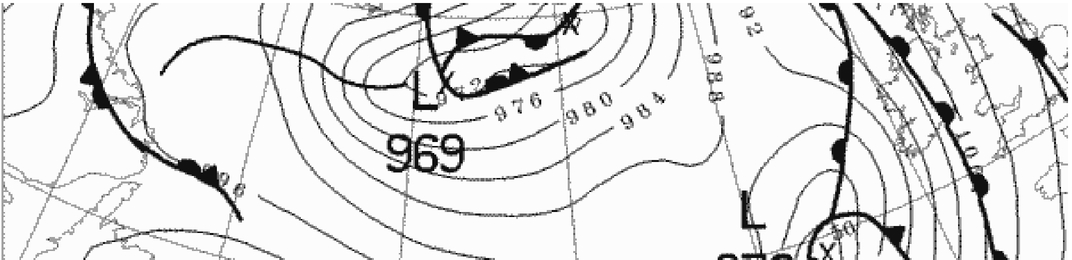
Wind and Solar Power Forecasting

Matthias Lange

SPP member meeting

14 June 2017
Little Rock



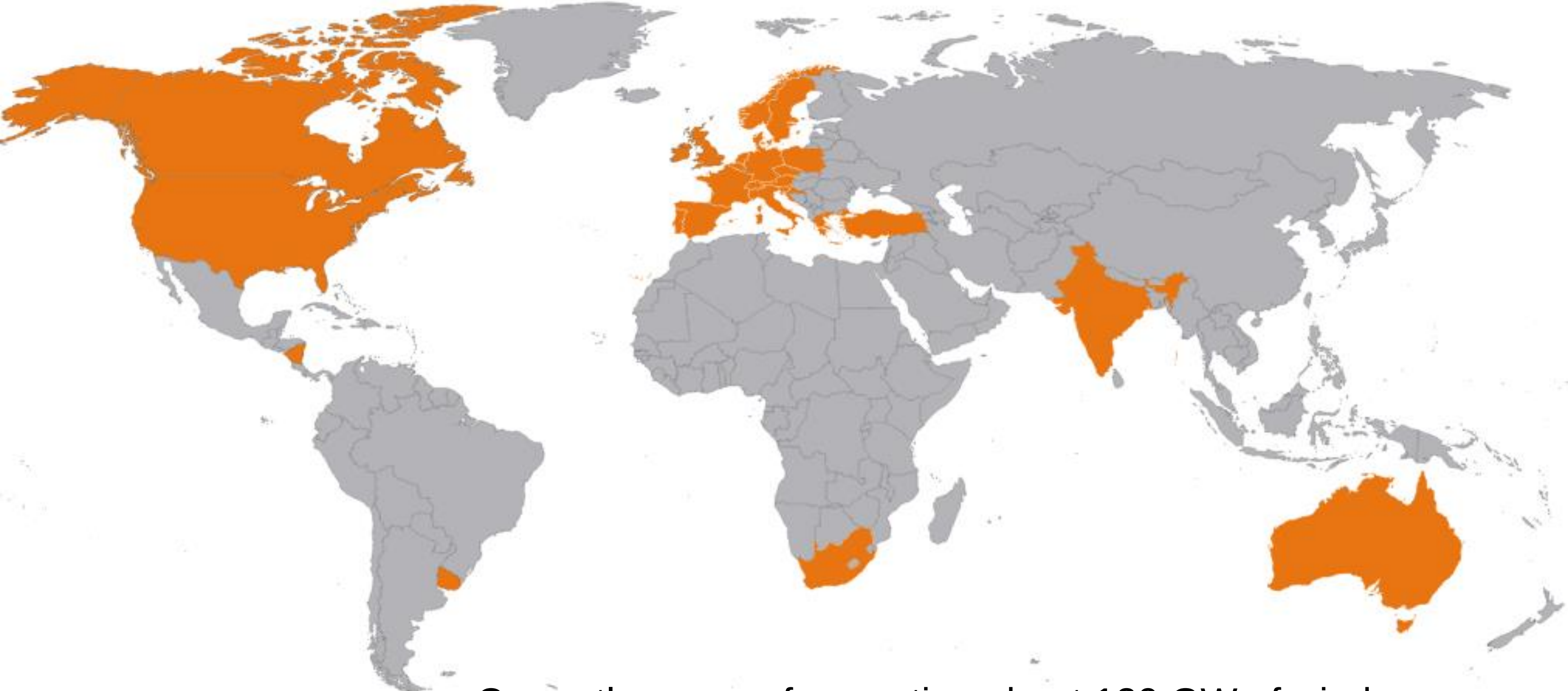
energy & meteo systems

About energy & meteo systems

- founded 2004, now 80 employees
- independent company owned by two founders
- goal: integration of renewables into grids and markets
- services:
  - wind and solar power forecasts
  - virtual power plants (software)
  - consultancy
  - research and development
- customers:
  - international TSO, DSO and ISO
  - energy trading companies
  - power plant operators

About energy & meteo systems

International business activities



Currently, we are forecasting about 120 GW of wind power and nearly 50 GW of solar power

Choice of international customers

TenneT Taking power further

EWE

Midwest ISO We manage power.

