How to forecast Germany‘s largest PV portfolio

By Martin Linden

Agenda

- Get to know Next Kraftwerke
- Why accurate intraday forecasts matter
- How we develop our PV forecasts
- Summary

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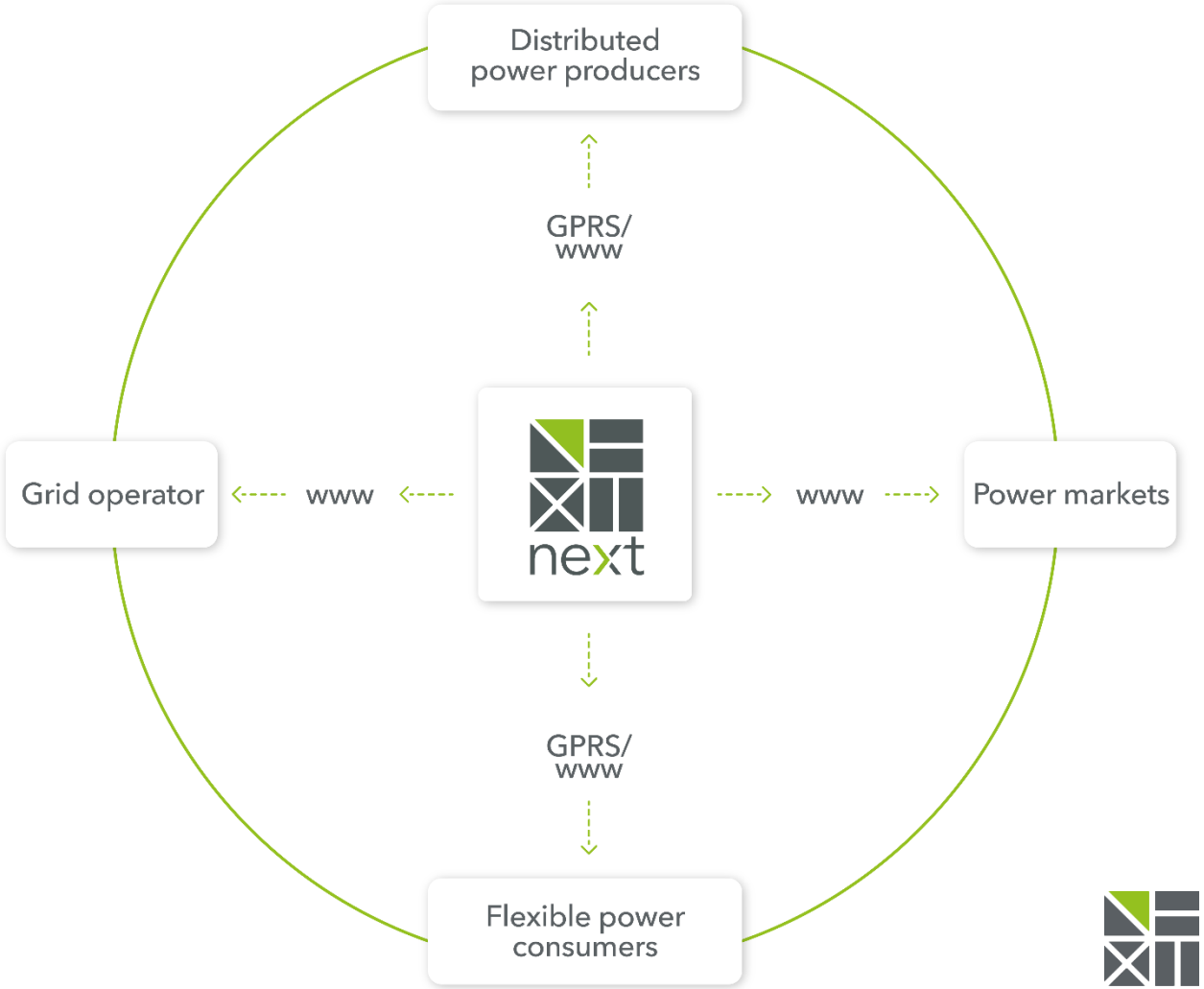
What is a virtual power plant

Operating a power plant without owning any assets

- Aggregation of decentralized renewable energy assets through a central virtual platform
- More than 8100 assets with more than 7100 MW capacity
- Intelligent steering of all networked assets with automatic M2M-communication
- Grid stability: ensuring that production and consumption are harmonized
- Offering access to various markets
  (i. e. spot exchange, ancillary services, etc.)



