Abstract

This thesis investigates methods to forecast the long-term regulating power prices (RPP) evolution in the Nordics. During the operating hour the transmission system operators buy balancing power on the regulating power market, and the RPP are the clearing prices. Each market player having caused imbalance is charged an imbalance cost depending on the RPP. Hence forecasting these prices in the long-term provides valuable information for strategic decisions such as wind power investment, power purchase agreement or for market players willing to have revenues from the RPM.

First, fundamental approach is investigated. Nord Pool data and probabilistic distributions are used to forecast the evolution of balancing needs. These volumes are then fed into models of the balancing price bids ladder, based on the bottom-up model EMPS (EFI[1]'s Multi-area Power Simulator), initially developed to model the long term day-ahead prices. Models appeared to perform poorly: results were underestimated and far from observed values.

In the second part of this work, a computational intelligence approach using Empirical Mode Decomposition (EMD) and Artificial Neural Networks (ANN) is investigated. The trend of regulating prices is extracted with the EMD and forecasted separately with ANN. Good results are achieved with the statistical approach, showing the superiority of this method over the fundamental approach. In the final part, the results of the statistical approach are analyzed and conclusions regarding the long-term regulating prices evolution are drawn for 2017-2020.

[1]Elektrisitetsforsyningens ForskningsInstitutt (Electricity Research Institute)