

Abstract

Under the old German "EEG" feed-in tariff system the tariff was fixed and wind power production has been driven by quantity only: the more the better.

The latest revision of the EEG implies a shift from fixed feed-in tariffs towards wind power auctions. The market value of the produced electricity will supersede quantity oriented power production.

Market oriented production will push the wind industry into classic financial terms: total return is determined by **quantity** and **price**.

The Market Value Atlas is an instrument which identifies quantities of produced power and price per produced power. Enlightening of both is required in a free market.

Methods

The Market Value Atlas is set up in two steps: we first evaluate the historic wind power production all over Germany or any other country. This is based on high resolution meso-scale modeling of the wind speeds and other relevant meteorological parameters. The meso-scale wind information is transformed into power production for a selected wind turbine at any location within the country. At the end the quantity (of power production) is evaluated which might have been traded at the spot market for each hour of the last 10 years.

Prices from the EPEX spot market are available for each hour since 2006. This pricing information is used to reproduce the market value for each hour of the last ten years.

Results

The Market Value Atlas explores big data achieved from meso-scale modeling and pricing information. It supports financial modeling and targets maximum revenue. Assets based on fixed feed-in tariffs must be re-drawn to meet the new market conditions.

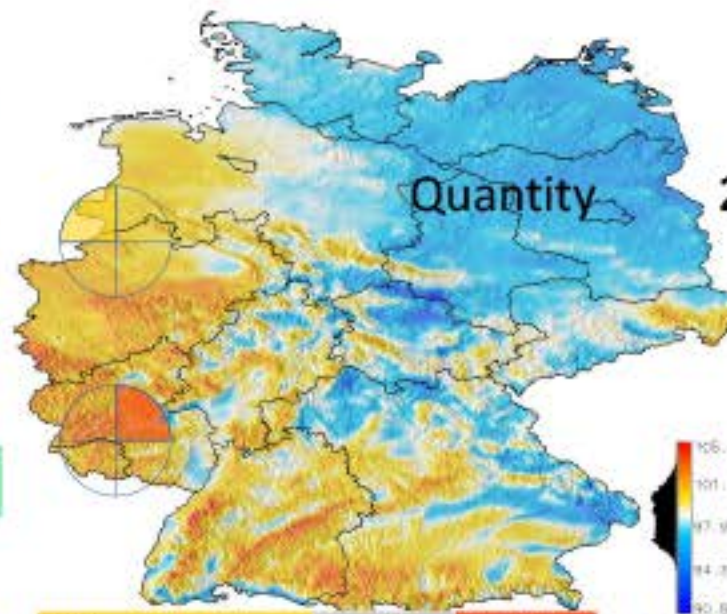
Optimal siting of wind parks implies a mixture of high volume and best prices. The Market Value Atlas confirms: prices at the spot market are not correlated with hourly power production and vary in both: time and space.

Site selection must consider volume and prices.

Results: Quantity

A Market Value Atlas consists of **two distinct maps**:

The maps on the left show the annual mean **quantity** (kWh/a) a selected wind turbine will produce under the local wind conditions. The quantity is fully given by nature. Proper site selection and optimal choice of the wind turbine will enhance quantity.



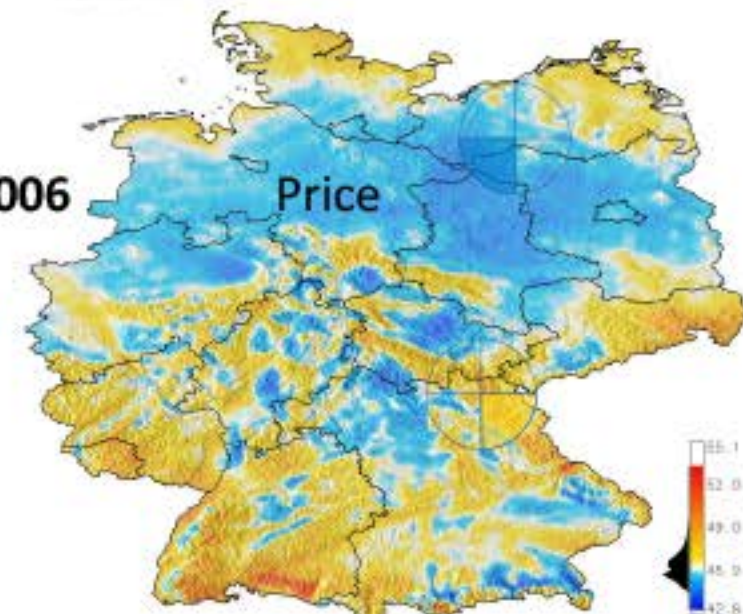
High	+ / -	+ / +
Low	- / -	- / +
↑ Index kWh/a	Low	High
Margin €/kWh →		

Results: Price

The maps on the right show the annual mean **price** (€/kWh) achieved at the spot market.

