Abstract

The overall business objective of this project is to exploit differences in the two major electricity markets: The day-ahead and the intraday market. Both are available online and provide platforms to exchange electricity for specific timeslots. For the day-ahead market, offers and bids can be placed up to 12 pm and are than cleared in the following fifteen minutes, after which the respective prices are also published. The exchanged electricity can be purchased as Mwh for a specific hour and is traded one day in advance. The intraday market in contradiction to the day-ahead market provides the ability of quarter-hourly trading timeslots, which can be placed up to fifteen minutes before delivery. From 15 pm the next 24 hours are open for trading. So both intraday and day-ahead market make prices available for the same timeslots, but most likely are not equal. Sometimes the day-ahead and sometimes the intraday market has economic advantages. Hence a measurement for this price differences is introduced: The price premium. Patterns that can be found in the derived price premium can generate economic value, if it is utilized by only buying or selling at advantageous markets or advantageous timeslots.

In order to identify meaningful patterns, the analysis is divided into the examination of the data in terms of time related and non-time related patterns. In general, over 70% of all price premiums are positive, which induces that the intraday market seems to be economically preferable. Therefore, the occurrences of positive and negative price premiums are counted for each hour, weekday and even week. Striking timeslots are between 10 am and 13 pm, since the price premium is high and therefore it is advantageous to buy on intraday market on this slots. Also noticeable is the increase of the positive price premium in the end of the year. Here it also recommends to buy electricity on intraday market, since the risk that the day-ahead market price is more expensive rises during October, November and December.

The non-time pattern analysis resulted in recommendations that partly support the findings of the time related pattern analysis. For example, the more freezing days occurred during the last 30 days the more likely the intraday market price is cheaper than the day-ahead market. In contradiction to that the snow volume implies the only rule that recommends a purchase on day-ahead market, due to a negative price premium. If the snow volume is 300 centimetres the probability of a negative price premium is above 50%.

Since a set of manually derived rules is difficult to optimize, deploy and maintain in a next step the weather and price data is used in order to derive predictive models that are able to predict whether the price premium is positive or negative. Therefore, seven predictive models are build and the best model, a Recurrent Neural Network, is able to predict with an accuracy of over 80%. It is expected that the performance of the model can be improved by using recent news reports and analyse them in order to detect potential catastrophes which can have impact on the prices of the markets.