What’s next for wind energy forecasting systems?

Current and future requirements seen from a utility’s point of view

Dr. Tilman Koblitz
Optimization Continental Manager
Vattenfall Energy Trading

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Production forecasts:
- **Wind power**: 2.7 GW
- Solar power: 350 MW

Demand forecasts:
- Gas demand: 1.9M customers
- Power demand: 9.4M customers
Today, BA Markets maximizes the value of our wind portfolio

Total installed capacity of wind portfolio: **2.7 GW**

- **Onshore:** 1.6 GW
- **Offshore:** 1.1 GW
- **Under construction:** 1.1 GW

Vattenfall’s wind asset portfolio

Source: https://corporate.vattenfall.elbformat.de/magazine/wind
Renewables forecast

Current wind power forecasting (FC) process

- Global weather model
- Mesoscale weather model
- Weather FC: local, aggregated
- Renewables model
- Power FC: local, aggregated
- Wind speed FC: local, aggregated
- Park/turbine model: physical and/or statistical
- Wind power FC: local, aggregated
Vattenfall’s Forecasting System

Data flows and IT landscape

**Input data**
- Portfolio Information
- Allocation data
- Realtime data
- Curtailment Notifications
- Availability Notifications

**External Forecast**
- Weather FC Provider A
- Weather FC Provider B
- Power FC Provider C
- Power FC Provider D

**Forecast system**
- Data import
- Data pre-processing
- Calculation Visualization Analysis
- Data post-processing
- Data export

**External tools**
- General tools
- Custom tools
- FC models

**ETRM systems**
- System A
- System B
- System C

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Vattenfall’s Forecasting System

Operative issues in 2015

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Operative issues in 2013-2015

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What’s next? - Evolution of operative issues

Impact

- Increasing
- Decreasing

Frequency

- Decreasing
- Increasing

Bubble size:
- No. of issues

Bubble color:
- Current impact
- Low
- Middle
- High

Vattenfall’s Forecasting System

External tools

Forecast export

External forecasts

Forecast model

Turbine outages

Realtime data

Allocation data

Weather data

Forecast system
What’s next? – Future wind power forecasting (FC) process

- More advanced power production models
- More complex weather inputs:
  - Higher number of meteorological variables
  - Improved probabilistic forecasts
- More advanced and flexible weather models
  - Assimilation of realtime data
  - Higher update frequency (rapid cycle updates < 1h)
  - Updates tailored to operational schedules
  - Higher resolution to include local effects

Vattenfall is exposed to an increased weather risk.
Vattenfall’s Forecasting System

Current and future requirements

**Business objectives:**
- Operational risk reduction
- Increase cost & process efficiency
- Business decision support
- Enable business growth
- Improving time to market

**User perspective:**
1. Reduce manual work (-arounds)
   - Optimize the quality & efficiency of FC models & processes
2. Improved system support (adequate response times for troubleshooting)
   - Optimized analysis tools

**Functional / Non-Functional:**
3. Process automation & monitoring (status, logbook, …)
   - Flexible & reliable interfaces to IT landscape
   - Data processing (import, validate, aggregate, export, …)
   - System performance & availability
Main areas of improvement:

1. Reduced manual work (-arounds)
2. Improved System support
3. Process automation & monitoring

Desired setup with integrated models & tools:
Thank you for your attention!

Contact for questions:

• Tilman Koblitz       tilman.koblitz@vattenfall.com
• Forecasting team     forecasting@vattenfall.com