50hertz

RWE

PJM Interconnection

TVA Tennessee Valley Authority

amprion

e·on

SPP Southwest Power Pool

EnBW

Statkraft

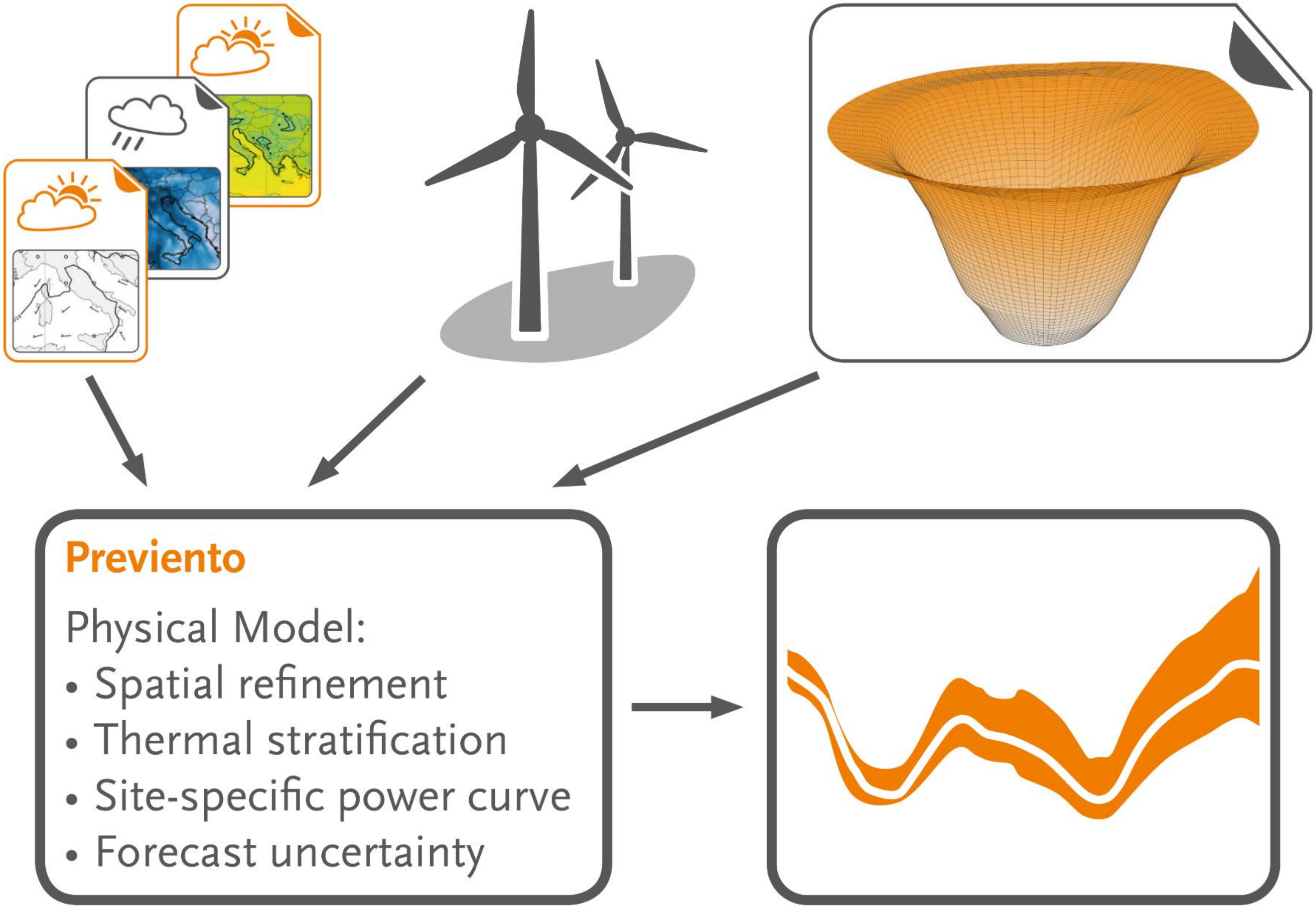
BPA
Bonneville Power Administration

elia

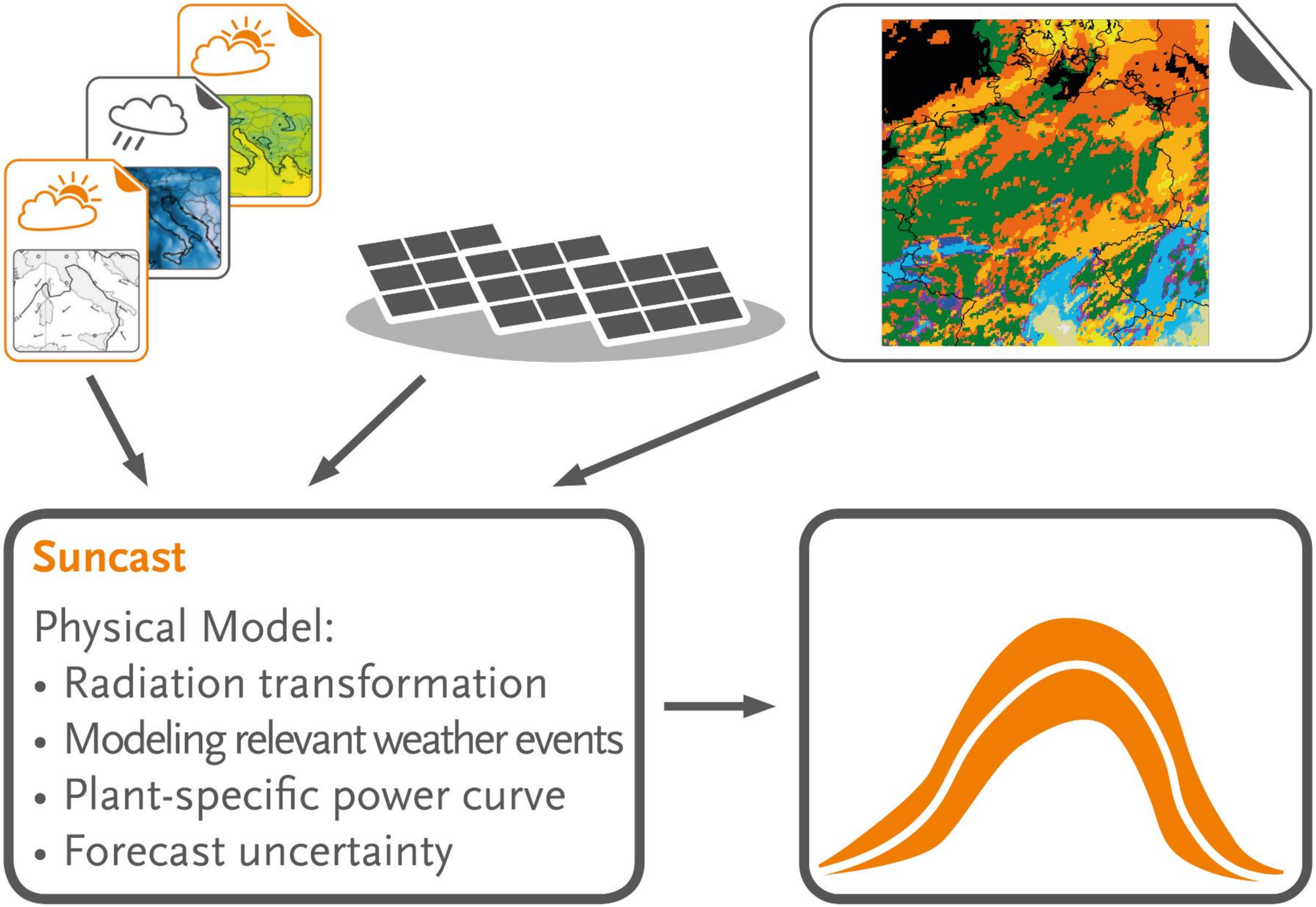
VATTENFALL

AEMO AUSTRALIAN ENERGY MARKET OPERATOR