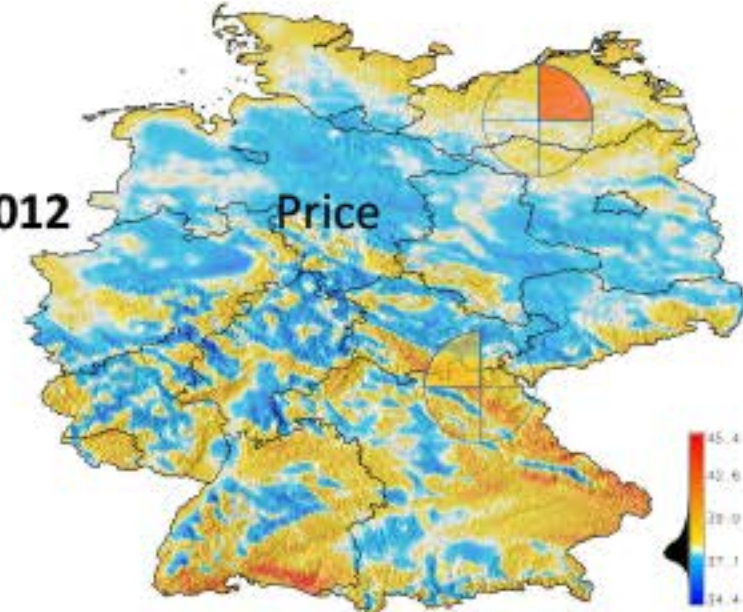
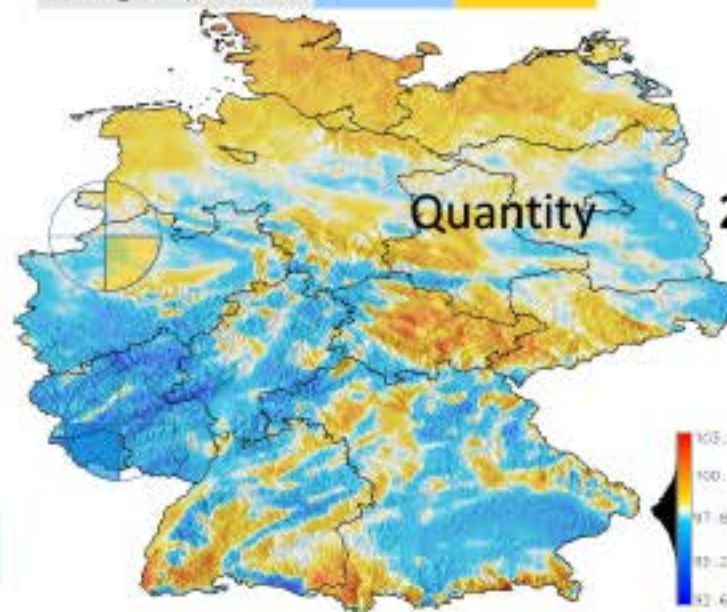
While prices agreed at the trading desk are equal for all market participants, power production varies during the course of the day and location of the wind farm.

Better prices are achieved at locations where wind speed is largest during high electricity demand.



Figures: Maps on the left side show the quantity of annual mean power production (kWh/a), relative to the long-term mean value. Maps on the right side show the annual mean price (€/kWh) achieved at the spot market for the years 2006 (upper map) and 2012 (lower map). Maps have been calculated for a ENERCON wind turbine. Attached to the color bars is the histogram of all sites in Germany.

Four sites have been marked with circles indicating areas of relative low (blue), high (red) or a mixture of low and high (orange) volume and price.



Conclusions

The shift of the feed-in tariff system towards a free market offers new opportunities to increase the market value of wind farms. Volume focused marketing strategy was the way to go in high wind speed areas. Low wind areas as in the German Hinterland may profit from better pricing. A match of both, price and volume is required.

The Market Value Atlas is intended to identify these hot spots.

Contact us

For further information contact us:
 Dr. Johannes Sander, SANDER + PARTNER
sander@sander-partner.com

Andreas Jansen, ProfEC Ventus
info@profec-ventus.com

or visit us at WindEnergy Hamburg 2016:
 Hall B1, First Floor, Booth No. **B1.0G.211**