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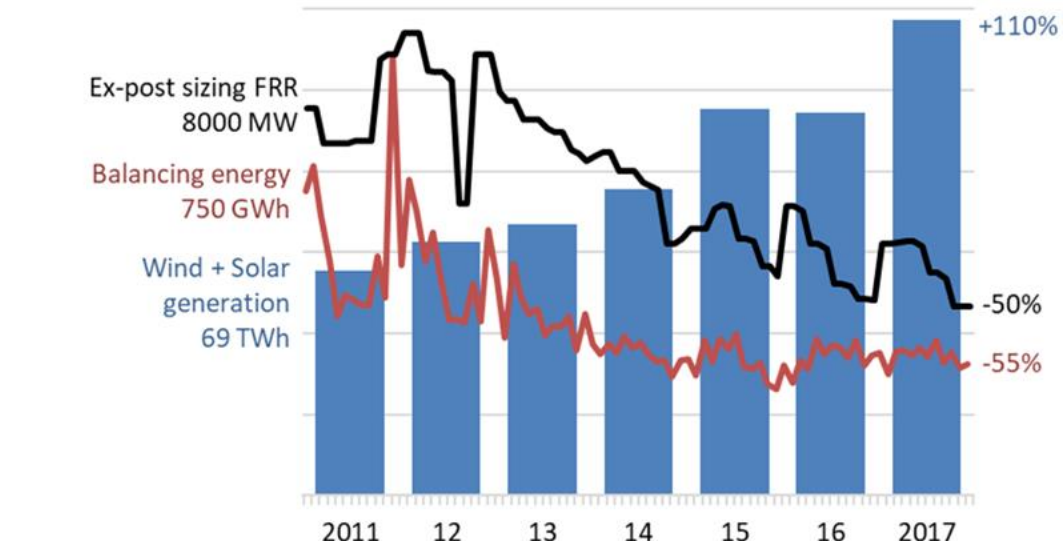
Cost-efficient integration of Wind/Solar

- Intuition: Renewables up = FRR up
- Reasons for FRR decrease:
  - Increasing trade in qh-products since 2011
  - 24/7 trading
- Prerequisites:
  - Sufficient liquidity in ID markets
  - Gate closure close to real time
- **Cost-efficient integration possible**



Source: Koch et Hirth 2019

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Requirements for forecast

Day-Ahead Forecast

Weather Data

- Irradiation
- Temperature
- Various Weather Models

Technical Data

- Orientation
- Location
- Module Type

Intraday Forecast

Live infeed

- Various Connection Systems
- Fast & robust
- Thousands of plants

Historical Data

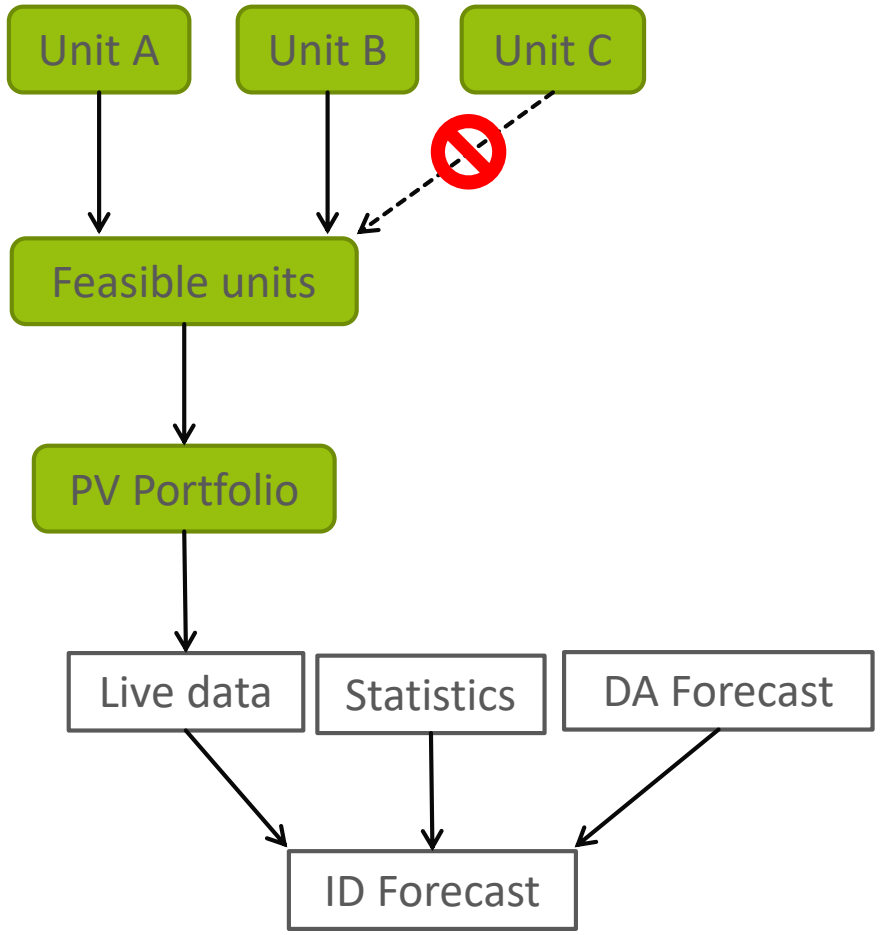
- Statistical algorithms
- Fast & robust

