

**Wind, forecast & analytics:
trading wind power and managing grid penalties
in spot markets and microgrids**
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As the share of renewable energy grows larger in the electrical mix, short-term forecasting becomes increasingly necessary to ensure the balance of the electrical grid, and manage the intermittency of those energy sources. Wind power is particularly fluctuating, but the latest technologies allow very accurate forecasts that make it possible to integrate much more energy into the grid.

To adapt to this challenge, the legislation all over the world evolves: feed-in tariffs tend to be replaced by trading on spot markets, supplemented by feed-in premiums. Those changes encourage the emergence of new market players, new business models (including using energy storage), and require advanced trading strategies based on short-term forecasting and decision sciences.

This presentation will describe some new market systems (spot-based & insular microgrids), then focus on two innovative tools meeting the emerging needs of the wind power sector:

- Probabilistic wind power forecasts (based on machine learning and ensemble meteorology)
- Electricity trading strategies and associated decision-support tools (based on stochastic optimization and linear programming)

Real-case examples of using forecasts and implementing trading strategies will be given to illustrate the talk :

- for spot markets, with a revenue increase from 82% to 95% of the optimum.
- for microgrid wind farms with storage, finding an optimal trade-off between a light battery and a secure strategy.

Key learning points

- ✓ New regulations and incentives in Europe (from feed-in tariffs to spot market & feed-in premiums)
- ✓ New market players (agregators, electricity traders, grid balancing entities, etc.) and business models
- ✓ Design and principle of insular microgrids and market-based trading systems
- ✓ Short-term renewable energy forecasting as a tool to balance the electrical grid
- ✓ Analytics and optimization tools for energy trading
- ✓ Maximizing the revenue, minimizing grid penalties: trading strategies and decision-support tools for wind farms

Speaker biography

Morgane Barthod has graduated in 2015 from the Ecole Polytechnique (France) and from EPFL (Switzerland) with two MSc. in Energy and Environmental Engineering. She worked on wind power-related topics such as blade icing, the Europeans regulatory frameworks and wind power in Scandinavia.

As a master thesis at the wind power consulting office Meteolien, she worked on France's first wind resource cartography, developed new downscaling and uncertainty assessment techniques, and proved the possibility to apply them to short-term forecasting.

This lead her to create the start-up meteo*swift to develop a breakthrough short term wind power forecasting tool, associated with cutting edge strategies for wind power trading based on those forecasts. meteo*swift also provides wind farms data analytics and performance monitoring tools. Since January 2016, the project received 5 selective awards and raised 330k€ of award money.

References

- ✓ Poster at EWEA Annual Event 2015 : www.ewea.org/annual2015/conference/allposters/PO114.pdf
- ✓ Speak at the Renewable Distributed Generation Forum 2016 : “An analytical storm over wind power : how new energy incentives transform the wind energy sector” : www.distributed-generation-forum.com
- ✓ Poster at the Wind Europe Summit 2016 : “From price-based incentives to spot markets, how to adapt the resource assessment financial studies and the O&M tools?”
- ✓ Speak at the 15th Wind Integration Workshop 2016: “State of the art use of forecast uncertainties in the business practices of actors in the power systems sector”, with C. Möhrle, R. Bessa , G. Goretti and S. Vogt
- ✓ A scientific paper, co-authored with Météo-France and Meteolien, is currently peer-reviewed by “La Météorologie”

Awards

- ✓ Concours Mondial d’Innovation, category “big data”, Jan. 2016
- ✓ FrenchTech Grant, Feb. 2016
- ✓ X Grant Silicon Valley, Apr. 2016
- ✓ Ranked 1st among 40 competitors at Prix des Innovateurs ArcelorMittal, category “big data”, July 2016
- ✓ Selected for the final stage of the Cleantech Open France contest, to take place in Sept. 2016