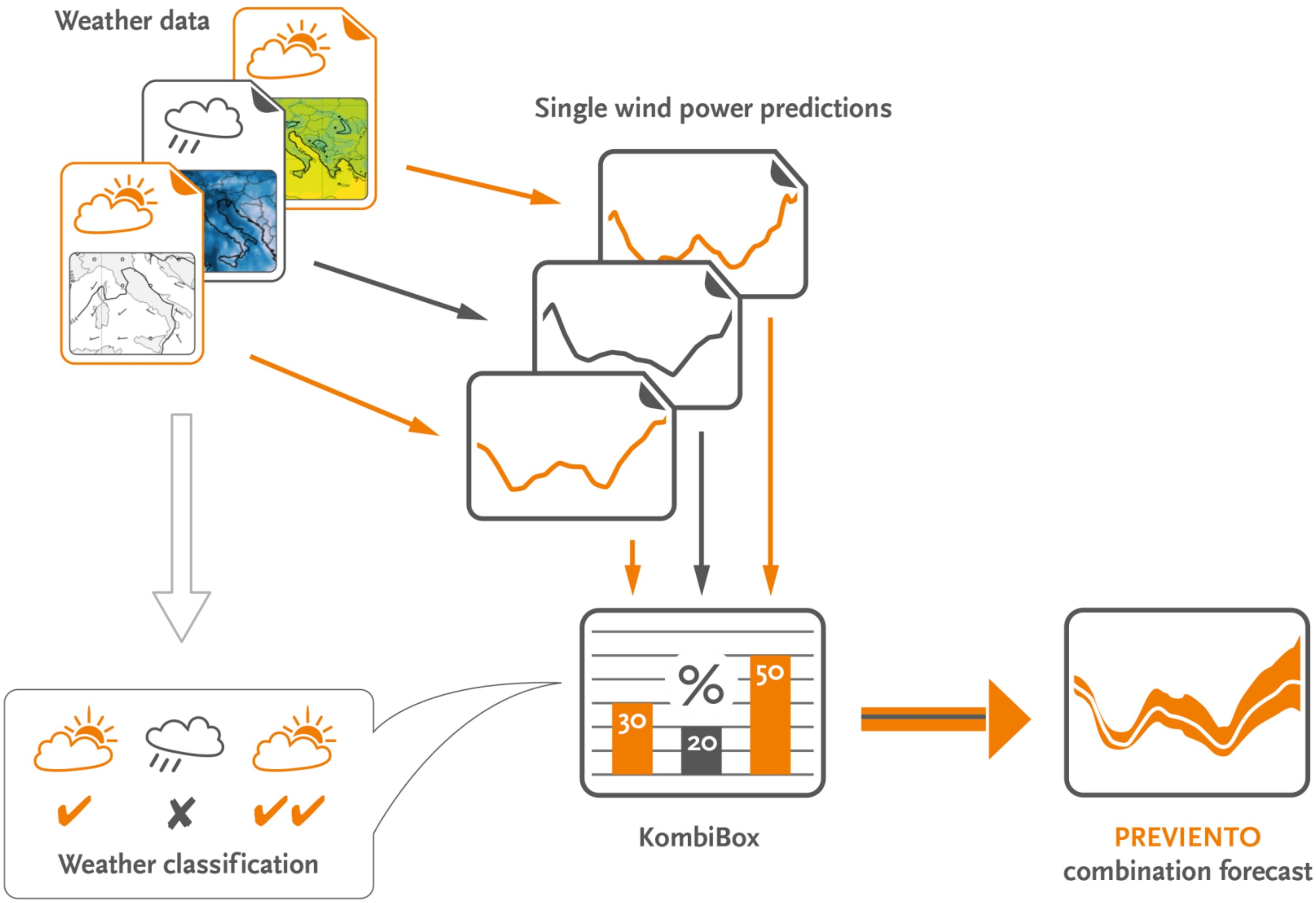
Previento wind power forecasting system



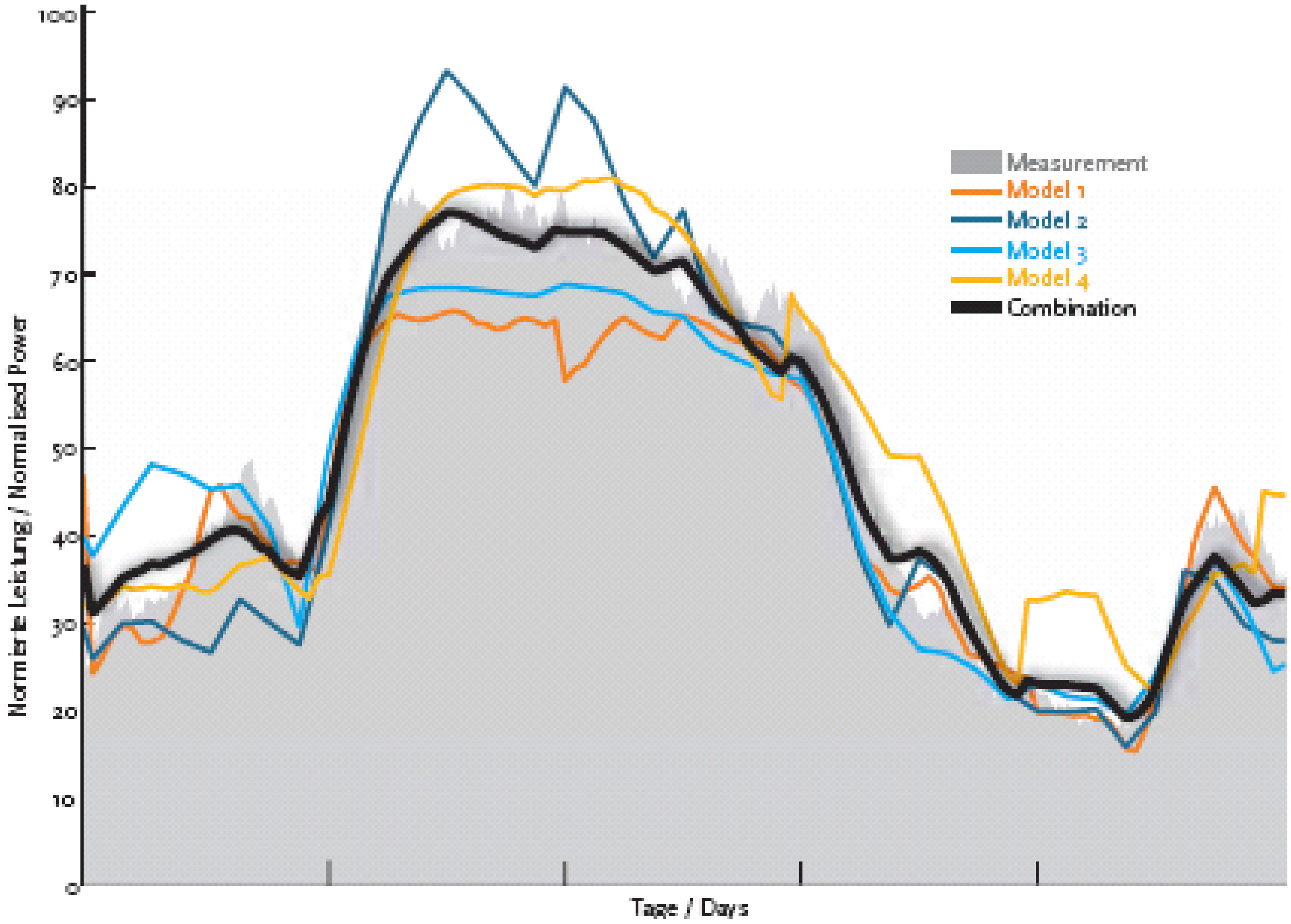
Suncast solar power forecasting system



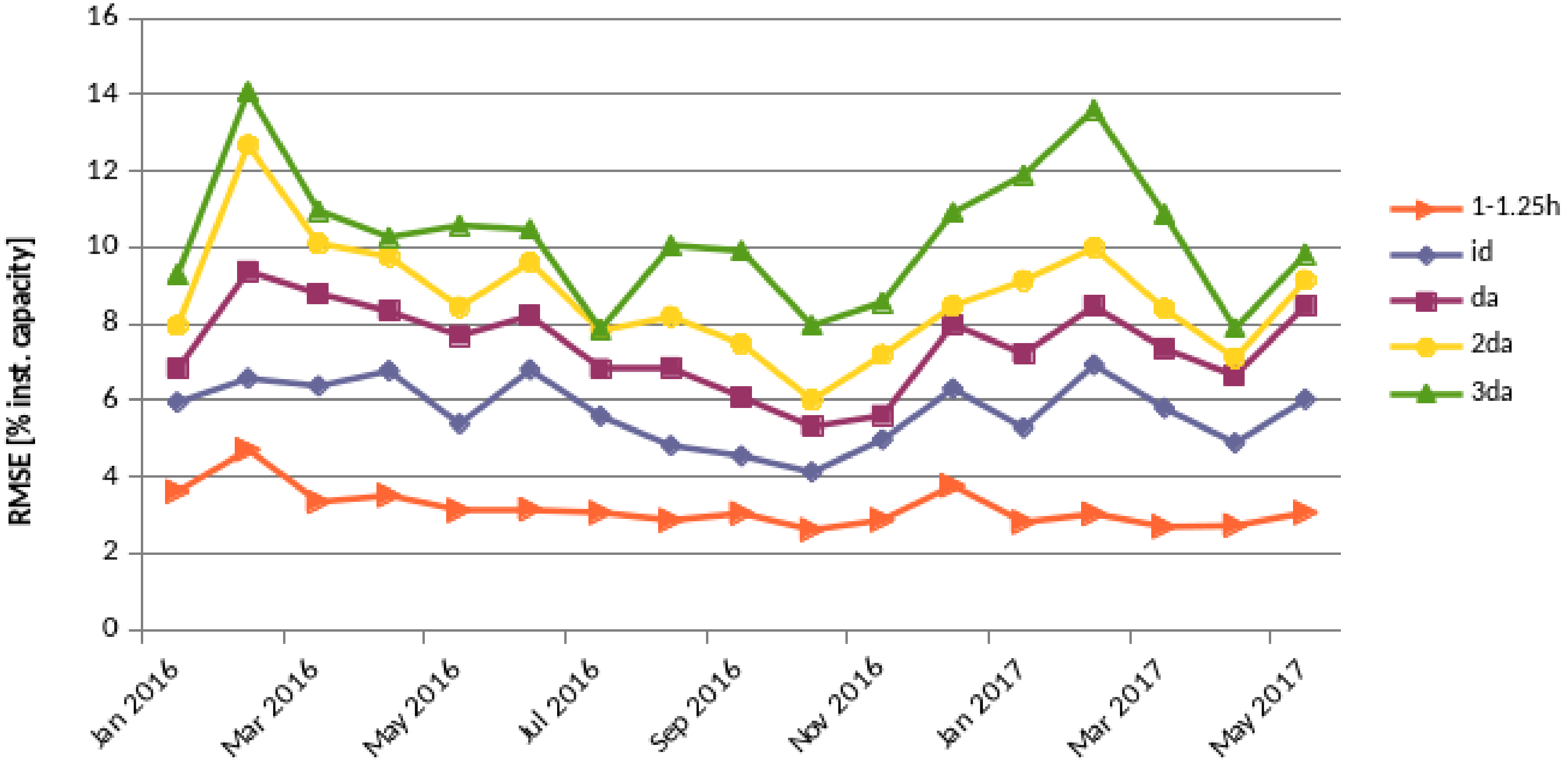
Combination of weather models



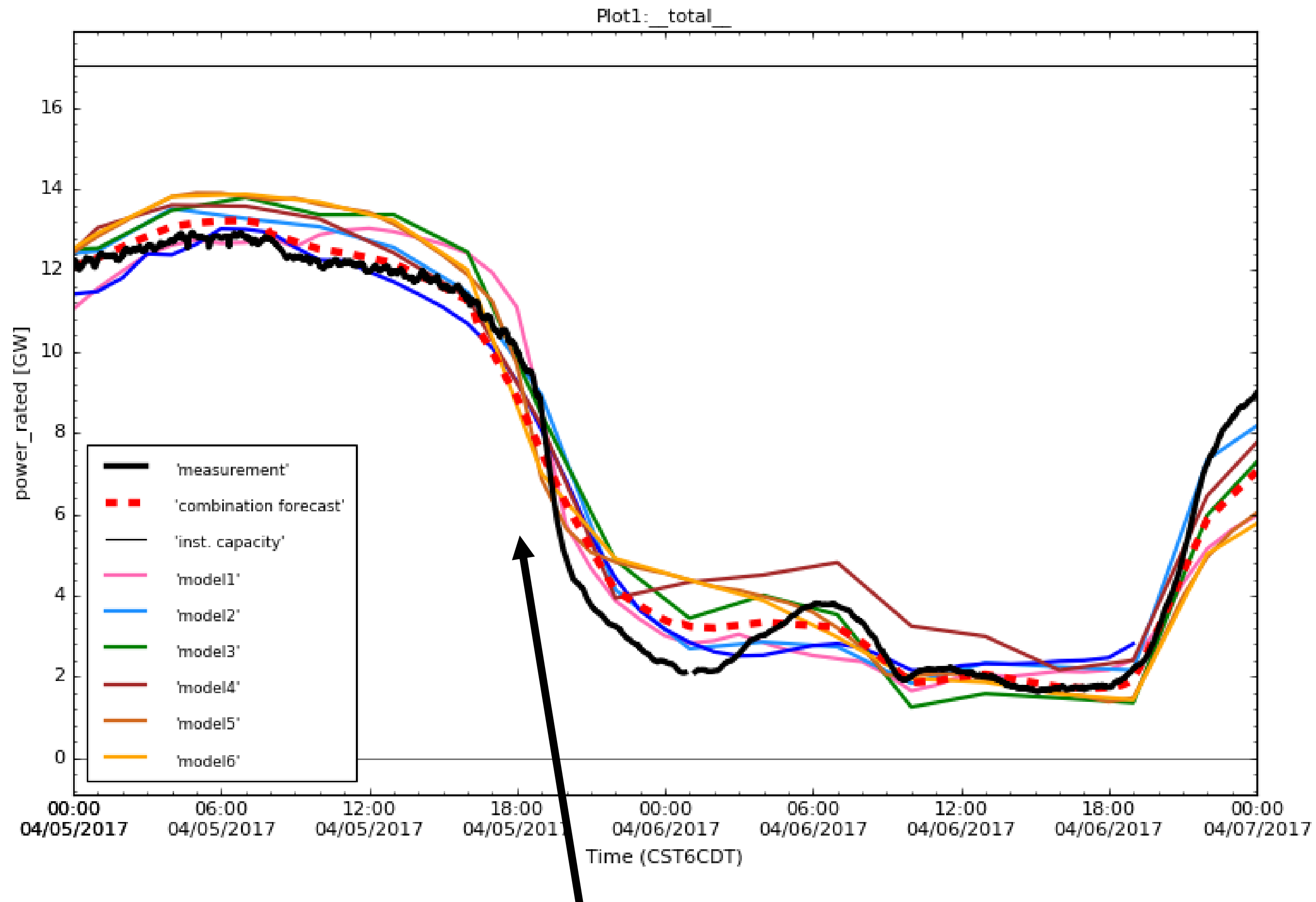
Do not trust in one weather model only !