Forecasting process

Live data

Preprocessing:

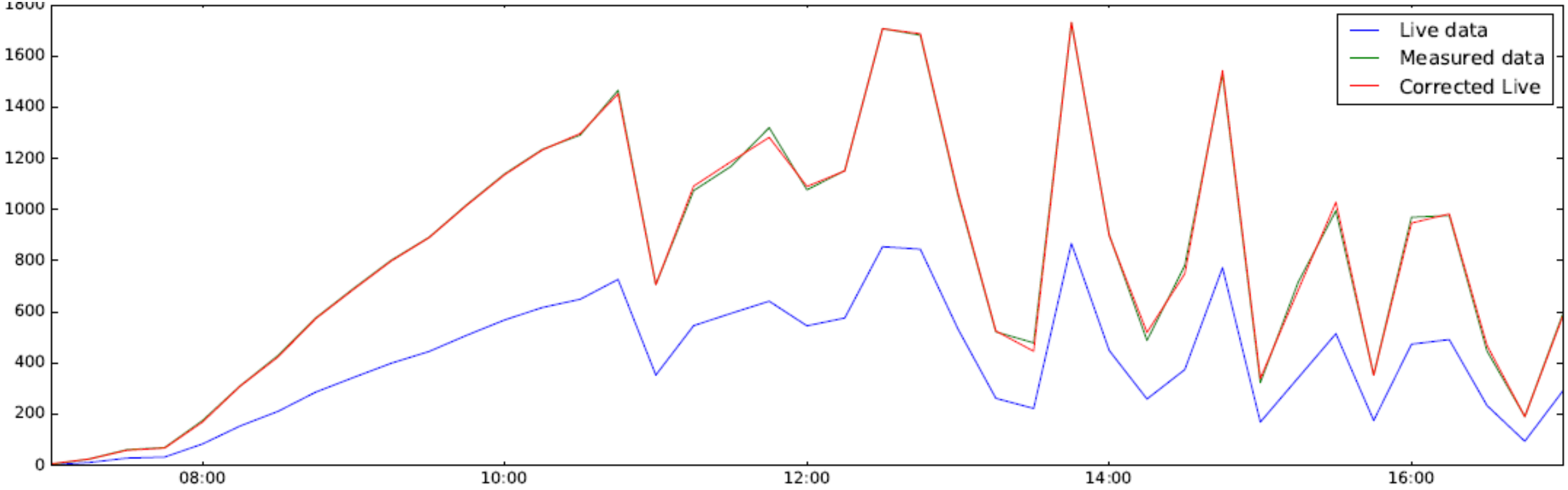
Scale to P_N:



