



# Forschungskolloquium | Research Seminar

*Vortrag im Rahmen dieses Seminars*

Titel:

**Essays on Energy Economics**

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Abstract:

The proposed dissertation project addresses the increasing complexity of modern energy markets, driven by climate change, technological innovations, and evolving economic dynamics. It consists of four potential papers that aim to advance research on strategic actor behavior and energy market modeling. The first paper introduces a refined Logarithmic Mean Divisia Index (LMDI) framework to decompose German industrial energy demand reductions during the 2022 energy crisis, revealing the product-level structure and substitution effects that were previously uncaptured by existing models. The second paper examines the welfare implications of generation and load regionalization in flow-based, coupled European electricity markets, with a particular focus on Germany, and proposes cross-zonal policy instruments to enhance efficiency. The third contribution focuses on refining fundamental electricity market models to accurately represent price volatility, with a specific emphasis on endogenously modeling negative electricity prices caused by factors like renewable subsidies, ramping costs, and must-run constraints. Finally, the fourth paper develops an optimal dynamic investment model for short-term and long-term storage technologies using Modern Portfolio Theory, accounting for weather-induced risks and integrating future-focused price projections from fundamental market models to overcome backward price bias. Collectively, these essays provide comprehensive insights into energy demand dynamics, market efficiency, price formation, and strategic investment decisions in an evolving energy landscape.