

Master Thesis

Capacity Mechanisms in Power Markets: Hedging Strategies and Risk Management

Background

To ensure security of supply the German government is planning to implement a *capacity mechanism* (*Kapazitätsreserve*) for the electricity market. This reserve comprises plants that may not partake in regular energy markets but are kept on standby to be dispatched in the event of a shortage of supply in the electricity market. If the reserve is dispatched the plants are allowed to charge a fixed price per MWh which is designed to be *prohibitively* high (several thousand euros) and which is charged to those participants of the energy system that caused the shortage. These high prices should act as incentives for companies to avoid imbalances in demand and supply.

Research Question

Since payments due to shortages in the above scheme represent a major risk to companies, risk mitigation strategies become relevant. Finding and evaluating such strategies is the topic of this thesis.

In particular, the tasks include:

- Identify mitigation strategies (demand response, fast idle generators, ...) that allow a company to balance unforeseen deviation from their own schedule.
- Design and test a probabilistic model for the occurrences of system wide shortages as well as individual mismatches of scheduled and realized supply and consumption.
- Design a decision model in which a risk averse company can find on an optimal mitigation strategy given the stochastic inputs modeled above.
- Analyze the results for a range of input scenarios and perform sensitivity analysis.

The thesis is co-supervised by the *Stadtwerke München* (SWM). The selection of a suitable candidate and the detailed specification of the project will take place in close cooperation with the SWM.

Qualified applicants are invited to send their electronic application to cem@wi.tum.de.