transaction bids (which are characterised by sending node, receiving node, quantity bid and price bid) and a full model of European transmission network. It maximises the product of price bids by quantity bids, taking into account the following constraints:

- Transmission capacity allocated to each transaction must be lower or equal than the quantity bid;
- Transmission capacity allocated to each transaction must be non negative;
- Transfer capacity limits must be fulfilled;

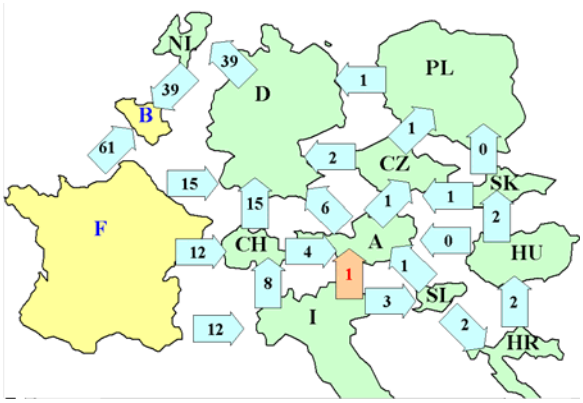

Fig. 1: Power Transfer Distribution Factors for a 100-MW transaction from Golfech (France) to Meerhout (Belgium)

The results are the allocated transmission capacities and their marginal prices. Additional by-products of the optimisation procedure are the physical links where congestion arises, the "economic weight" of each congestion, and the equivalent value of the coordinated auction session. The full paper will give additional details about the methodology [Marannino 2006] adopted in the procedure developed by the authors.

Results

The developed optimisation procedure will make use of a transmission network model extended up to 4200 busses adopting a relatively limited set of capacity bids with the objective to better explain the results.
Results will be included in the full paper.

Conclusions

To be included in the full paper.

References

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