Evaluation Wind: SPP Portfolio - RMSE

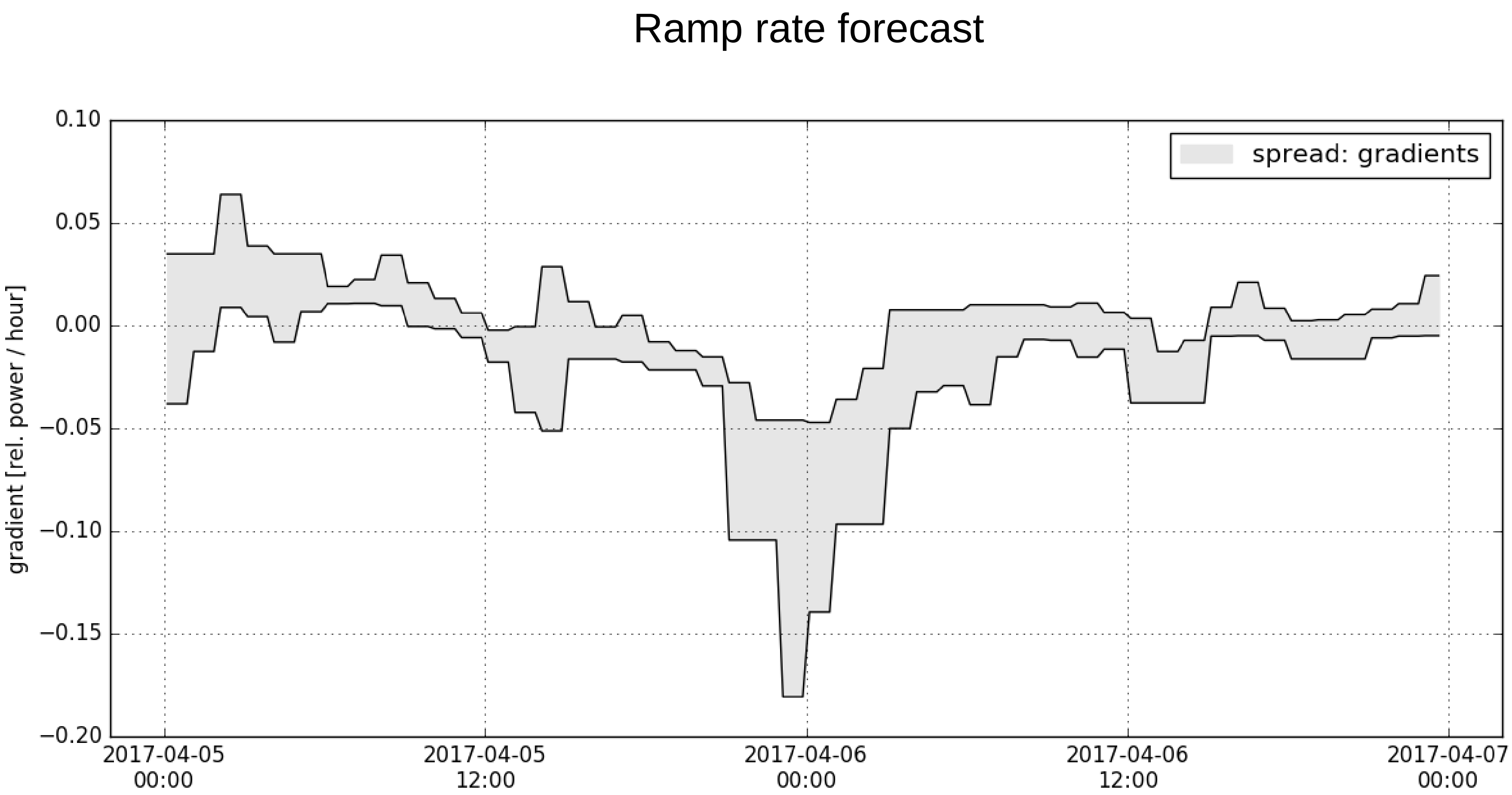


Special Weather Situations: Sharp ramps – SPP portfolio

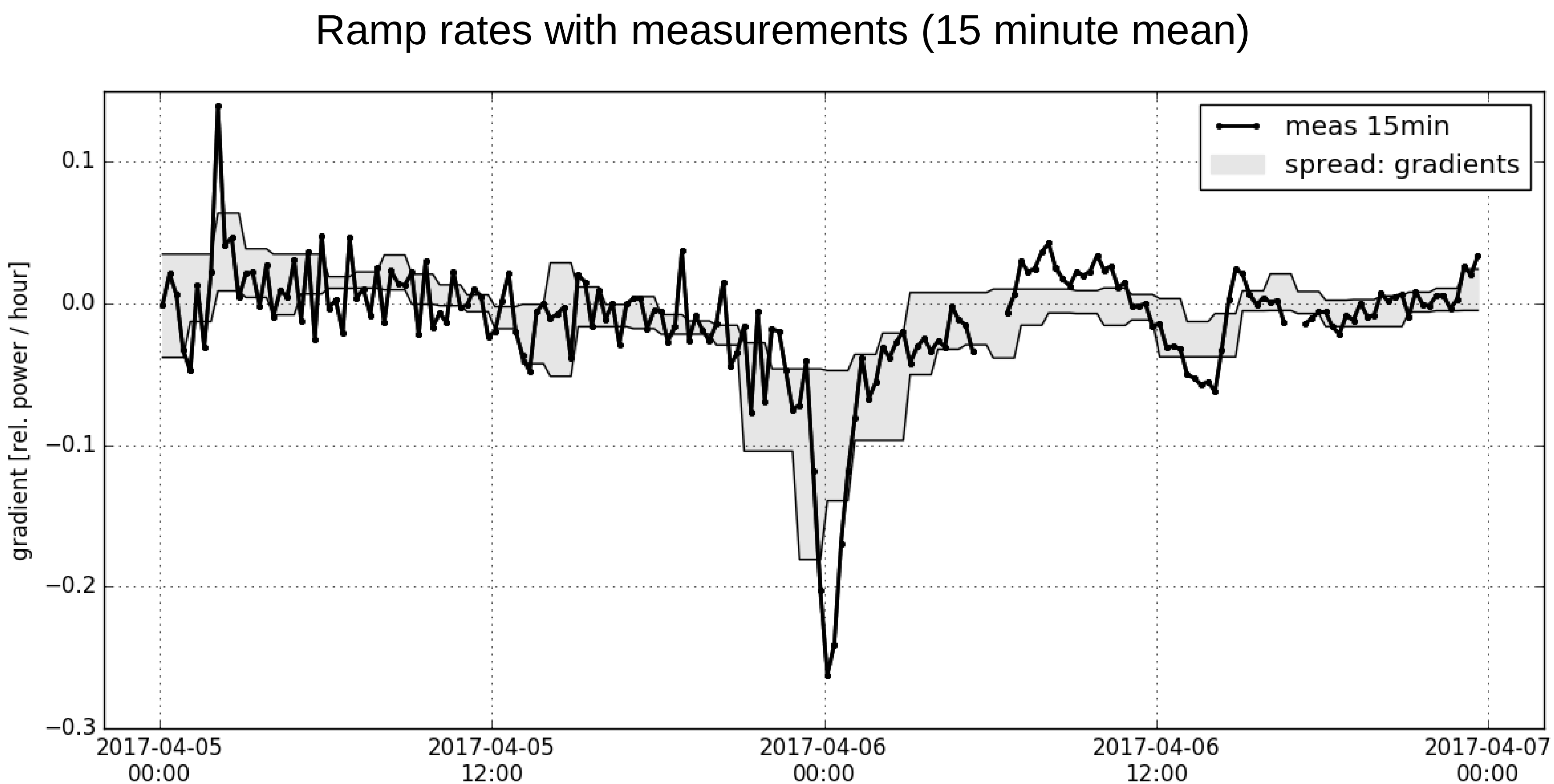


temporal resolution of weather models is not able to capture sharp ramps

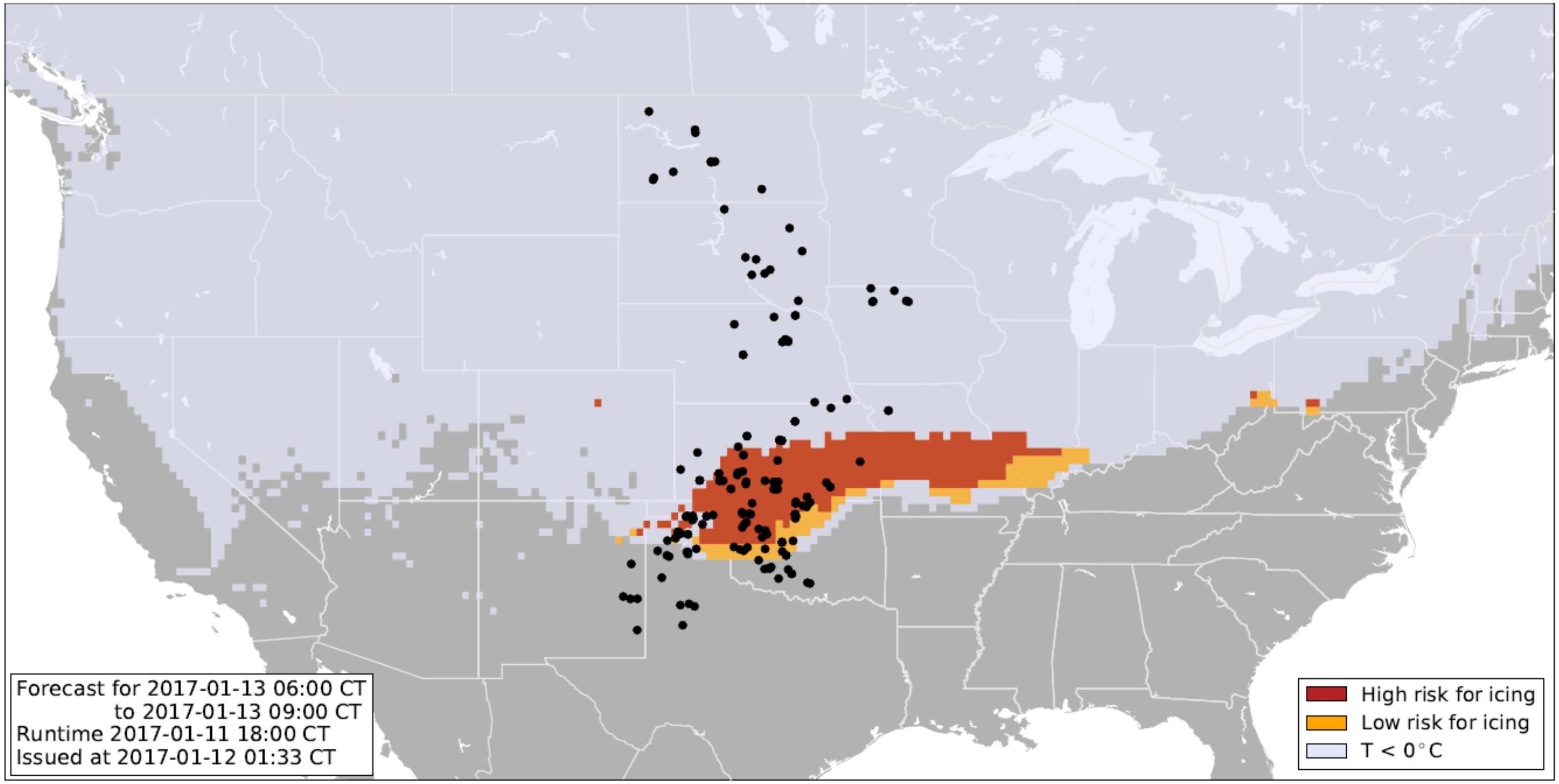
Improved Ramp Forecast



Improved Ramp Forecast



Icing: Forecast Pre-Warning



Thanks for your attention !

