

# DEVELOPMENTS IN GERMAN SHORT TERM ELECTRICITY AND BALANCING MARKETS

*... how to tame record high renewable electricity  
penetration.*

Energy Trading Conference SEE, Bucharest 2016  
Christopher Geisel, Statkraft Markets GmbH

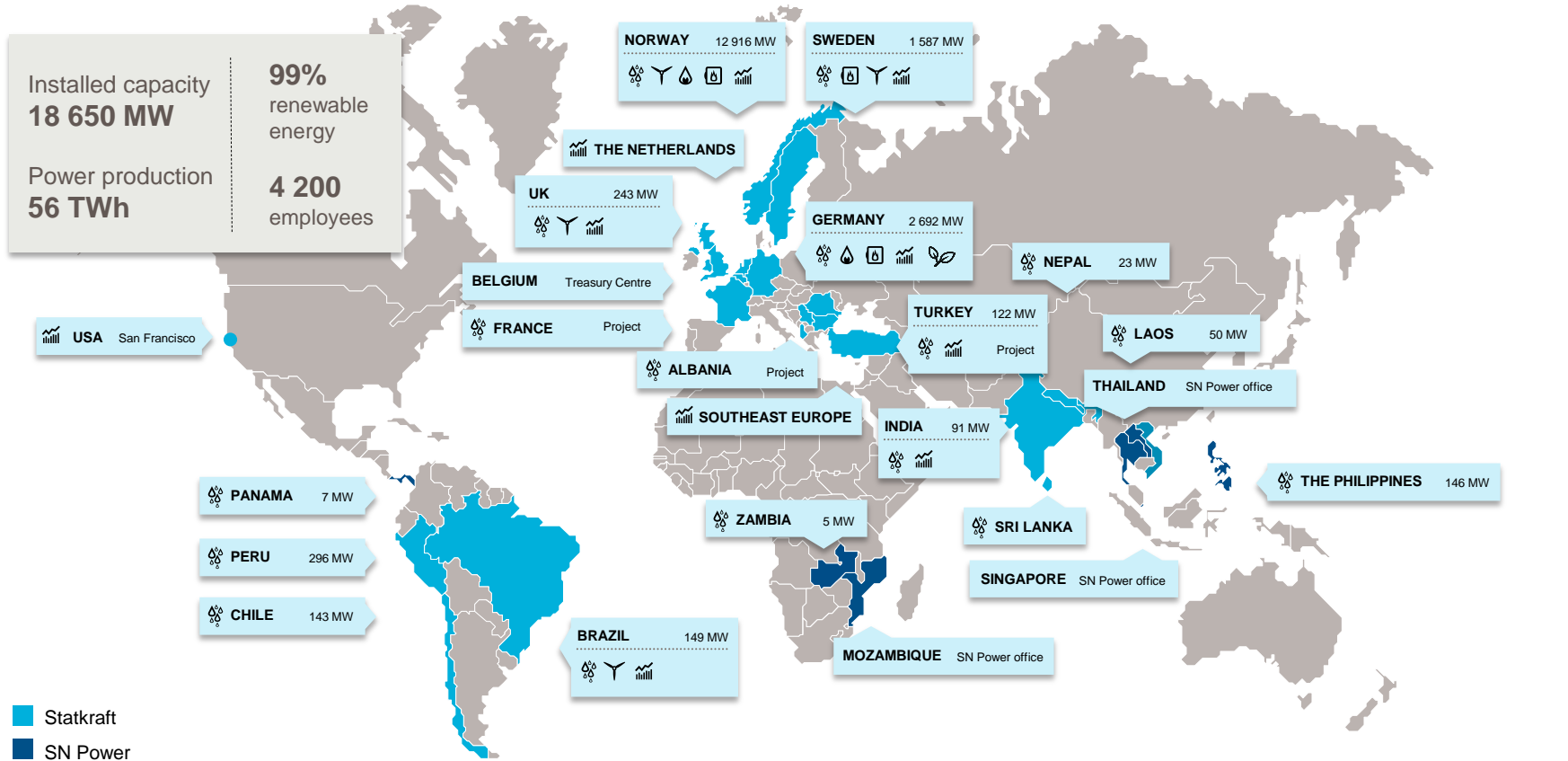
# AGENDA

**1** Renewables in  
Germany

**2** Balancing Markets

**3** Intraday Trading  
becomes  
