Webinar
How to forecast Germany‘s largest PV portfolio

next

Speaker: Martin Linden, Data Analyst

Agenda

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

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Our Virtual Power Plant

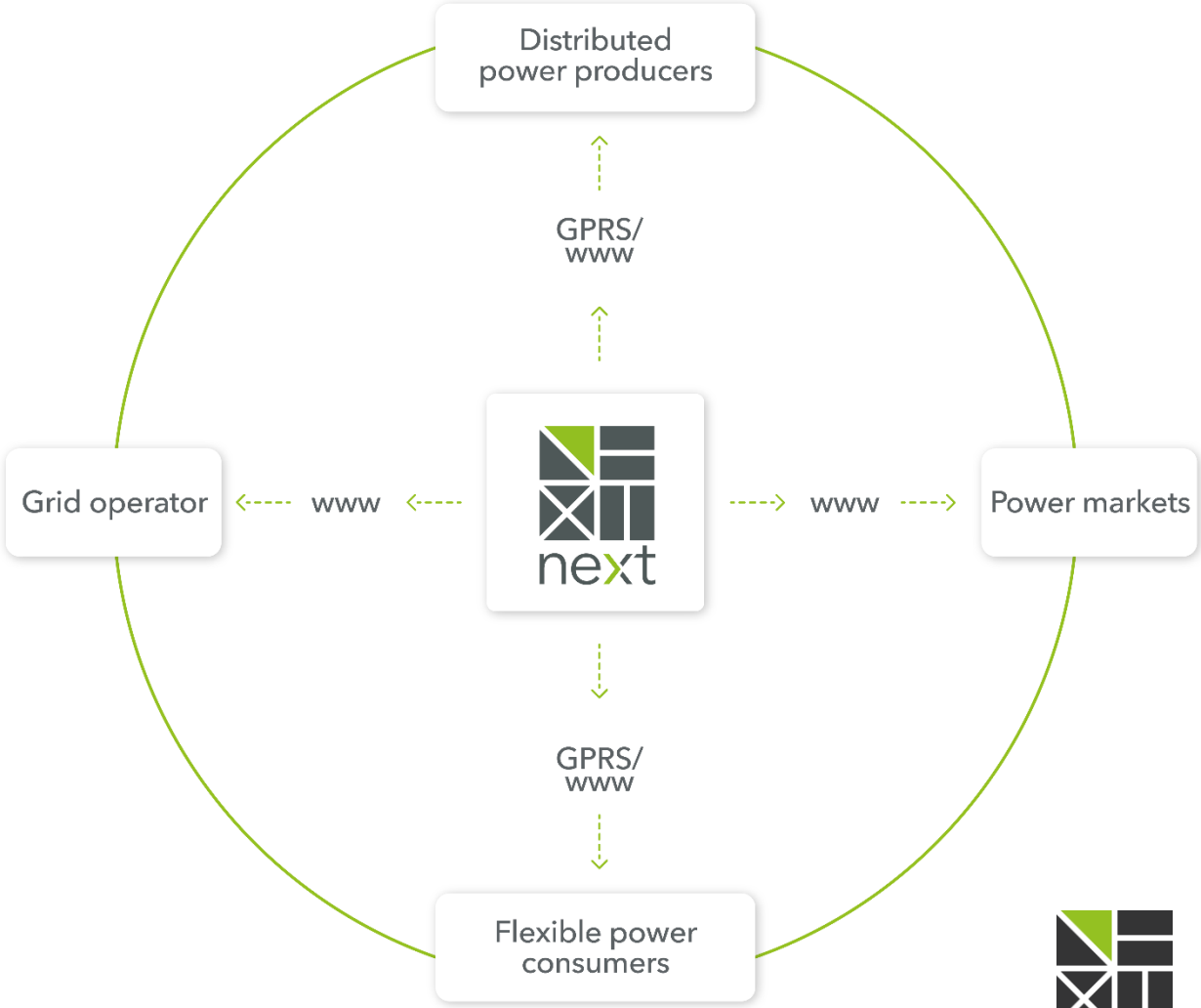
“In 2009, we started with our vision of a Virtual Power Plant. Today, we operate one of the largest Virtual Power Plants in the world.“

Jochen Schwill & Hendrik Sämisch
(Founders & CEOs)

Aggregated Power:	**9 500 MW**
Aggregated Assets:	**9 700**
Providing services to:	**8 system operators**