www.energymeteo.com

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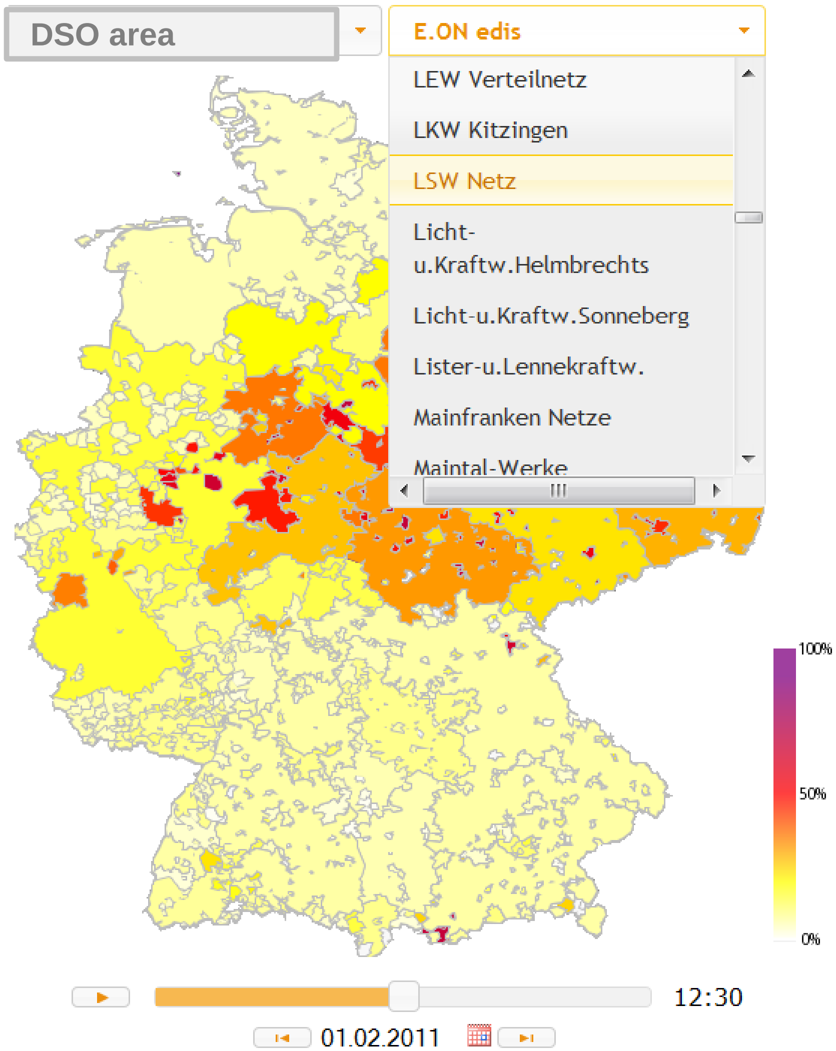
Roof-top: Regional solar power forecast for DSO areas



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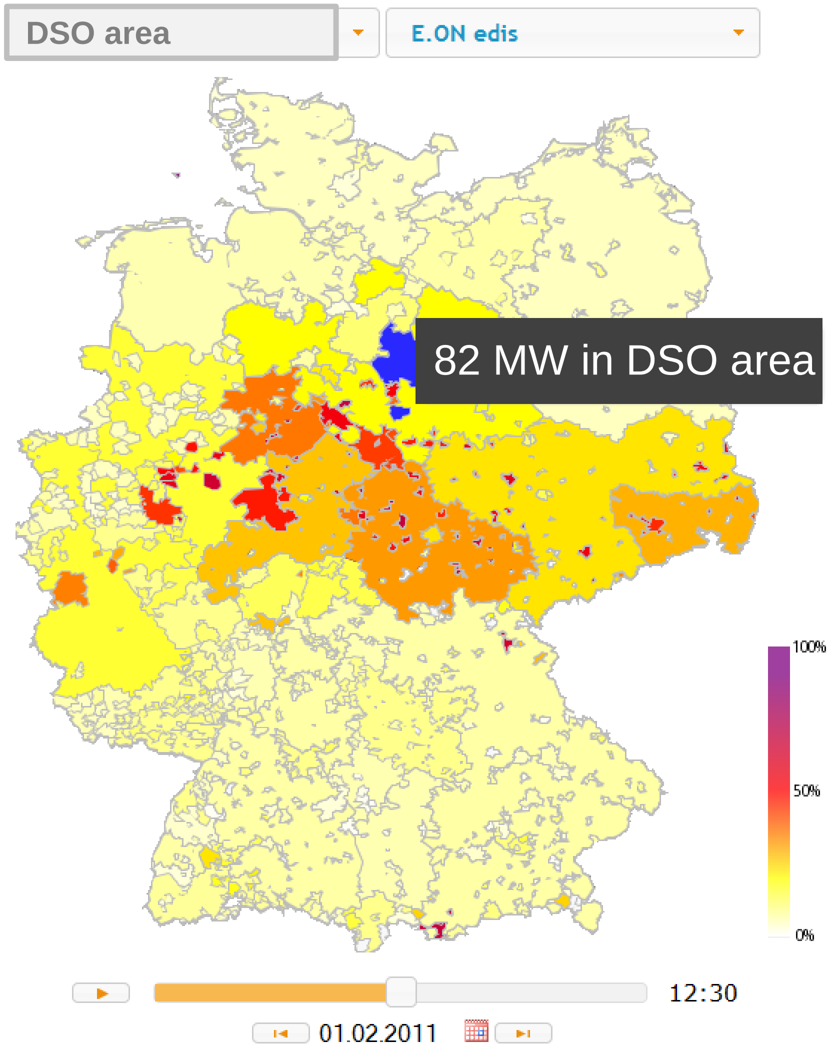

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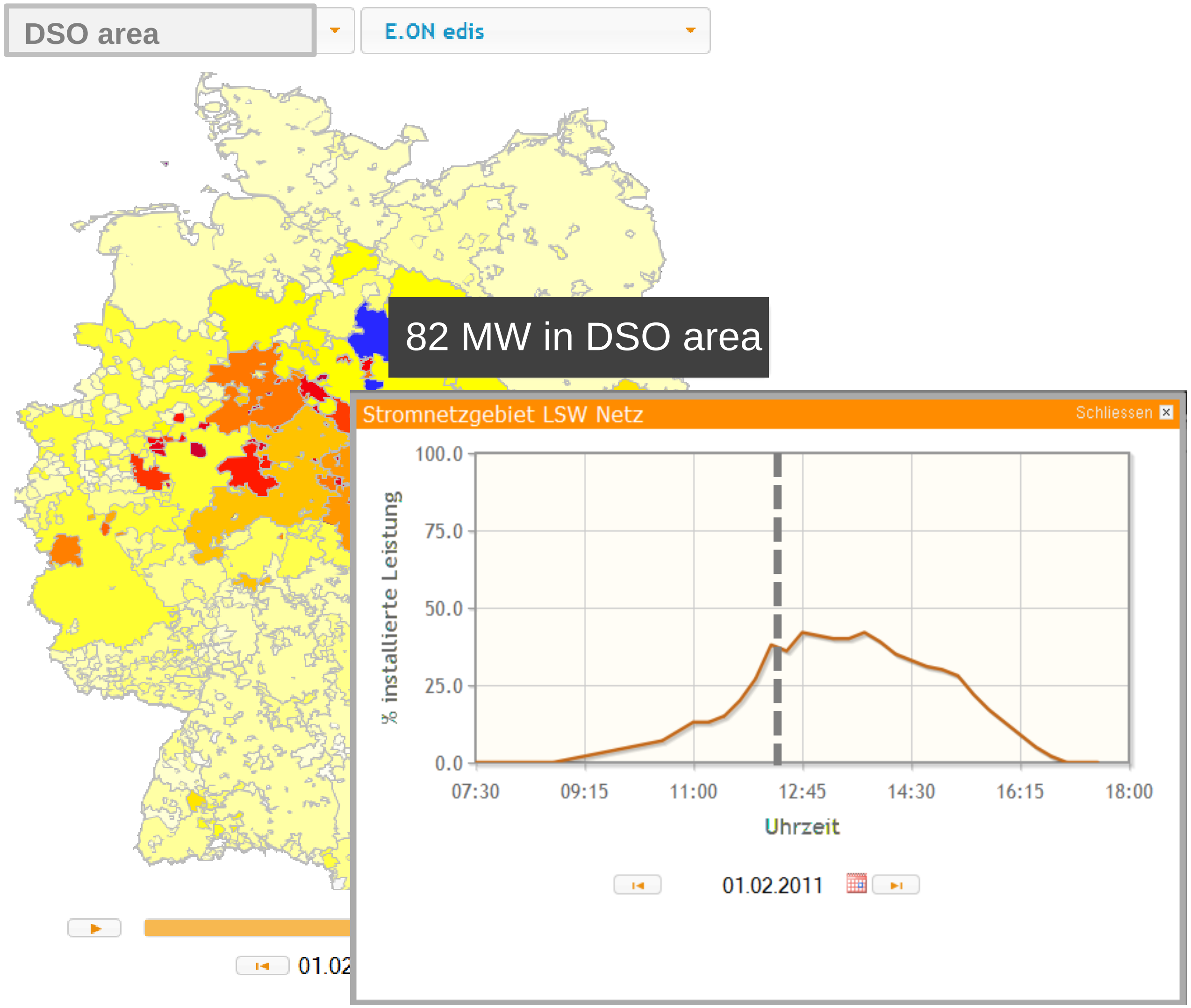
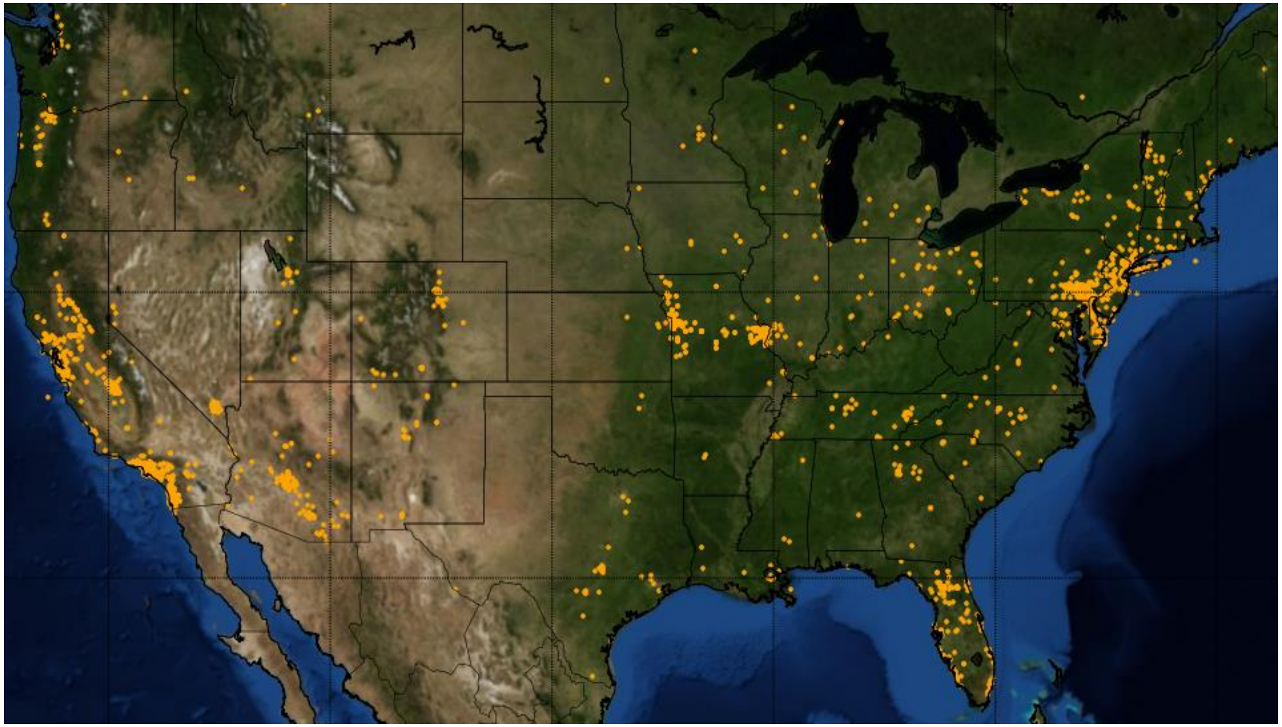