automated

# Statkraft's global presence



# AGENDA

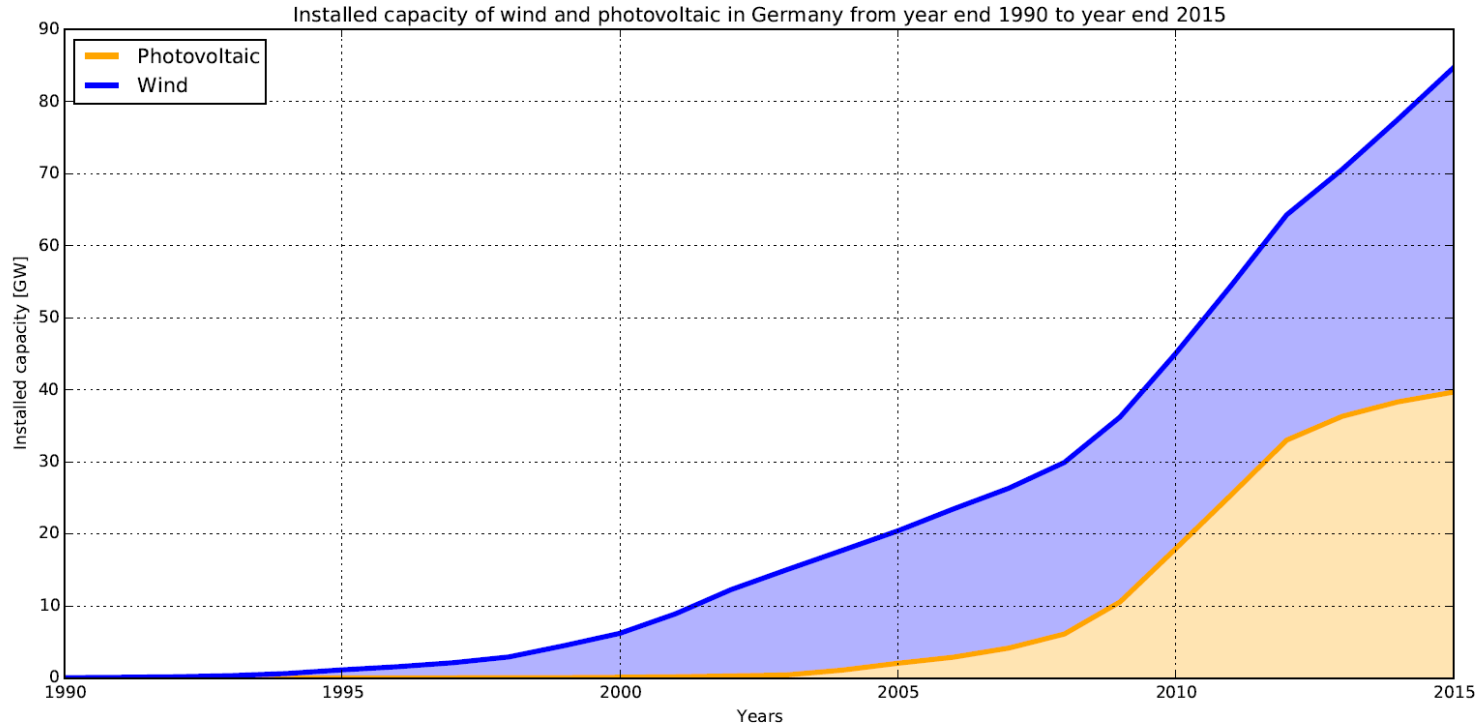
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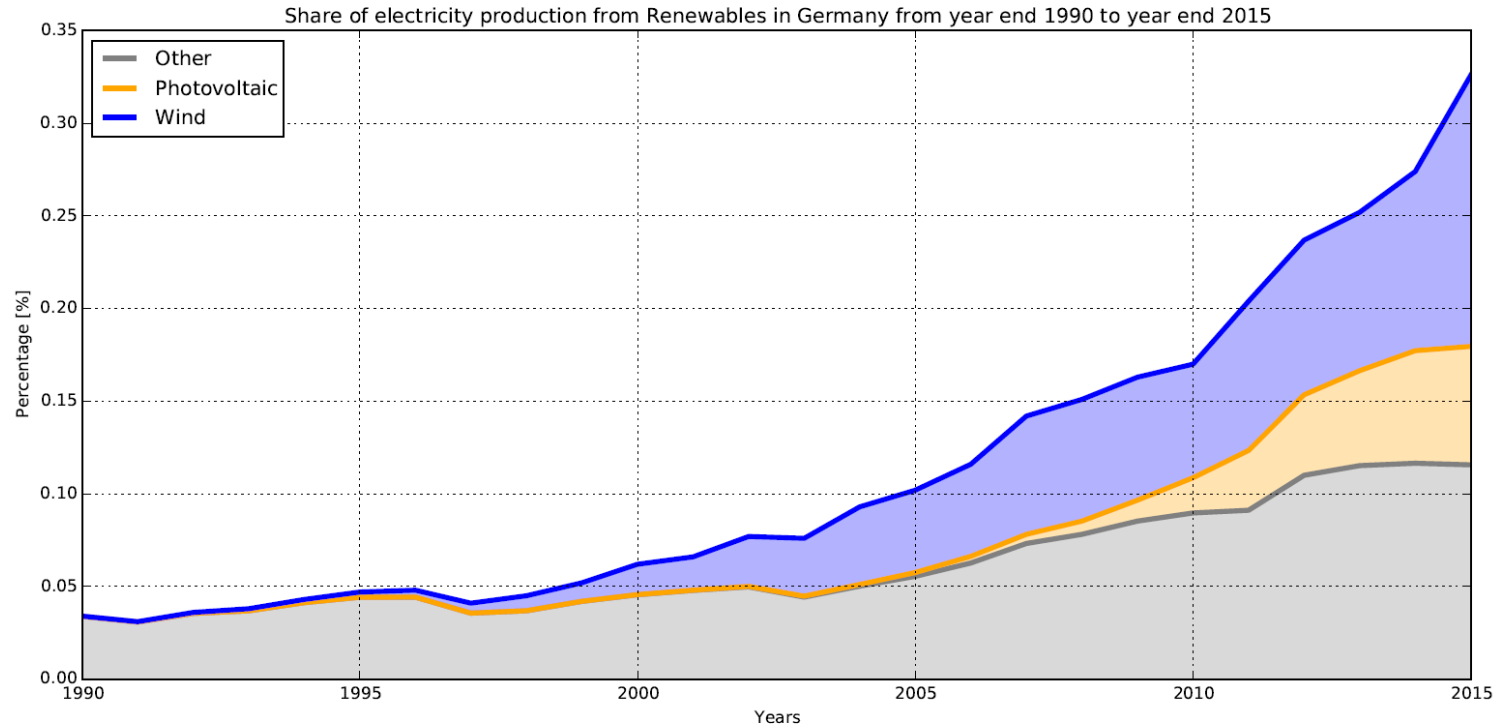


