

Bachelor- / Semester- / Masterarbeit

(Theoretical)

Evaluation of the Influence of Different Forecast Horizons on District Energy Systems

Description:

Energy system optimization models are a widely used tool to provide useful information on the pathway to achieve carbon reduction targets. Based on the given assumptions as well as the defined boundary conditions of the model, the most cost-effective pathway to reach climate goals is determined. The necessary build rates for the different technologies can also be derived from the model. In addition, the models can be used to give indications about the relevance of different energy technologies. Accordingly, these models are often used to support regional energy planning. Most of these models assume perfect foresight. This means that all future developments, e.g. CO₂- or fuel prices, are known to the optimizer from the beginning. Thus, this method of linear optimization always finds the system with the lowest costs. However, this long-term perspective contradicts the short-term decisions made by companies. Due to the high uncertainties in the development of certain input values, the investment decisions in perfect foresight models do not reflect those of reality. In the real world, decision-makers do not have accurate information about the development of future prices and costs. These uncertainties, as well as high investment costs for energy infrastructure projects, could lead to a postponement of long-term strategically important decisions, which can result in a failure to achieve climate targets. For this reason, models with limited foresight have been developed. In this work, the influence of the forecast horizon on the simulation result should be examined. Therefore, the rolling horizon method should be applied to a small regional energy system.

Prerequisites:

- Interest in energy systems optimization,
- High motivation and independent, structured way of working.
- Experience in programming with Python (PyPSA) and knowledge of optimization is a plus.

Arbeitspakete:

- Literature research on rolling horizon and foresight in energy system optimization
- Application of the rolling horizon method of PyPSA on an existing district energy system
- Analyzing and evaluating the results

Beginn ab: sofort
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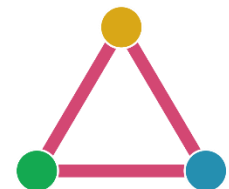


Fig. 1 Python-Package: PyPSA Python for Power System Analysis