Chair of Renewable and Sustainable Energy Systems
TUM School of Engineering and Design
Technical University of Munich

Master's Thesis

Assessing the impact of forecast accuracy on market clearing outcomes in local energy markets

Background

The European energy markets have been under a lot of pressure lately. The steady increase of new generation technologies, such as wind and solar, as well as new storage systems and consumers such as electric batteries and vehicles, create a significantly different technical framework than what the markets were designed for. One aspect that has been discussed recently is when energy can be purchased. Traditionally, the majority of the energy that is traded on markets such as the EPEX SPOT is on the day-ahead market. The reason for the 24-hour clearing schedule is that this design was chosen for centralized fossil power plants that need to plan their work schedule at least one day in advance. However, new generation types are non-dispatchable while new consumers show stochastic behavior. Therefore, temporal forecast accuracy gains increasing importance. The question is if given the development of the energy system, the purchase of electricity should be moved closer to the time of delivery.

Research Questions

- How can current forecast methods be translated into synthetic forecasts of similar quality?
- How do forecasting accuracy and clearing methods correlate in local energy markets?
- What is an adequate clearing interval for a renewable energy system given the state-of-the-art and future forecast accuracy?

Requirements

- Strong interest in and knowledge of energy markets
- Fluent in German or English (thesis can be written in either language)
- Programming experience in Python is of advantage

Main goals

- Literature review of state-of-the-art forecasting techniques and methods to create synthetic forecasts
- Analysis of the accuracy of current forecasting methods over time and in the future
- Development of synthetic forecasting methods that mirror real-life forecasts
- Development of simple clearing methods
- Integration of forecasting and clearing methods in HAMLET
- Simulation of different combinations of forecasting and clearing methods
- Analysis, discussion and presentation of results

Contact

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