Online monitored PV plants in the US



~ 11000 PV plants
(~400 plants in SPP)

Static information of each PV plant

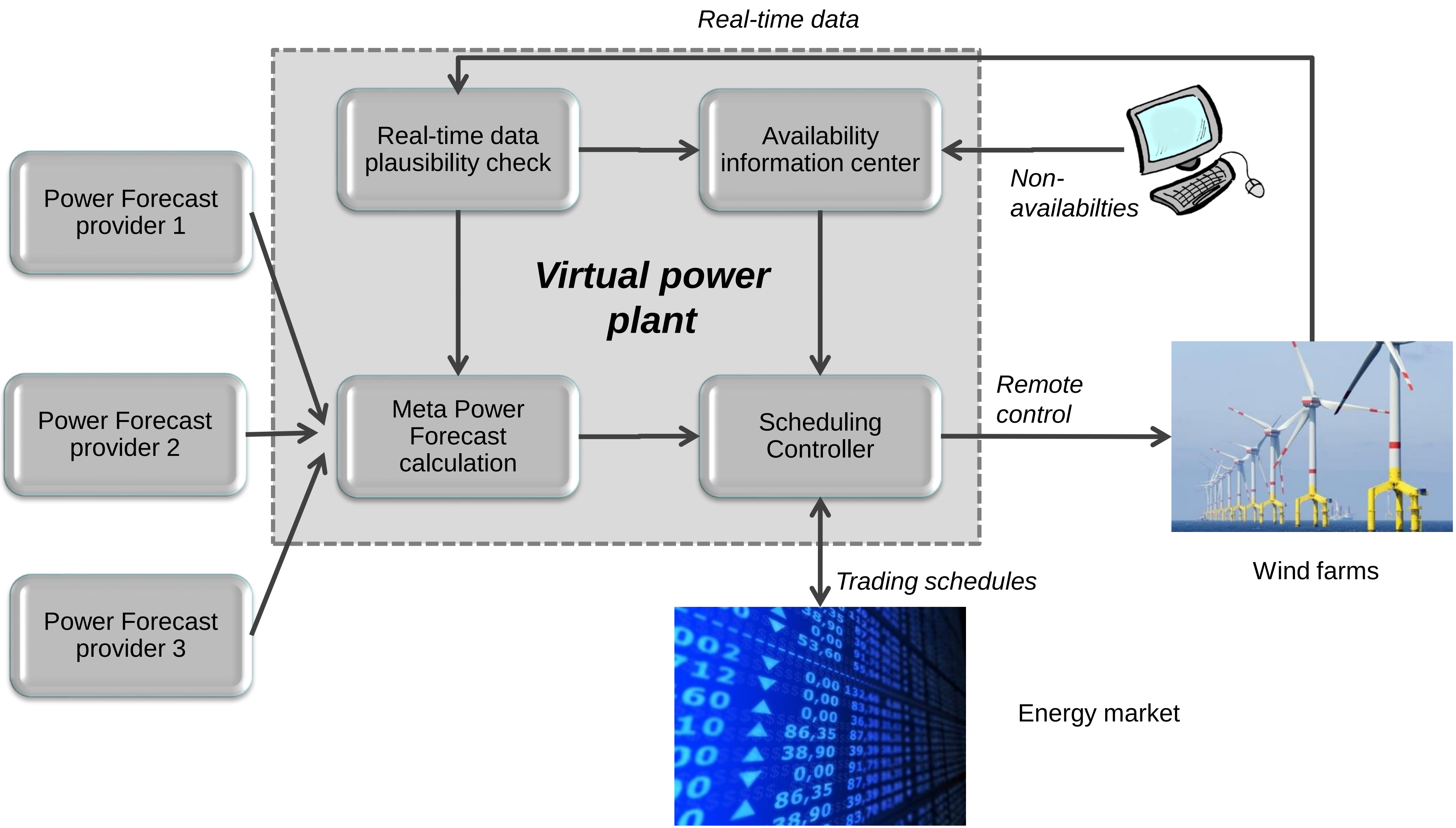
Online monitored on 15 min, hourly or daily basis

Databasis is growing day by day

Forecast of roof-top solar power

- Main difficulty: how many PV modules are installed and where exactly?
- Register of roof-top plants is often not available, hence, different data sources have to be used
- Forecasts requirements:
  - Aggregated solar power forecast for regions, e.g. ZIP code areas
  - Intraday and day-ahead according to application

Virtual Power Plant as trading platform



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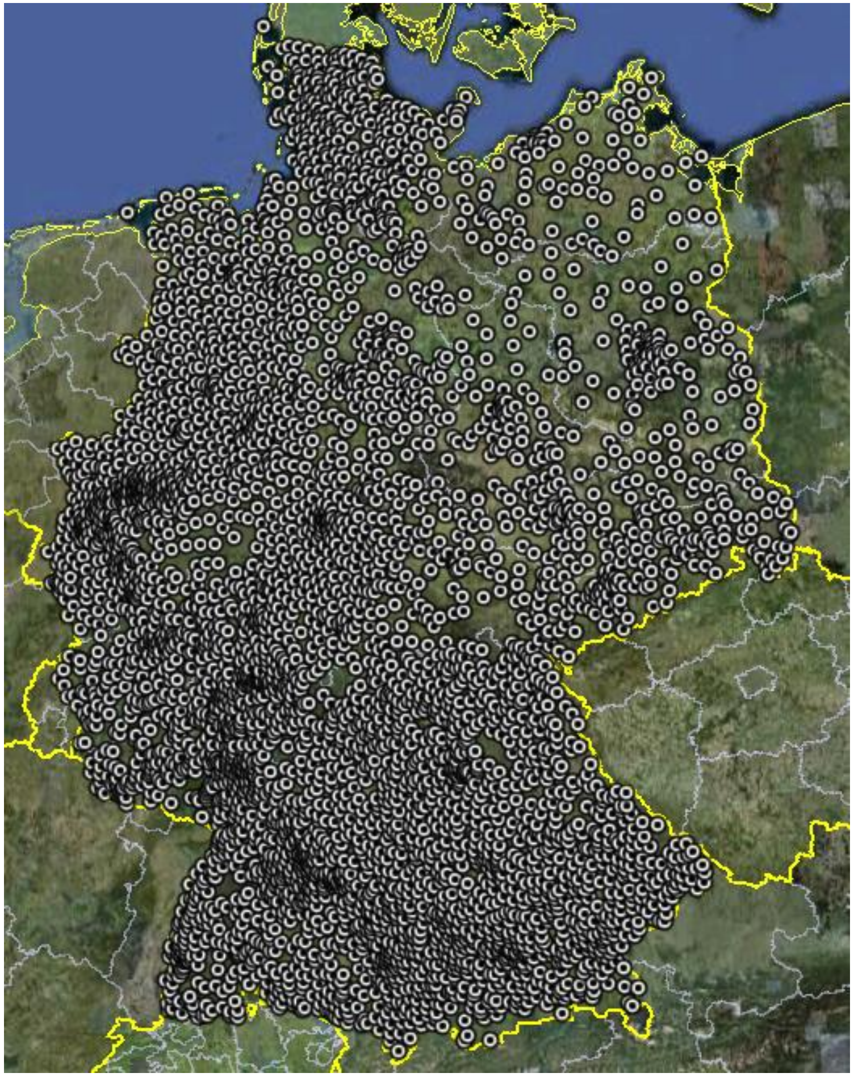
Why a good register for standing data is very important …