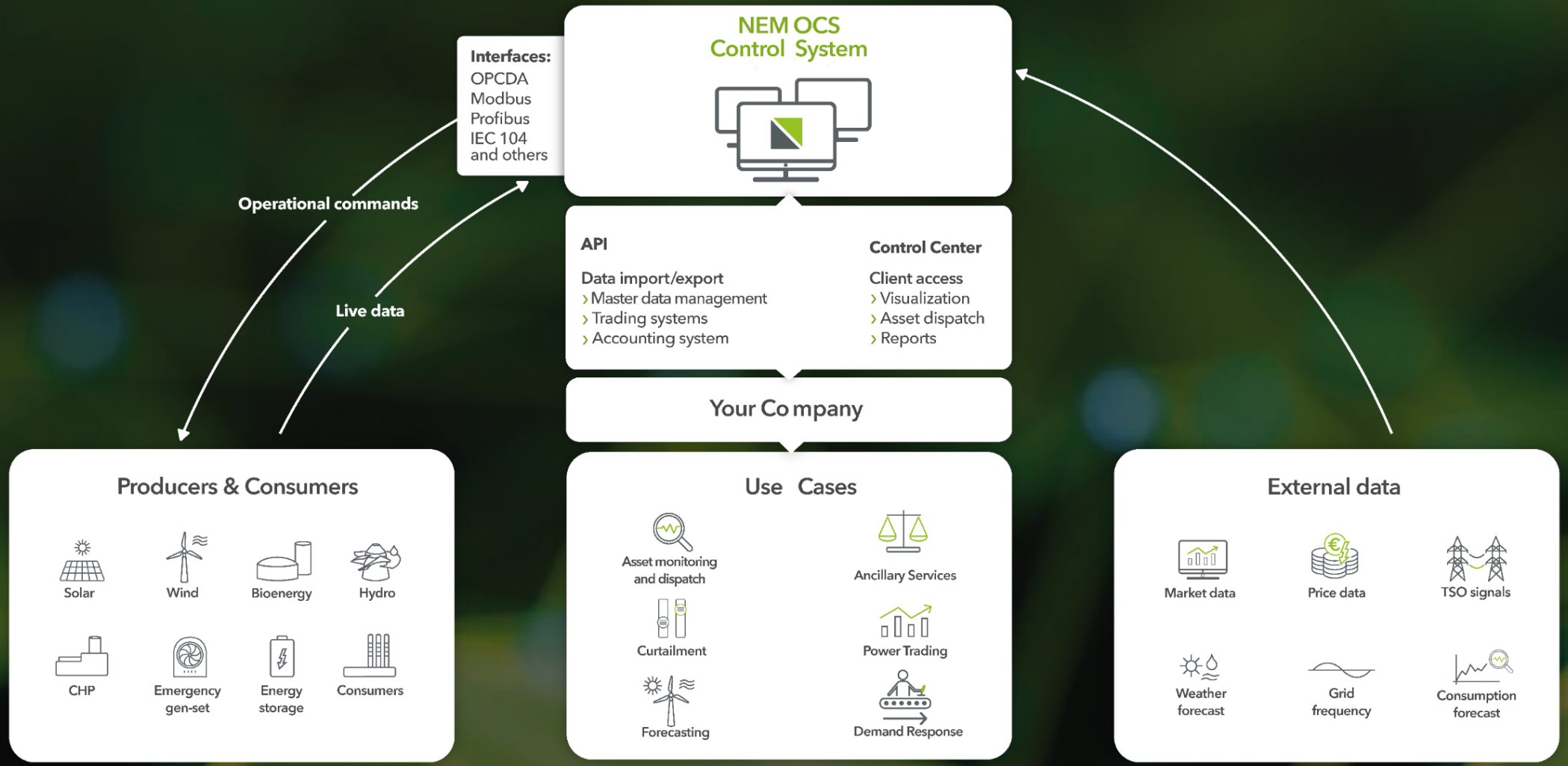
What is a virtual power plant

- Aggregation of decentralized renewable energy assets through a central virtual platform
- About 9500 assets with nearly 10 GW 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.)



