



Bachelor Thesis

Modelling the drivers of negative prices on the German wholesale electricity market

Negative prices have become a fundamental property of wholesale electricity prices in recent years. While it might be counterintuitive that actors are willing to sell their generated energy at market losses, there are some economic and technological incentives explaining this behavior. These include, i.a., ramping restrictions, generation-based subsidies, a lack of generation flexibility and must-run capacities. However, there are few studies scrutinizing these factors in detail. Also, there is also a lack of theoretical works on how the drivers of negative prices can be modelled in fundamental electricity market models, as most open-source models are barely able to produce negative (shadow) prices.

The objective of this bachelor thesis is to identify the underlying drivers of negative prices on the German wholesale electricity market and describe why and how they imply negative electricity prices in a simplified theoretical unit-commitment model.

Key tasks and objectives of the thesis

- Familiarize with literature and data on negative electricity prices (literature review) and their modelling in unit-commitment problems and fundamental electricity market models
- Distinguish and describe the underlying drivers of negative wholesale electricity prices
- Apply an existing simplified theoretical electricity market model and include 1-2 drivers (i.e. fixed subsidies and ramping costs) to derive and explain the occurrence of negative prices.

Your profile

- Economic major, best with a focus on energy
- Interest in electricity market
- Knowledge of quantitative modelling in GAMS desirable

Literature

- Eurelectric (2024). Understanding ultralow and negative power prices: causes, impacts and improvements.
- Agora Energiewende (2014). Negative Electricity Prices: Causes and Effects.
- De Vos, K. (2015). Negative wholesale electricity prices in the German, French and Belgian day-ahead, intra-day and real-time markets. *The Electricity Journal*, 28(4), 36-50.
- Prokhorov, O., & Dreisbach, D. (2022). The impact of renewables on the incidents of negative prices in the energy spot markets. *Energy Policy*, 167, 113073.

Contact



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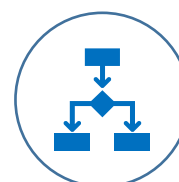
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Topics



- Electricity markets
- Generation technologies

Methods



- Literature Review
- Analytical Modeling