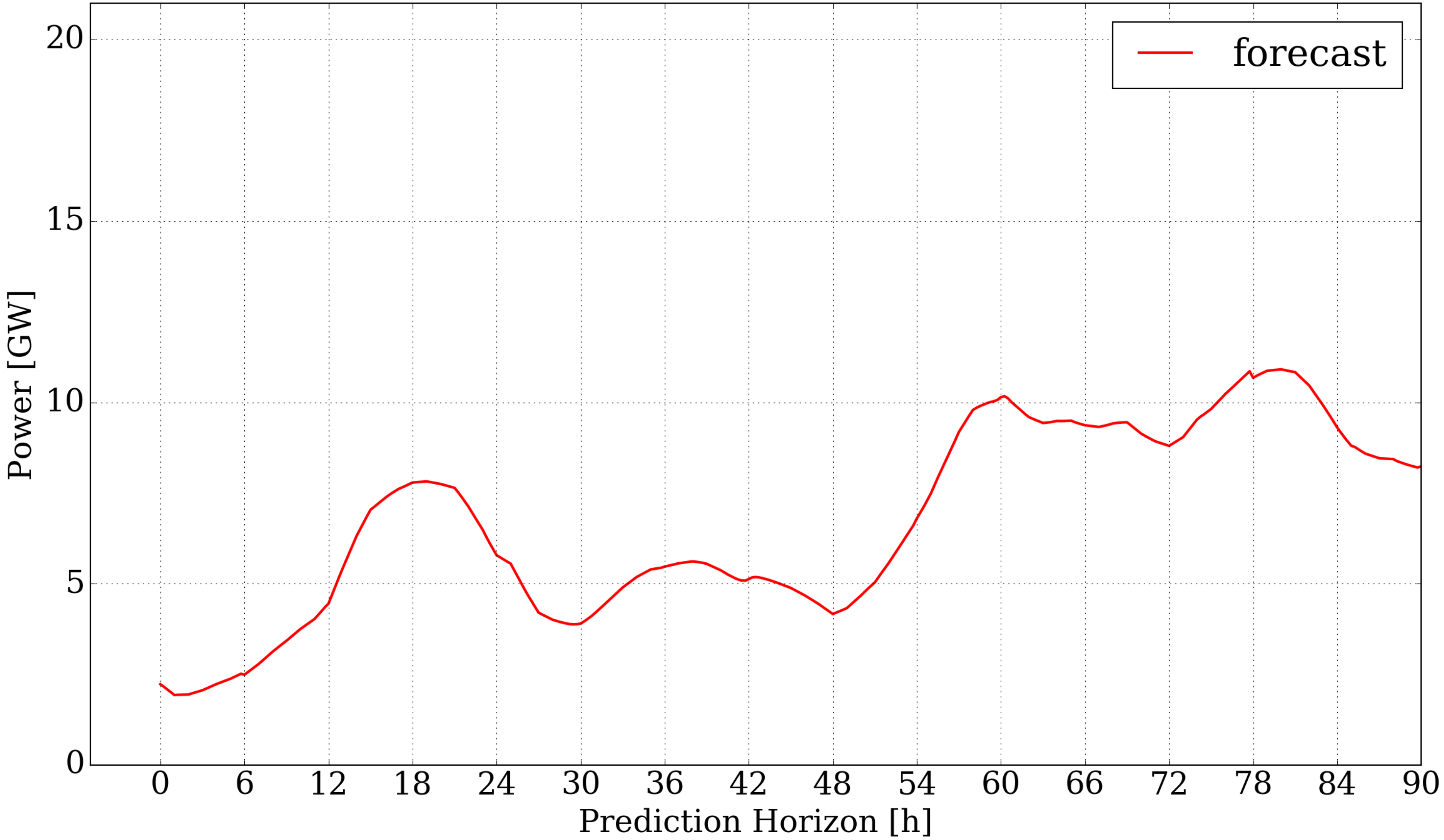


… if forecasts are needed for a large number of plants.

Shown here:
Small proportion of the PV plants in Germany.
83,500 PV plants with installed capacity:
6.8 GW

Germany has more than 1 million PV plants feeding into the public grid, but has no complete national register!

How does a wind power prediction look like?



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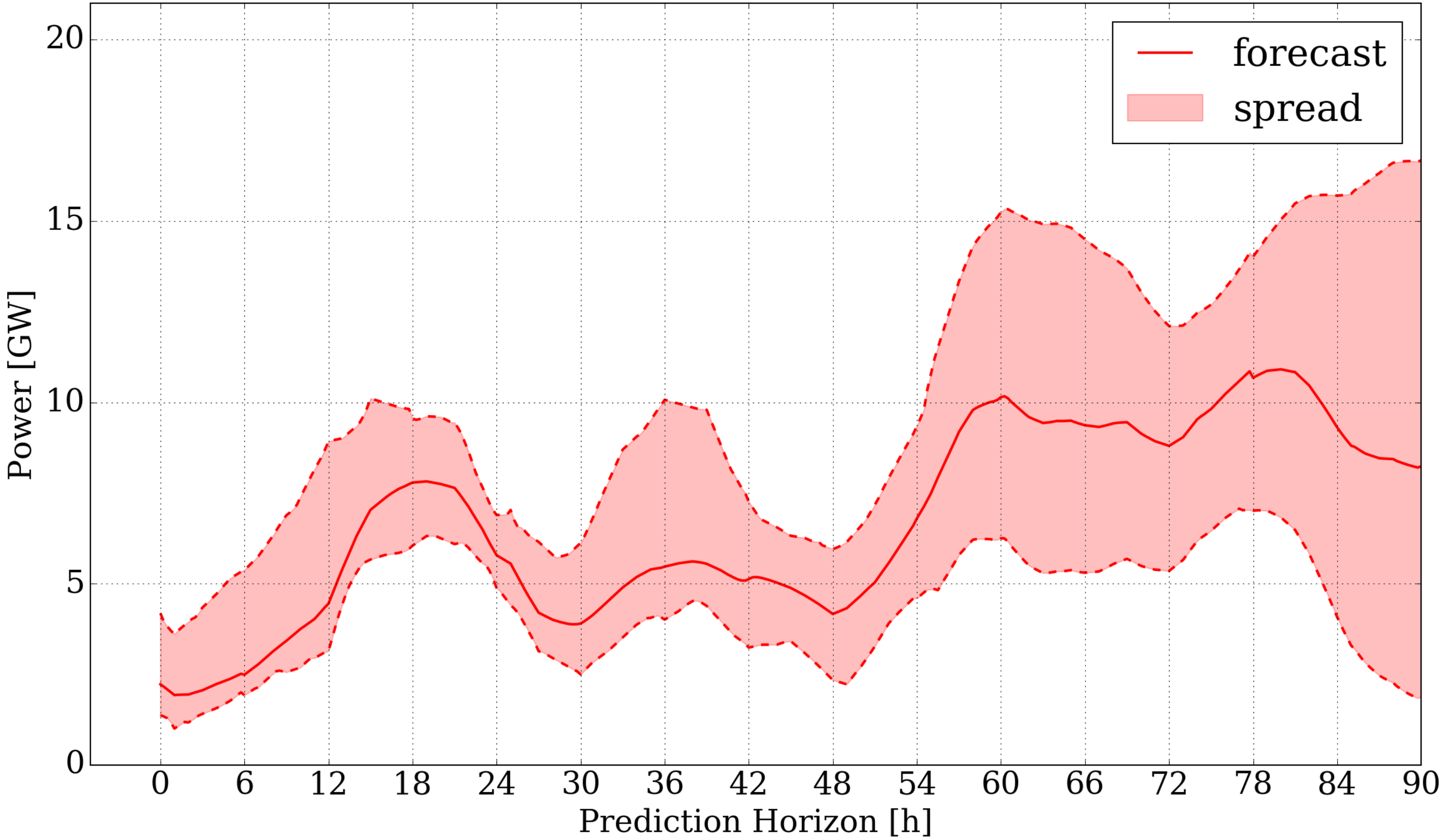

