

UNCERTAINTIES IN THE BALANCING MARKETS FOR ELECTRICITY - BARRIERS FOR RENEWABLE ENERGY SOURCES

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Overview

Balancing services for electricity are vitally important to ensure the balance between demand and supply for electricity in real-time. In many electricity systems in Europe, services for balancing energy are tendered long time before delivery (days to weeks) and for long time periods (hours to weeks). Due to the increase in volatile and uncertain renewable energy sources, two major developments can be depicted in near future

- a) the requirement for short-term balancing will increase and
- b) installed capacities for thermal power plants will decrease.

These developments make it necessary to adapt the markets for balancing energy to the new framework conditions. Incentives for renewable energy sources to participate in the markets for balancing energy should be promoted.

This presentation deals with uncertainties in electricity markets, especially on the balancing markets. Thereby, forecasting quality plays an important role in this context, as shorter lead time leads to better forecasts. Shorter contract durations on the balancing market would reduce the costs for providing balancing energy and would lower barriers for market entry. To measure the efficiency gain of shorter contract duration in balancing markets, an optimization model is applied to the German electricity system. Thereby, day-ahead and markets for balancing energy are modelled in detail.

Methods

A Stochastic mixed integer linear optimization model minimizing total system costs is applied. Uncertain parameters are the renewable feed-in. The time series are generated with an ARMA and/or SARIMA approach. Under these uncertainties the balancing commitment are optimized. Based on these commitments a second model is used, where the need of control energy is modelled as stochastic component. With this two-stage model approach, the influence of different balancing market design options are analysed concerning effectivity.

Results

With shorter contract duration time

- a) costs for providing balancing energy decrease,
- b) number of market participants increase significantly and
- c) renewable energy sources have an incentive to participate in the markets for balancing energy.

Higher volatility of day-ahead market prices intensifies the above mentioned effects.

Conclusions

As a consequence of a more flexible market design, more participants will enter the markets for balancing energy and thus markets would be more competitive. Furthermore, the flexible market design would allow a dynamic reserve dimensioning for the TSO according to actual load situation in the electricity grid.