

Assessing the Role of Spatial Aggregation and Market Coupling in an Agent-Based Model of the European Electricity Market

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Extended Abstract

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Abstract Summary

While agent-based models (ABMs) are increasingly used to study market designs and market participants bidding strategies (Lebeau 2024, Haugen 2024, Gonzalez-Ruiz 2026), their scaling to highly complex systems, the incorporation of a large number of heterogeneous agents, and validation are still limitations (Trimarchi 2025). National studies employing ABMs often focus on representing local market concepts in more detail, and integrate market coupling only through exogenous time series or simplified models. In contrast, European energy system models (e.g. Neumann 2023) mostly apply a central optimization approach, which allows to emphasize the influence of cross-border flows or the specific inter-zonal coupling characteristics (Unnewehr 2022), thus excluding for instance heterogeneous market participants, strategic bidding or coordinated portfolio effects. This work investigates the middle ground between these perspectives by exploring the required level of detail to approximate historical prices and generation in the European electricity market using an agent-based simulation parametrized to 2024.

Presenting Author Biography

Gunter Grimm is a research associate and a doctoral student at the Institute for Sustainable Systems Engineering (INATECH) at the University of Freiburg. He completed his master's studies in "Renewable Energy Systems" at TU Berlin. His research primarily focuses on the interaction of market participants with regulation and market design in the long vs. the short term.