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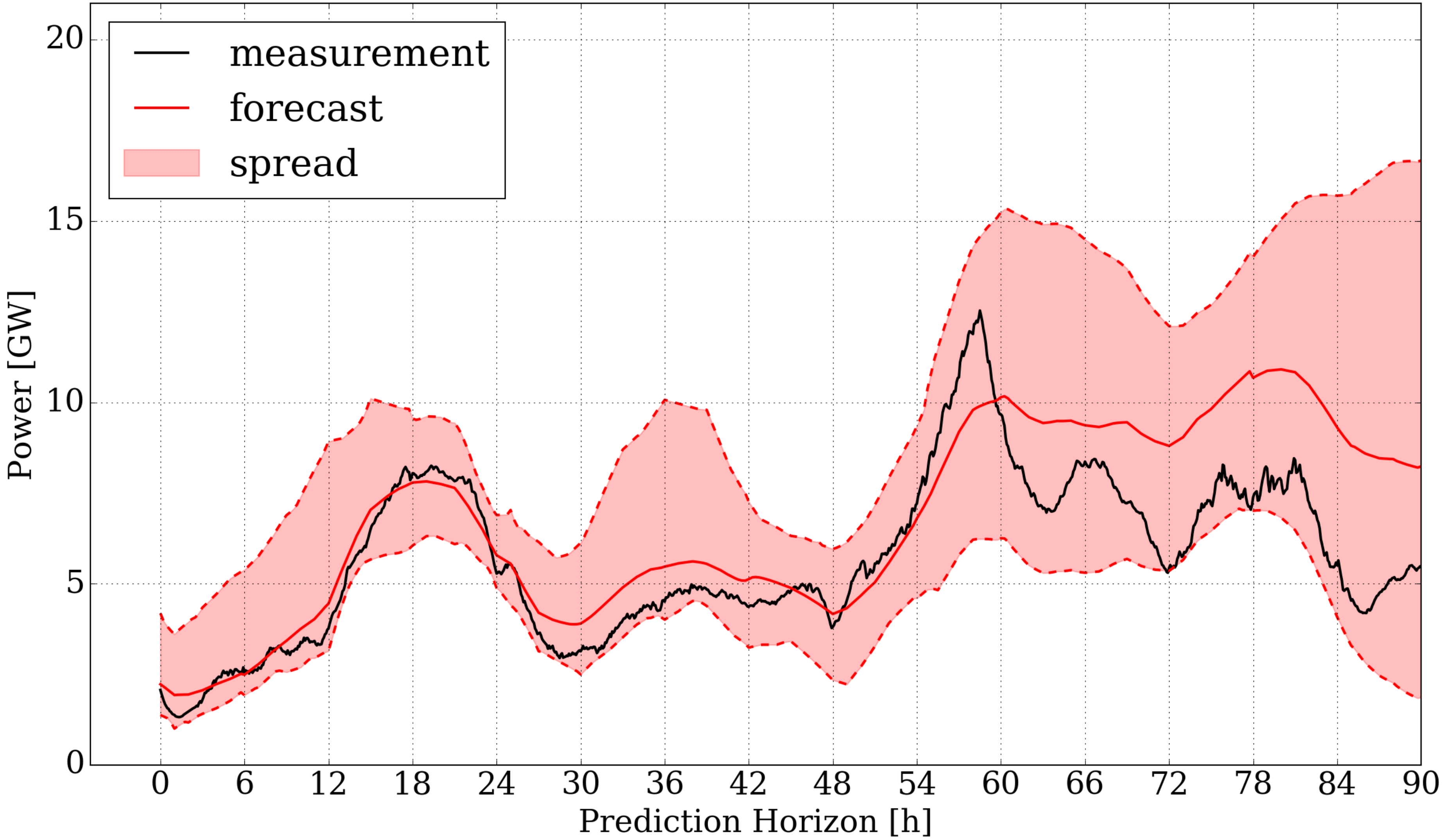
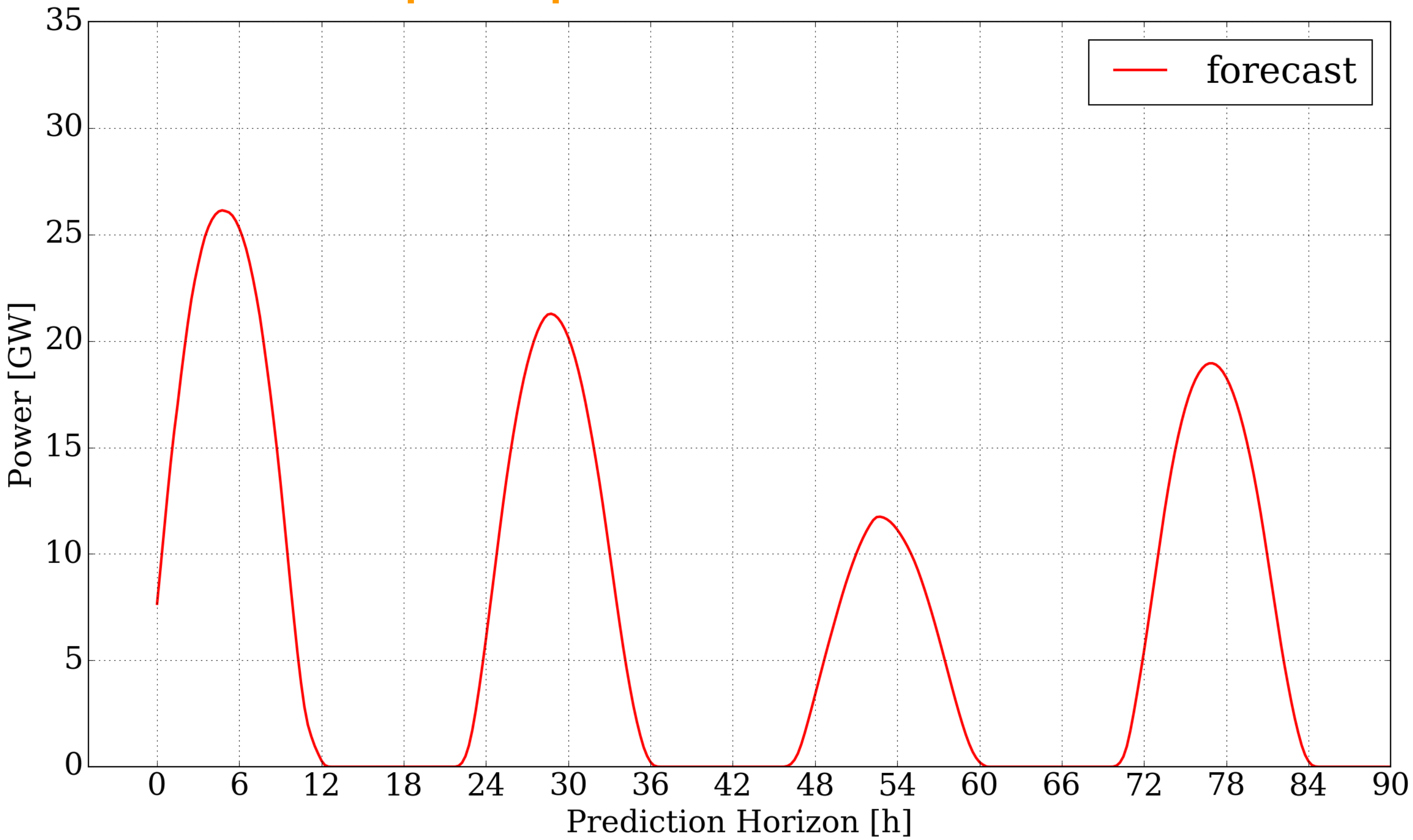


How does a solar power prediction look like?



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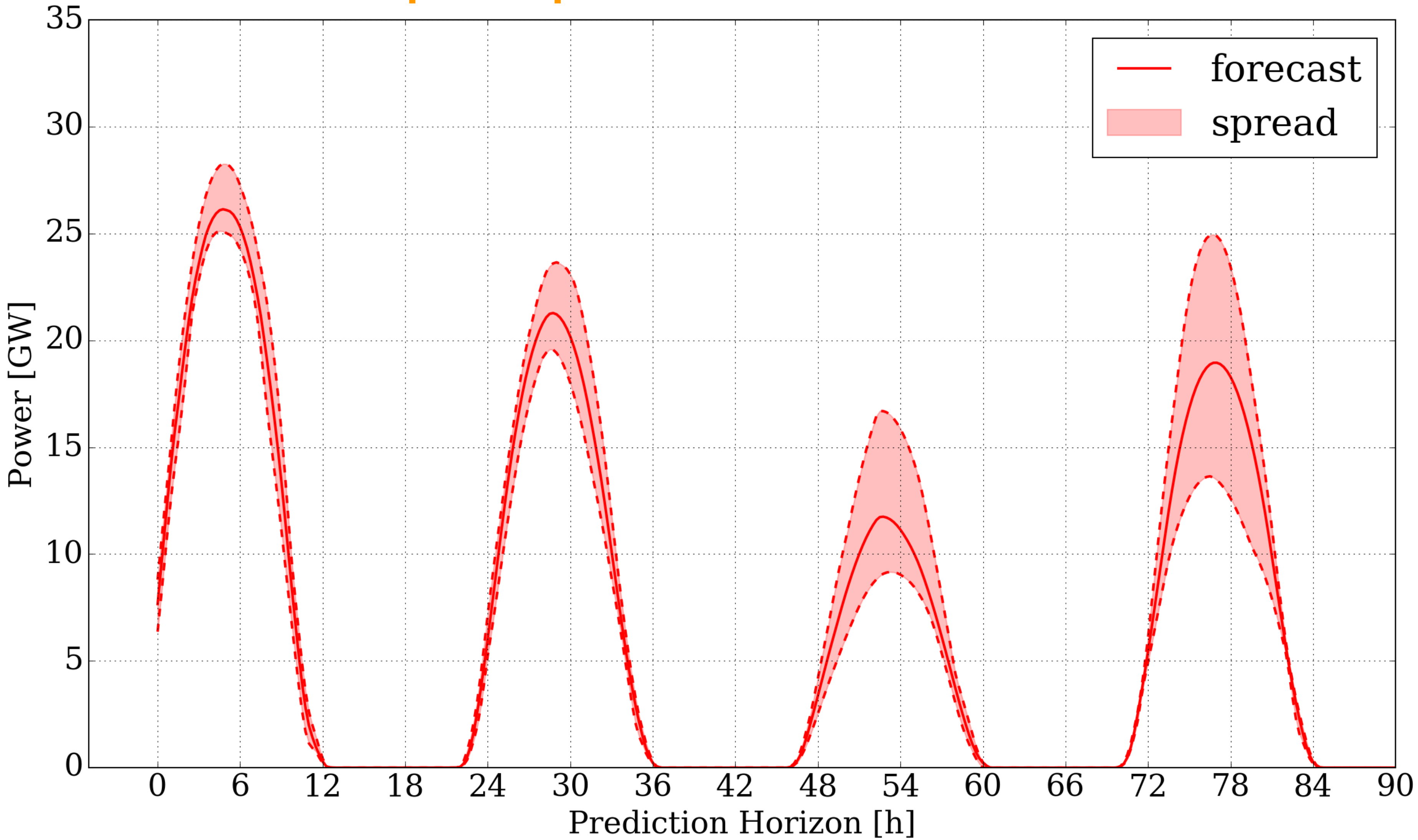

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