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Increase cross-border capacity to reduce market splitting of day-ahead electricity markets – A dynamic line rating approach

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Summary

Market splitting occurs when the energy flow between different market zones is higher than the cross-border capacity, separating the markets and bringing economic losses to market participants. The cross-border capacity is computed by Transmission System Operators using a seasonal steady-state line rating (SLR). SLR considers fixed conservative meteorological conditions throughout the year except for the ambient temperature that can have a fixed seasonal and spatial variation. Dynamic line rating (DLR) analysis using near real-time meteorological data allows to effectively computing the capacity of the lines while SLR, by usually underestimating it, may lead to market splitting. This work presents a case study where DLR is applied to reduce the number of market splitting occurrences in the Iberian market of electricity. For the different scenarios analyzed, the reduction of market splitting occurrences can range from 16% to 57%, being lower than 1% in case of exporting from Portugal to Spain.

Highlights

- Application of a DLR analysis to assess its potential to reduce the number of hours with market splitting occurrences. For each sector, the wind speed and direction, ambient temperature, and solar irradiance are obtained using a numerical weather prediction model;
- The CIGRÉ model is used to compute the DLR of the interconnecting overhead power lines;
- The dayahead market from the Iberian electricity market (MIBEL) is used as a case study;
- Considering the bids of all market zones to a centralized day-ahead market (market coupling) and using a marginal pricing system algorithm it is possible to compute the clearing price, the energy of the coupled market, and the importation or exportation energy flows between market zones.