



Vortrag im Rahmen des Seminars

Forschungskolloquium | Research Seminar

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Titel:

Essays on Energy Economics

Abstract:

The proposed dissertation project addresses critical modeling gaps and regulatory challenges within the transforming German electricity market, driven by the expansion of renewable energy and increasing grid constraints. It consists of four research papers that aim to advance the accuracy of fundamental market modeling and the economic assessment of strategic behavior. The first paper examines the systematic underestimation of price volatility in established models, introducing an endogenous representation of technical and market-based drivers to improve the economic valuation of flexibility technologies. The second paper investigates inefficiencies in congestion management, proposing an opportunity cost-based valuation approach to quantify the welfare gains of integrating battery storage into redispatch mechanisms. The third contribution analyzes the potential for local market power abuse by incumbent generators following a bidding zone split, utilizing a Cournot-Fringe Mixed Complementarity Problem with Flow-Based Market Coupling to assess whether strategic behavior diminishes theoretical welfare benefits. Finally, the fourth paper explores the strategic interaction of large-scale battery storage systems driven by network topology effects, quantifying the potential to leverage internal bottlenecks and evaluating the effectiveness of restrictive grid connection conditions in mitigating this strategic behavior. Collectively, these essays provide comprehensive insights into price formation, market design efficiency, and strategic interactions in zonal electricity markets."