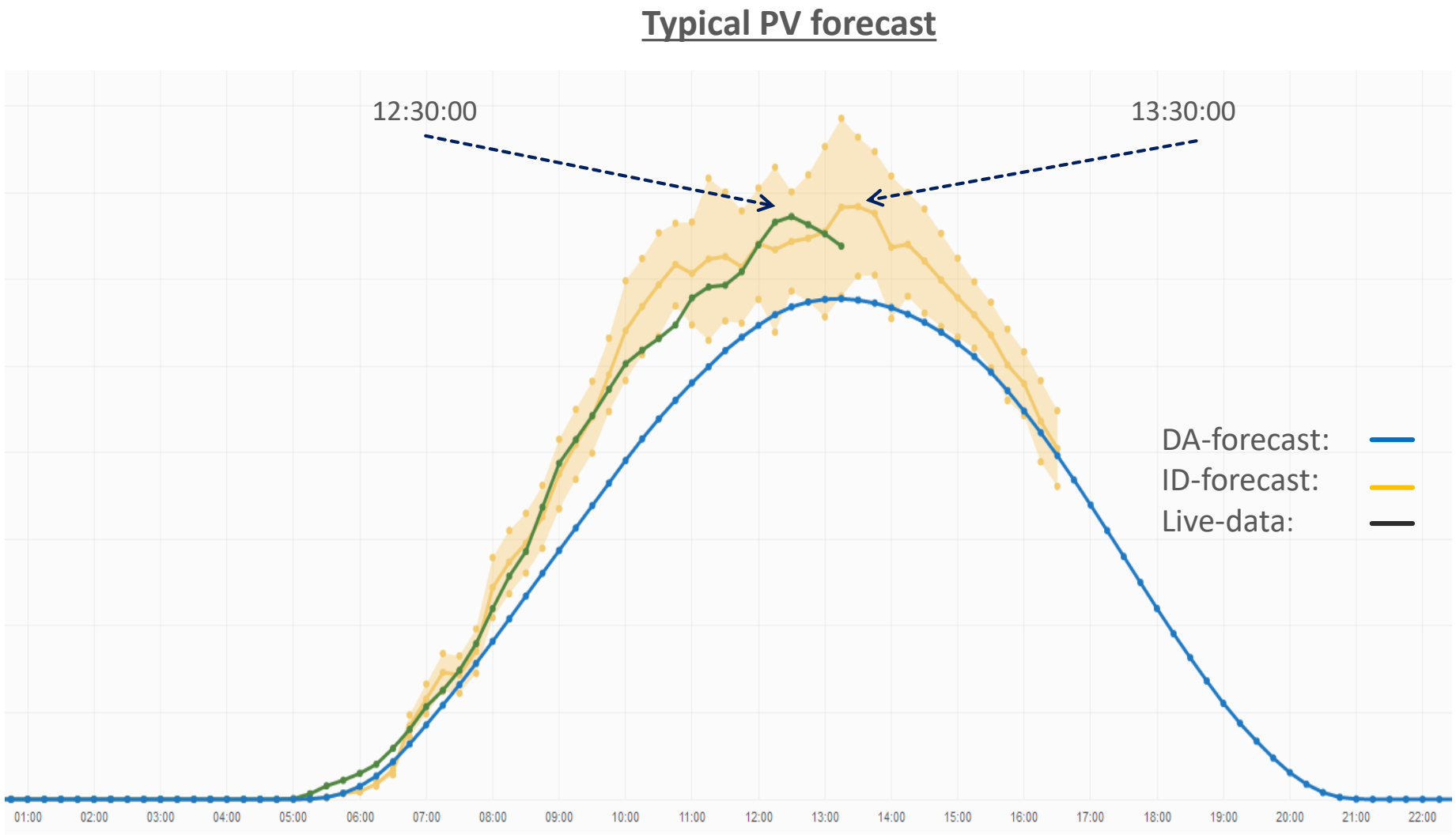
Problems and Bottlenecks:

- Technical errors when reading live data → data correction & data cleaning
- Different data sources (ftp, protocols for live data) → data abstraction for further processing
- Processing time & computing capacity → efficient algorithms required

Preprocessing: Data correction



Real life example



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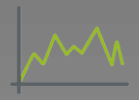
Summary

- **Virtual power plants promote the decentralization and digitalization of the power industry**

- **Liquidity in well-designed ID markets enable a cost-efficient market integration of wind and solar capacities on a large scale**

- **PV forecasts:**
- Smart and fast data pre-processing required to overcome technical bottlenecks
- Quality over quantity of data
- Combination of live-data, deterministic and statistical algorithms lead to effective portfolio forecasts



Thank you for your attention.

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