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Wind Power Forecasting For Trading Purposes: The Importance of Managing Wind Volatility

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Abstract

Energy Trading companies demand different kind of forecasts in order to achieve their business activity. In fact, their benefit highly depends on forecasts accuracy, especially on accurate wind energy forecasting, since wind energy volatility has a big impact on pool price and deviations from actual generations yield to penalizations.

Day-ahead and short-term forecasting are the most widely known services required by traders. These kinds of forecasts are mainly used to operate in different sessions at spot markets. Depending on market rules, the forecast horizon, time resolution and number of possible updates can be completely different. For instance, in Spain, forecasts can be updated in seven different sessions that require different horizons in an hourly time-basis, whereas the German market, it is closer to a continuous market and 15-min time resolution forecasts are required.

In addition, long-term wind forecasts are also highly interesting for traders working on future markets, or any other financial markets, in order to evaluate the risks associated to these long-term investments, since market prices depend on available wind energy production, among other variables.

Under these scenarios, probabilistic forecasting is the most valuable source of information that traders can use in order to evaluate different scenarios and to estimate their probability to occur. Hence, information systems are needed in order to manage all this volume of data in a comprehensive way, which helps to analyze them, taking decisions in almost real-time to maximize the benefits of trading.

Finally, the analysis would be incomplete without a performance evaluation of the forecasts, which also helps to take into account their behavior under given meteorological scenarios where uncertainties might be higher.

Objectives

- Maximization of revenues obtained from energy market
- Minimization of deviation penalties
- Information System for risk management in trading operations
- Real-Time performance evaluation

Methods

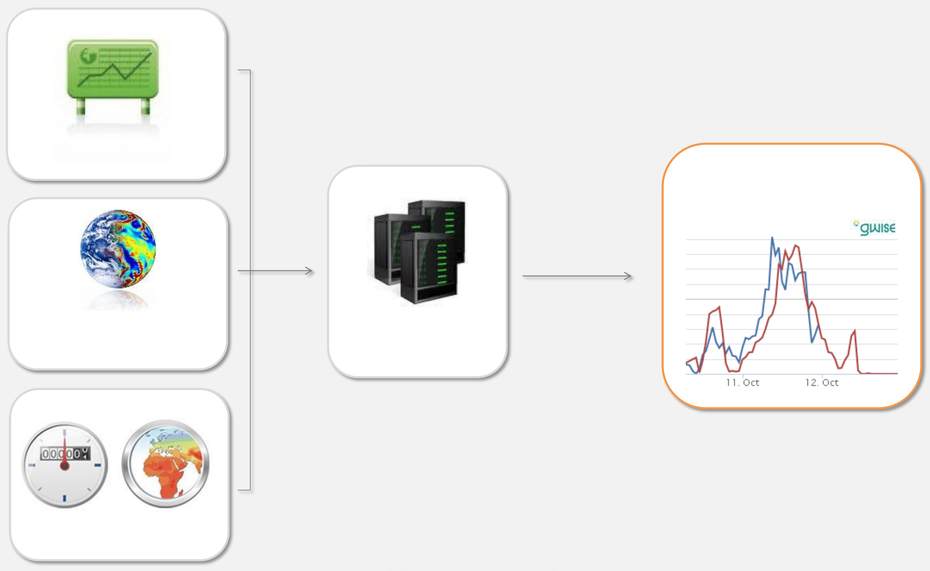

Fig. 1: Global Architecture of Forecasting Systems

Forecasts are derived utilizing various weather prediction models and a sophisticated system of mathematical algorithms. Additionally, this data can be combined with individual meter outputs to offer higher accurate forecasts.

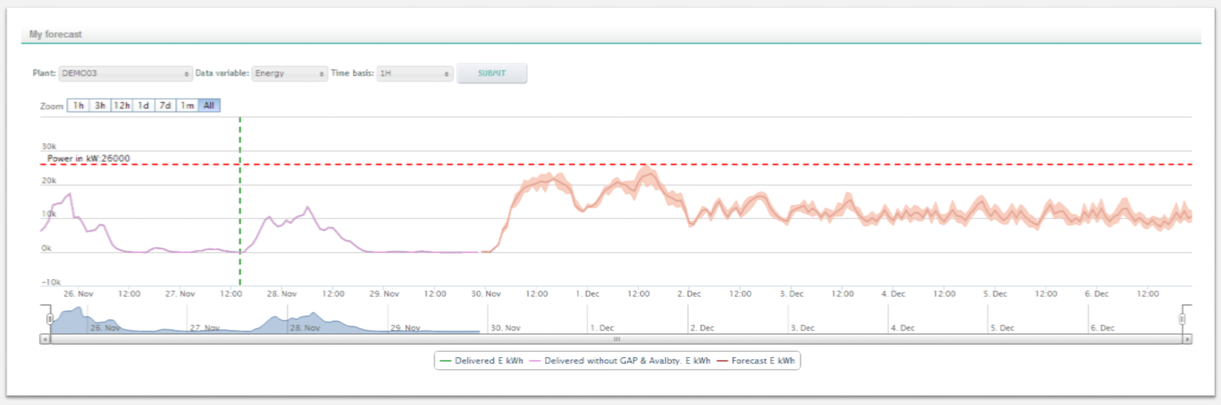

Fig. 2: Probabilistic Forecast of a wind power plant.