Overview

NEMOCS as platform for your VPP & DER use cases



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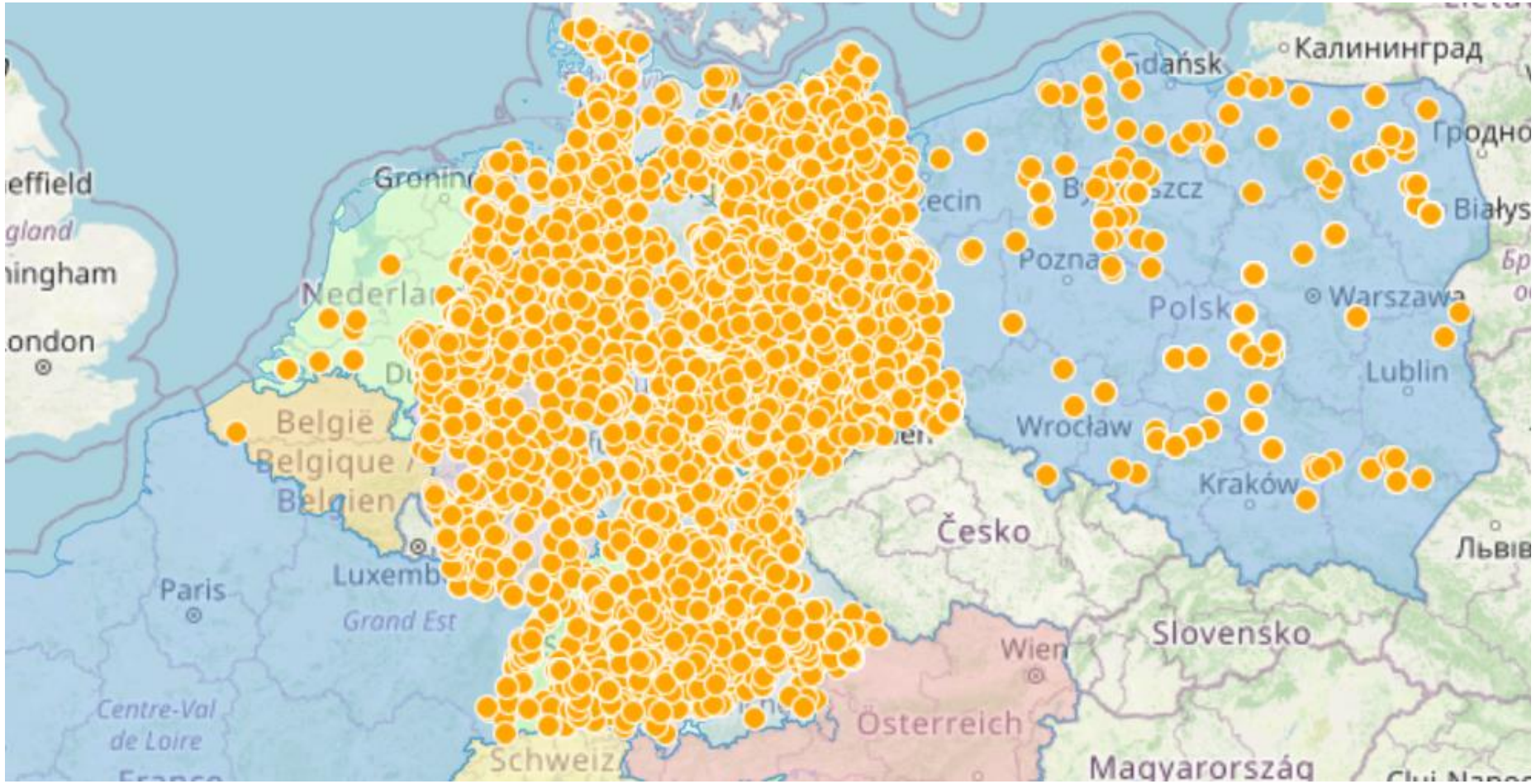
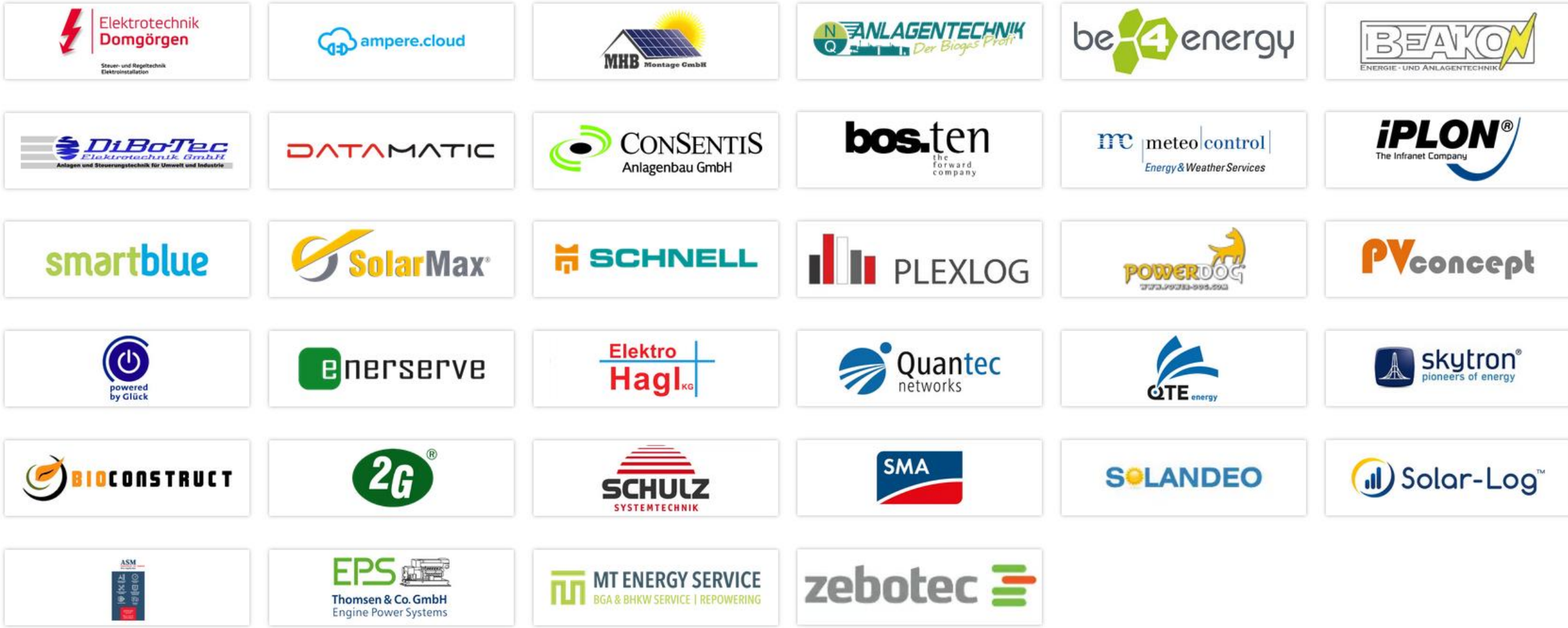
Our PV portfolio



PV-related services

- PV plant steering and live-data collection via Next Box
- PV curtailment services
  - In Germany DSOs are no longer obliged to pay a market premium in case of 6 subsequent hours of negative DA prices
  - Next can shut off PV plants in those cases
- Bilateral PV Power-Purchase-Agreements
- PV forecasts
  - Eg. PV Monte Christi 58MW (Dominican Republic)
- PV monitoring via NEMOCS (VPP software solution)

