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Reducing Redispatch Costs through Symmetric Dynamic Tariffs: Evidence from a Stylised German Electricity Market Model

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Extended Abstract

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Abstract Summary

Grid congestion, aggravated by zonal electricity markets, increasingly leads to market dispatch outcomes that are not physically feasible due to transmission constraints. In Germany, the redispatch required to reconcile market outcomes with grid limitations already amounts to several billion euros per year. One instrument currently under discussion to mitigate conventional redispatch is a symmetric dynamic grid tariff based on expected redispatch volumes, which penalises injections in regions and hours with excess supply while subsidising electricity withdrawals.

We develop a highly stylised market model of a sector coupled, renewable dominated future German energy system, split into two zones connected by a single generic transmission line. The model follows the framework of Traber (2021) and is implemented in the open source optimisation software Pyomo. To ensure robustness with respect to weather variability while maintaining reasonable computation times, the model is calibrated to full year price outcomes and reduced to nine representative weeks, including three consecutive weeks capturing the most system critical periods. Price formation is further enriched by incorporating demand response, demand reduction, and a value of lost load, following Brown et al. (2025).

Our results show that, excluding savings from reduced redispatch volumes, northern consumers benefit substantially less than southern consumers lose, implying an overall welfare reduction of roughly the same magnitude as the tariff revenues. The effects on renewable generators are more pronounced. Due to their low marginal costs, the export tariff induces significant shifts in dispatch towards the importing region. In particular, we identify a pronounced risk of photovoltaic generation relocating from the exporting northern zone to the importing southern zone, raising concerns about long term spatial distortions in investment incentives.

Presenting Author Biography

Thure Traber is an energy system developer at **50Hertz Transmission GmbH**, where he has been working since 2024 on the analysis and design of future electricity system architectures. His work focuses on market design, grid congestion management, and the integration of high shares of renewable energy in sector coupled power systems. He has extensive experience in quantitative energy system modelling and electricity market analysis, with a particular interest in the interaction between market outcomes and physical grid constraints. His research bridges academic energy economics and practical transmission system operation.