Results

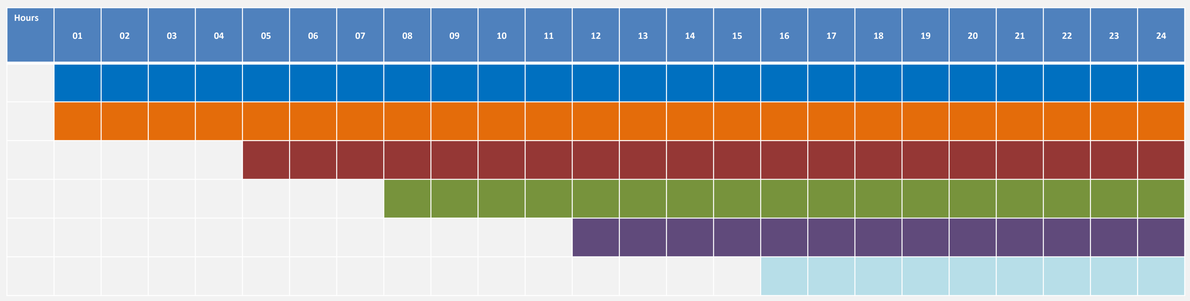

Fig. 3: Intraday and Daily Sessions in Spot Market

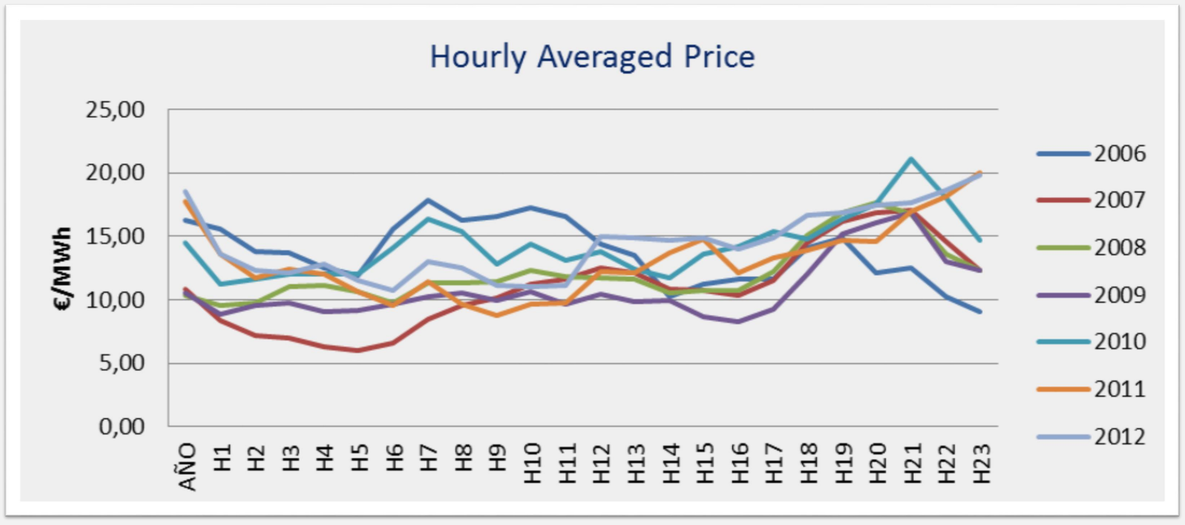

Fig. 4: Hourly Average Price

Our forecasting solution yields very precise results by implementing statistical prediction models tailored to the technical specifications of the installation. To optimize energy trading, our forecasting solution interrelates the results of forecasted production with market prices, offering the highest potential profit when trading energy.

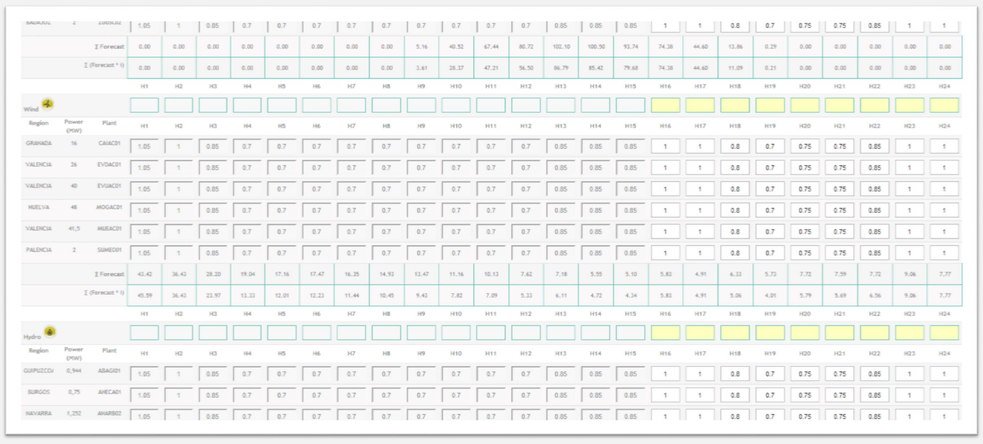

Fig. 5: Energy Management Panel for Trading.

Conclusions

	Nameplate Capacity	Costs w/o Forecasting	Costs w/ Forecasting & Portfolio	Costs Managing Uncertainties	Savings
Wind	140 MW	0,86 M€	0,26 M€	0.20 M€	0.66 M€
PV	513 MW	4,05 M€	0,48 M€	0.40 M€	3.65 M€
Hydro	125 MW	0,6 M€	0,05 M€	0.04 M€	0.56 M€
TOTAL	**778 MW**	**5,51 M€**	**0,79 M€**	**0.64 M€**	**4.87 M€**

An accurate forecast can create significant economic benefits throughout energy market operations. In big data scenarios, it becomes essential to have a flexible and reliable solution to manage and relate all the information in order to make a profitable trading.

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