PV monitoring interfaces to



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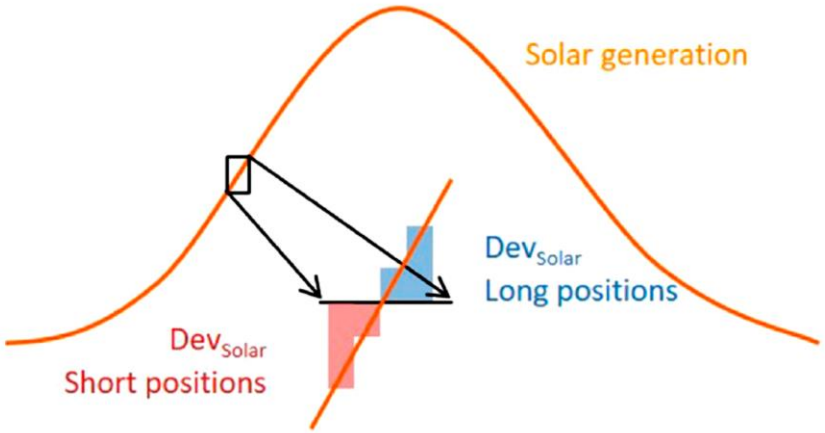
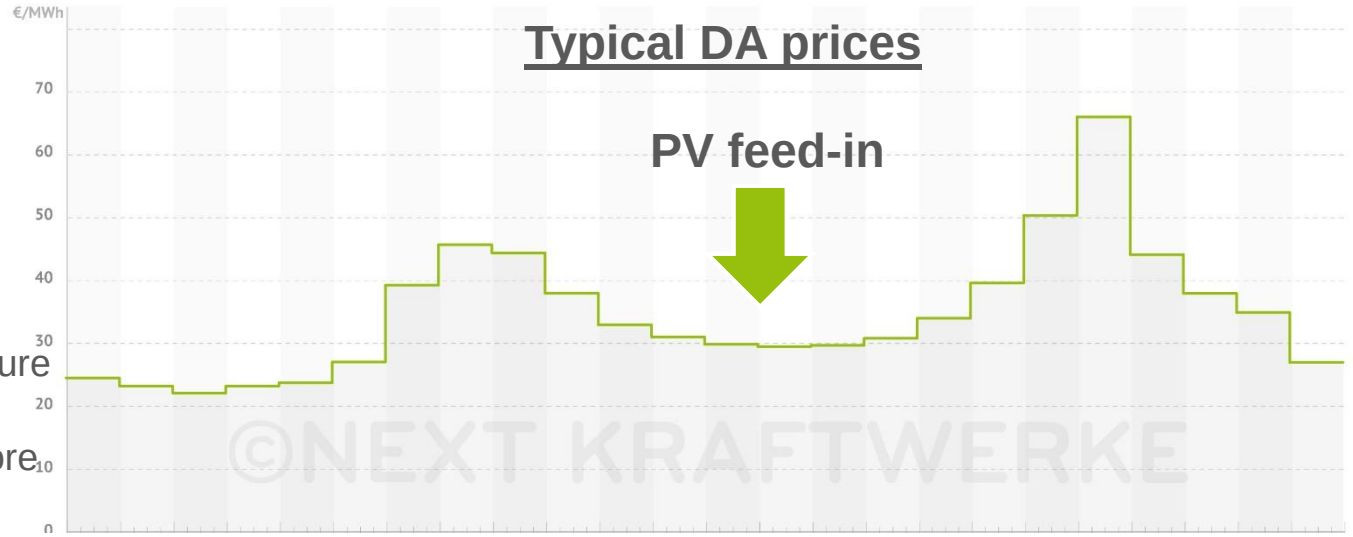
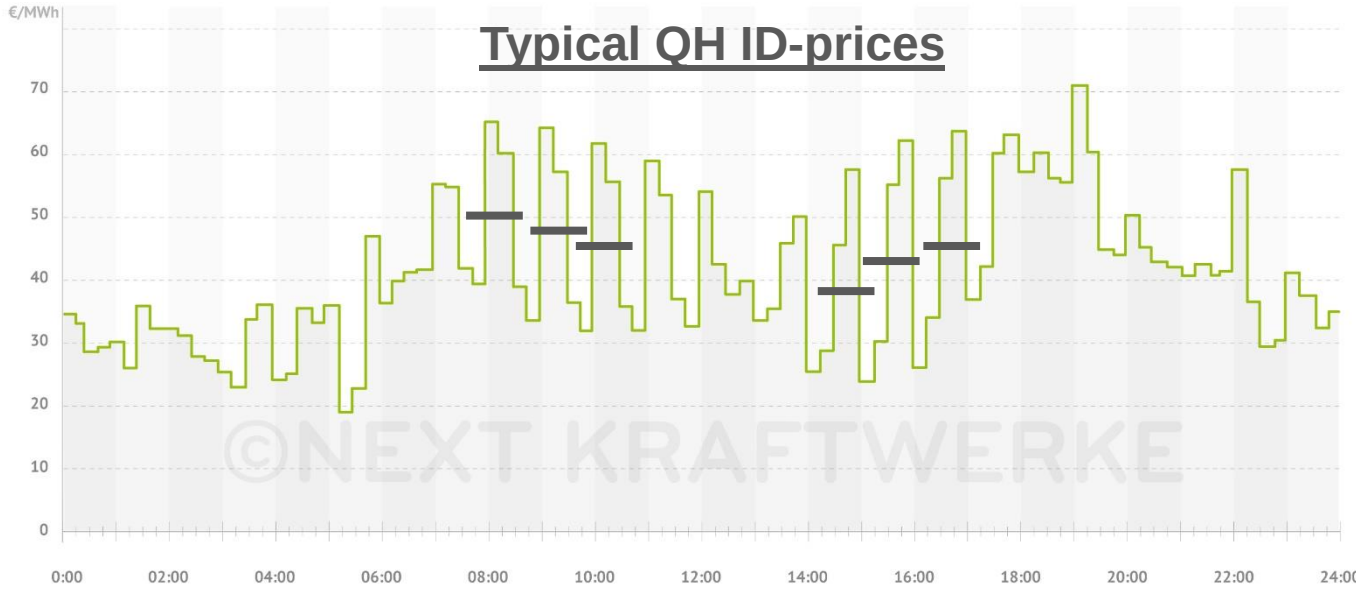
Short-term market in Germany

- BRPs are responsible for balancing of a portfolio
- EPEX SPOT Germany:
  - DA auction at noon
  - ID auction at 3pm
  - ID continuous starts after the ID auction – gate closure 30min before real time
  - Extended trading within control zone until 5min before real time
- PV infeed creates camel-like price pattern
- Clear influence on German short-term prices

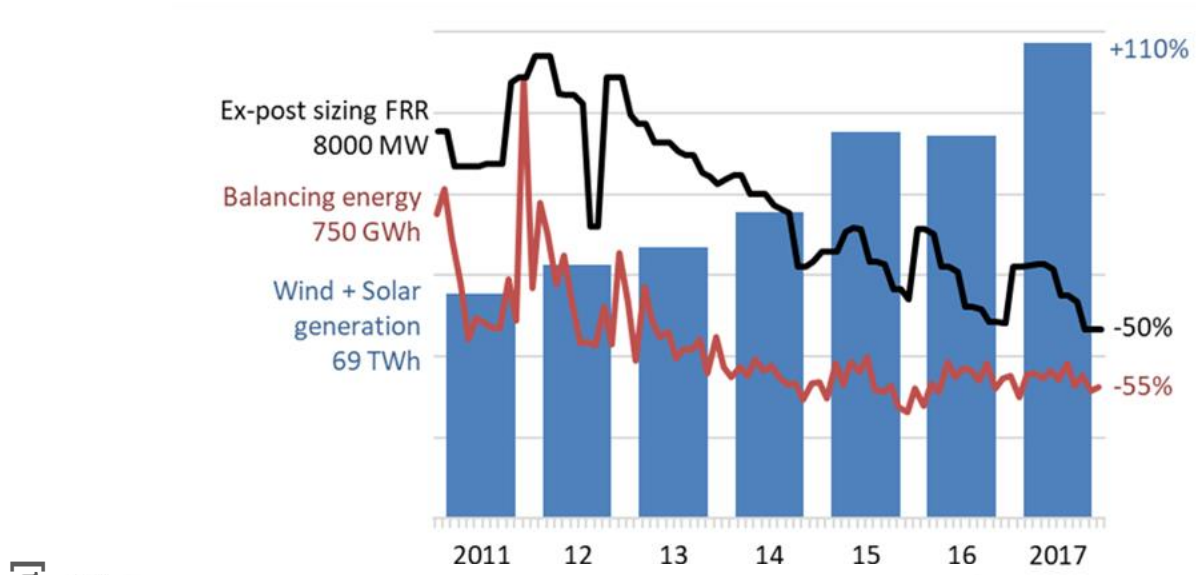


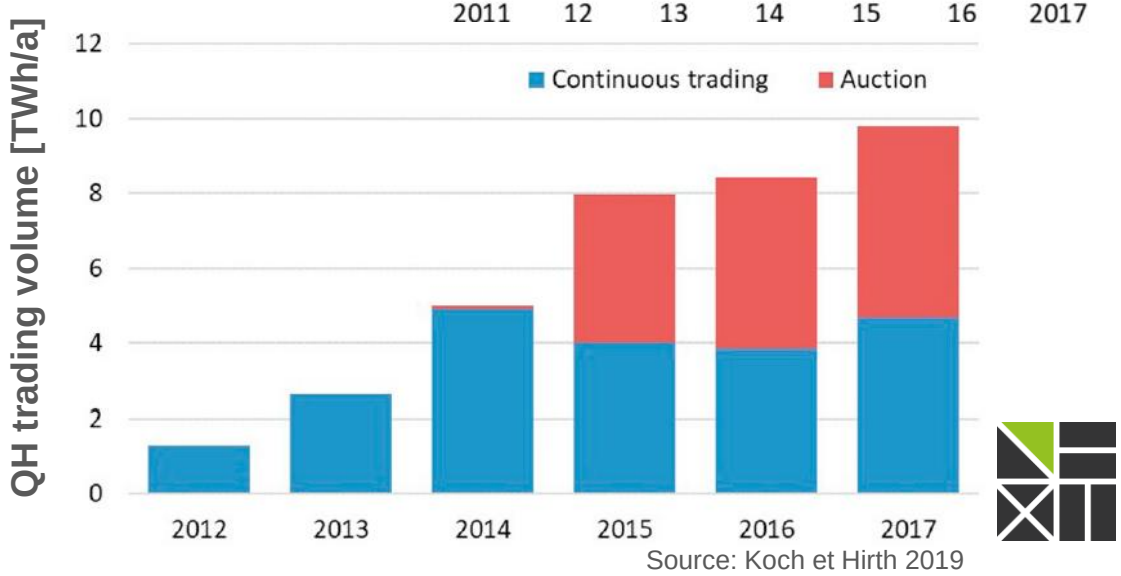




Cost-efficient integration of Wind/Solar

- 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

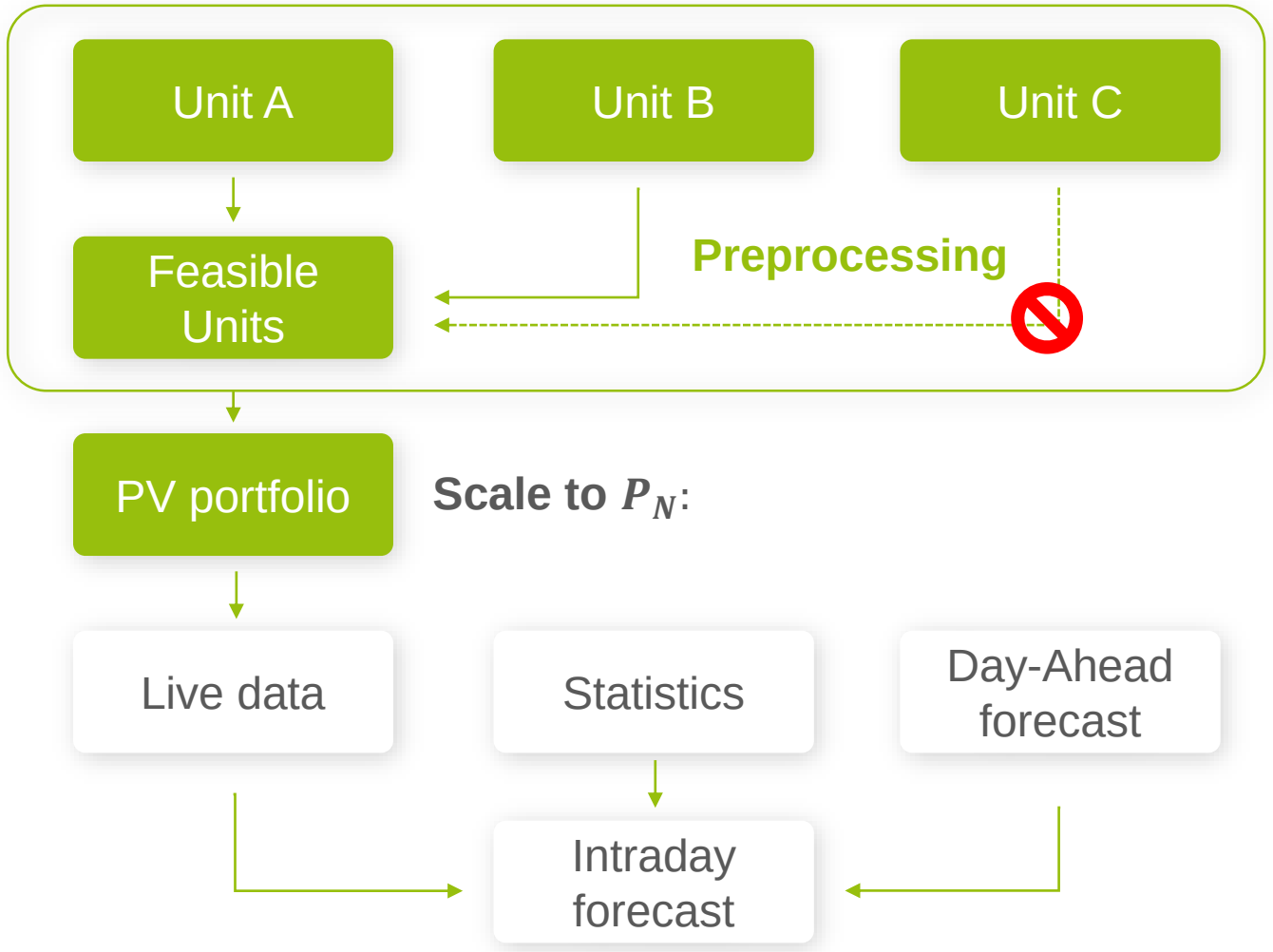
Live infeed

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

Historical Data

- Statistical algorithms
- Fast & robust

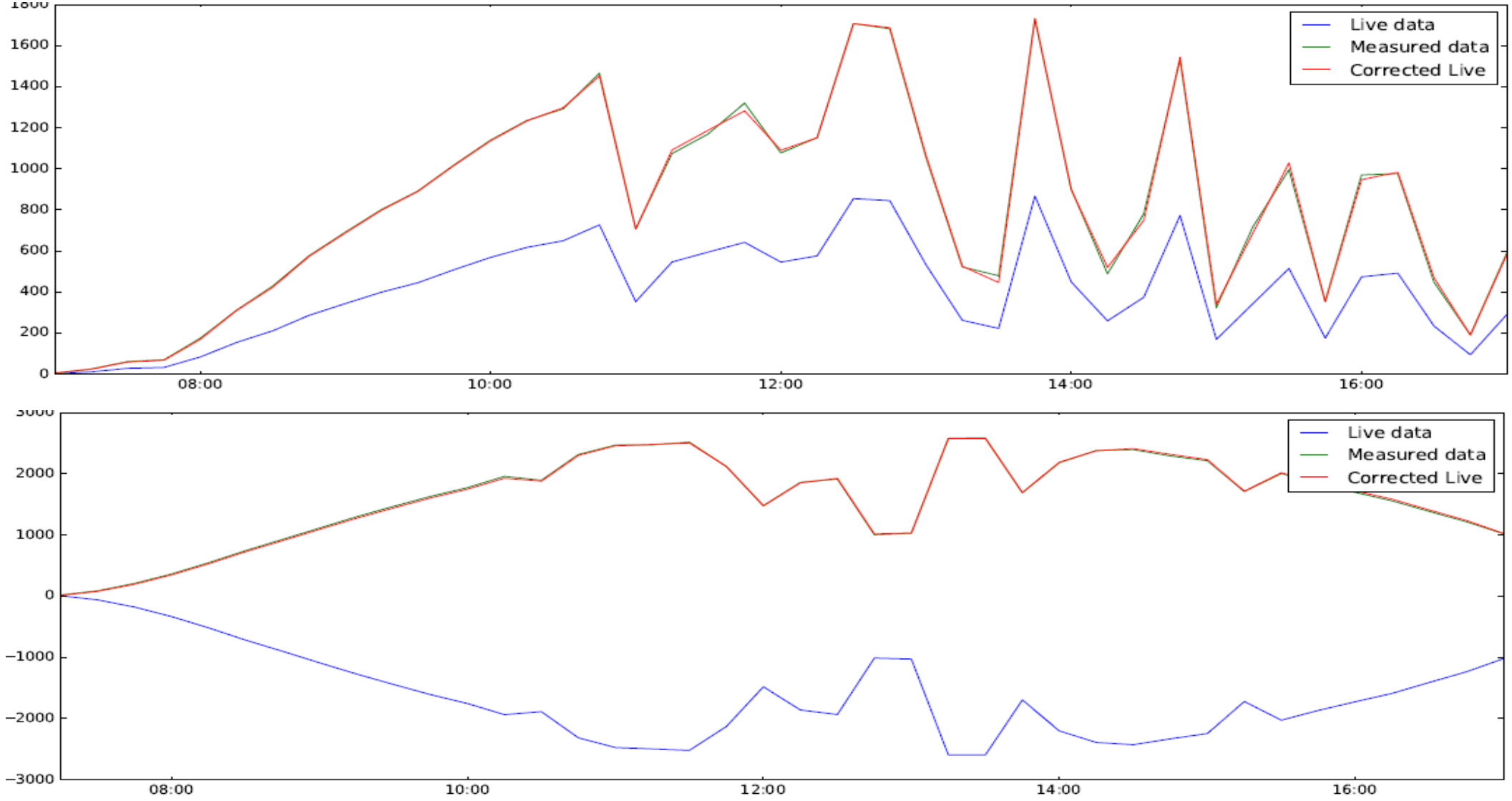
Forecasting process



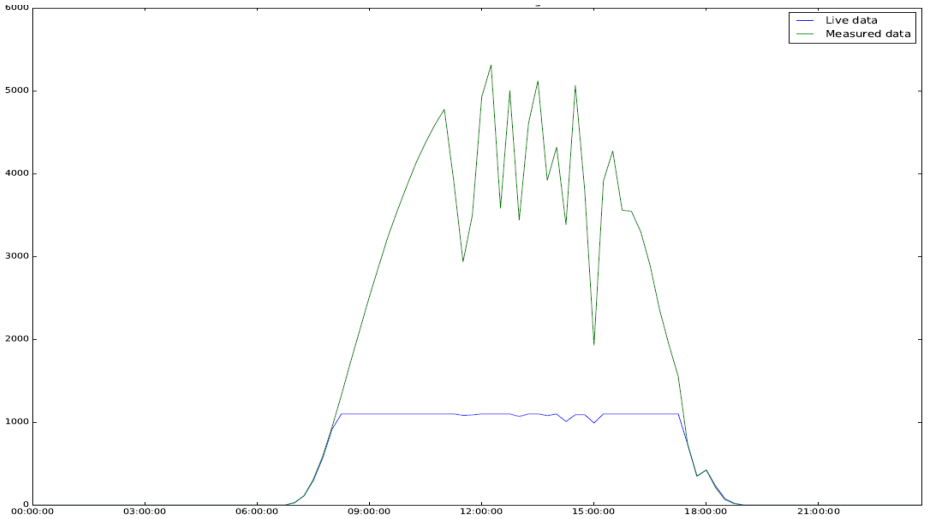
Problems and Bottlenecks

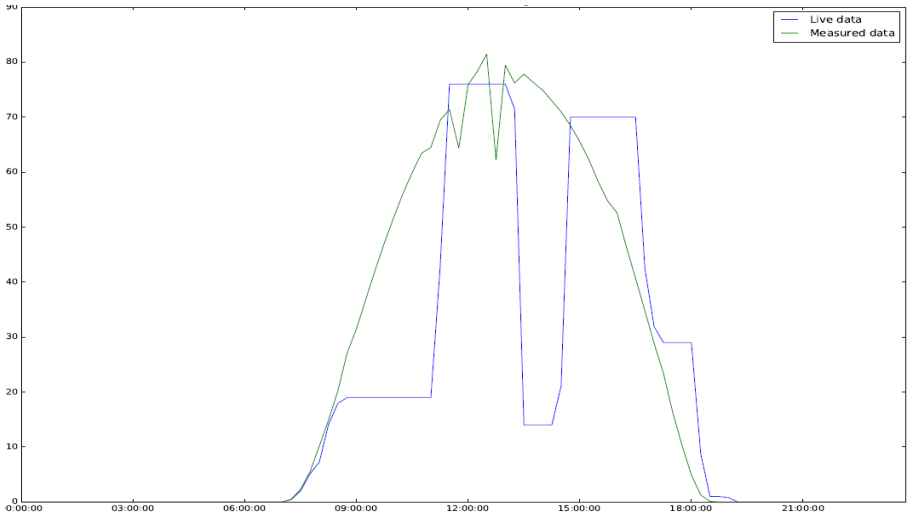
- Technical errors when reading live data → data correction & data cleaning
- Different data sources (ftp, protocols for live data) → data abstraction for further processing
- Processing time & computing capacity → efficient algorithms required. Power from >5000 units need to be traded

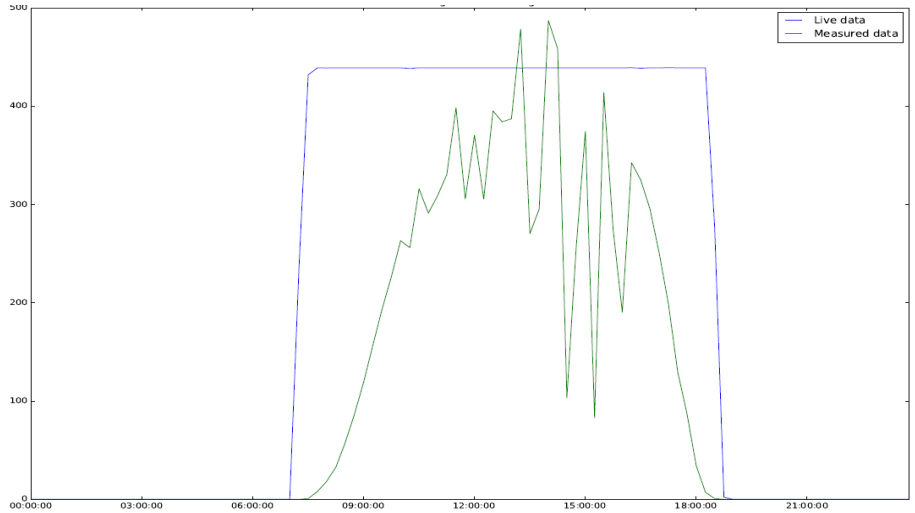
Preprocessing: Data correction

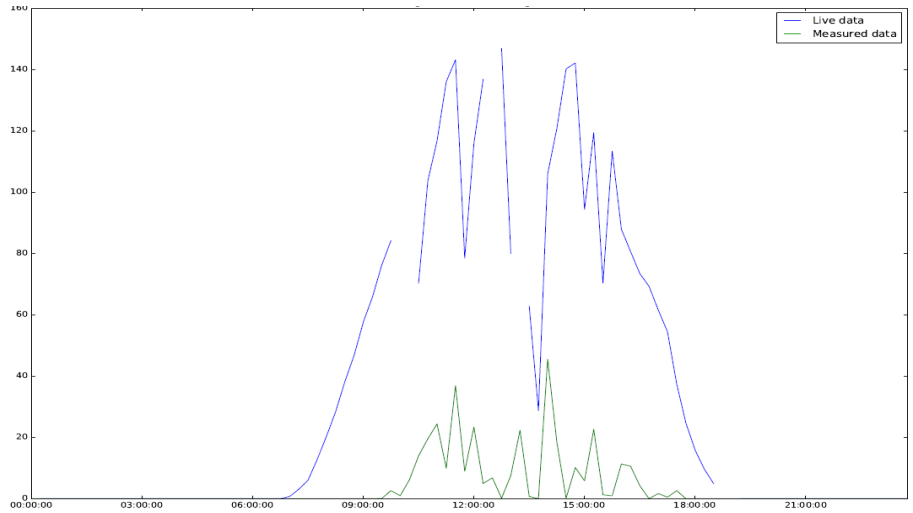


Preprocessing: Data cleaning

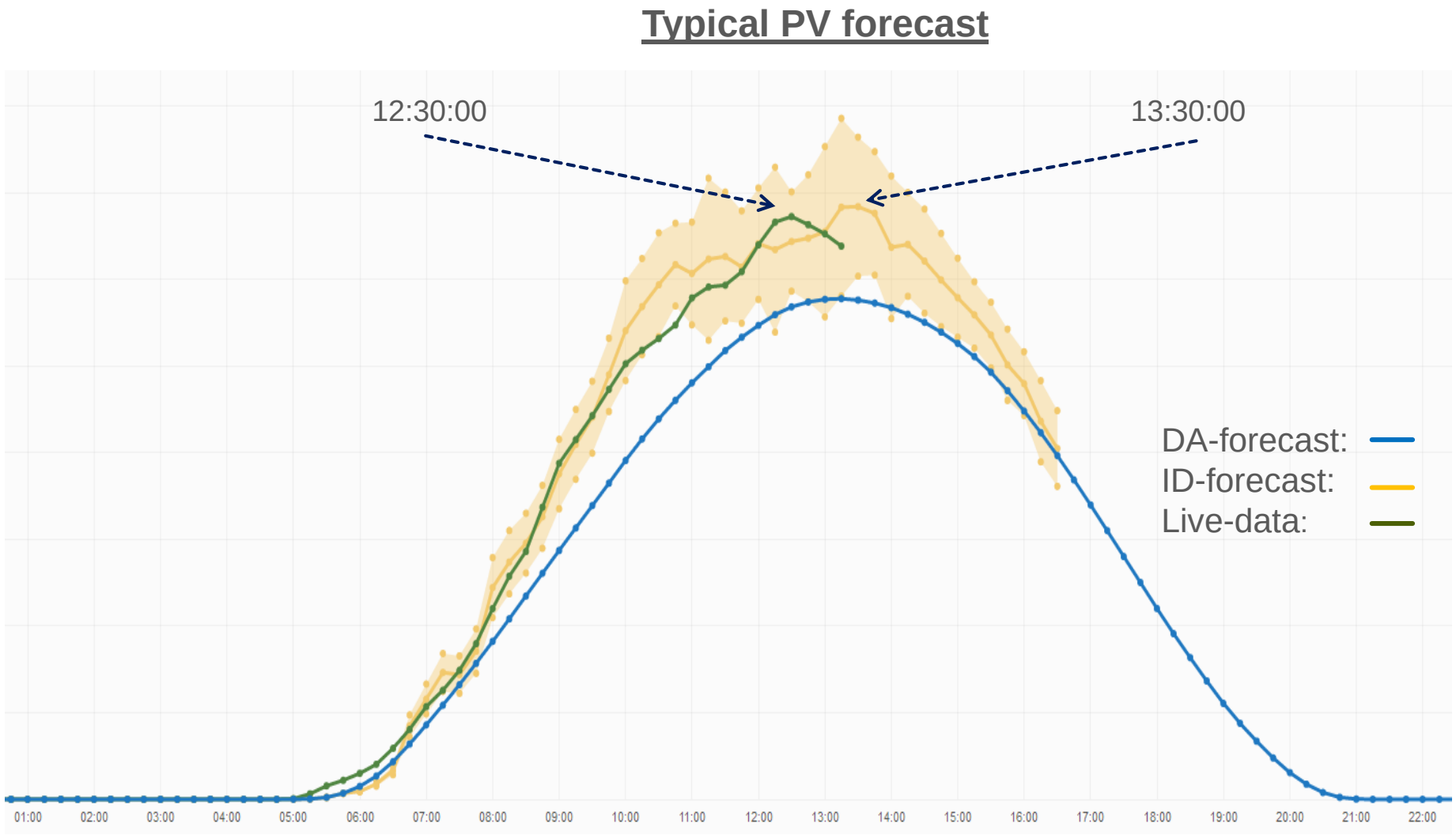








Real life example



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Summary

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

Next supports profitable operation of PV technologies via various services

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
- Combination of live-data, deterministic and statistical algorithms lead to effective portfolio forecasts

Thank you for your attention.

Contact

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