# Installed capacity of renewables in Germany



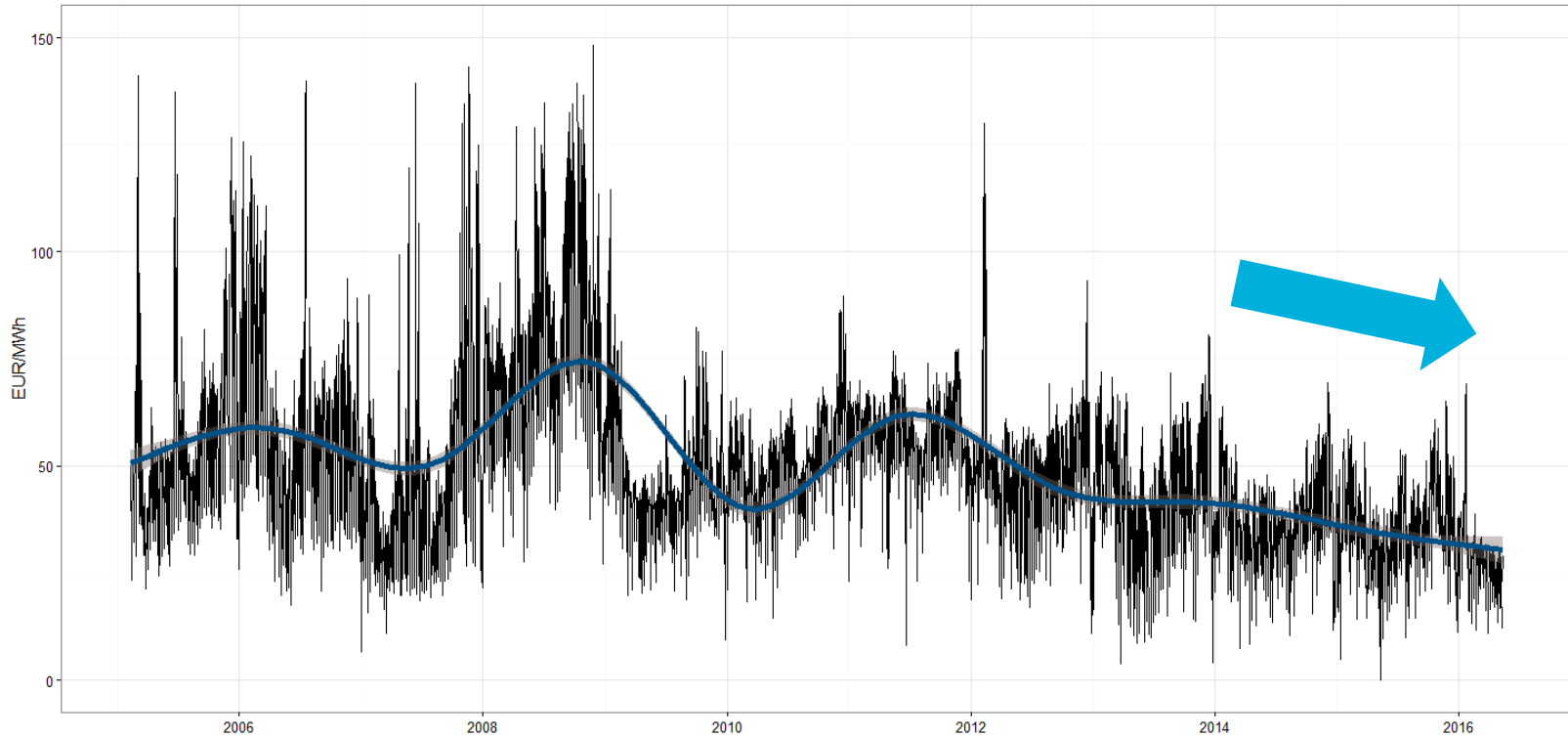
Data: Federal Ministry for Economic Affairs and Energy ([www.bmwi.de](http://www.bmwi.de))

# Share of electricity production from Renewables



Data: Federal Ministry for Economic Affairs and Energy ([www.bmwi.de](http://www.bmwi.de))

# Falling Spot Prices (Peak)



Data: EPEX Spot





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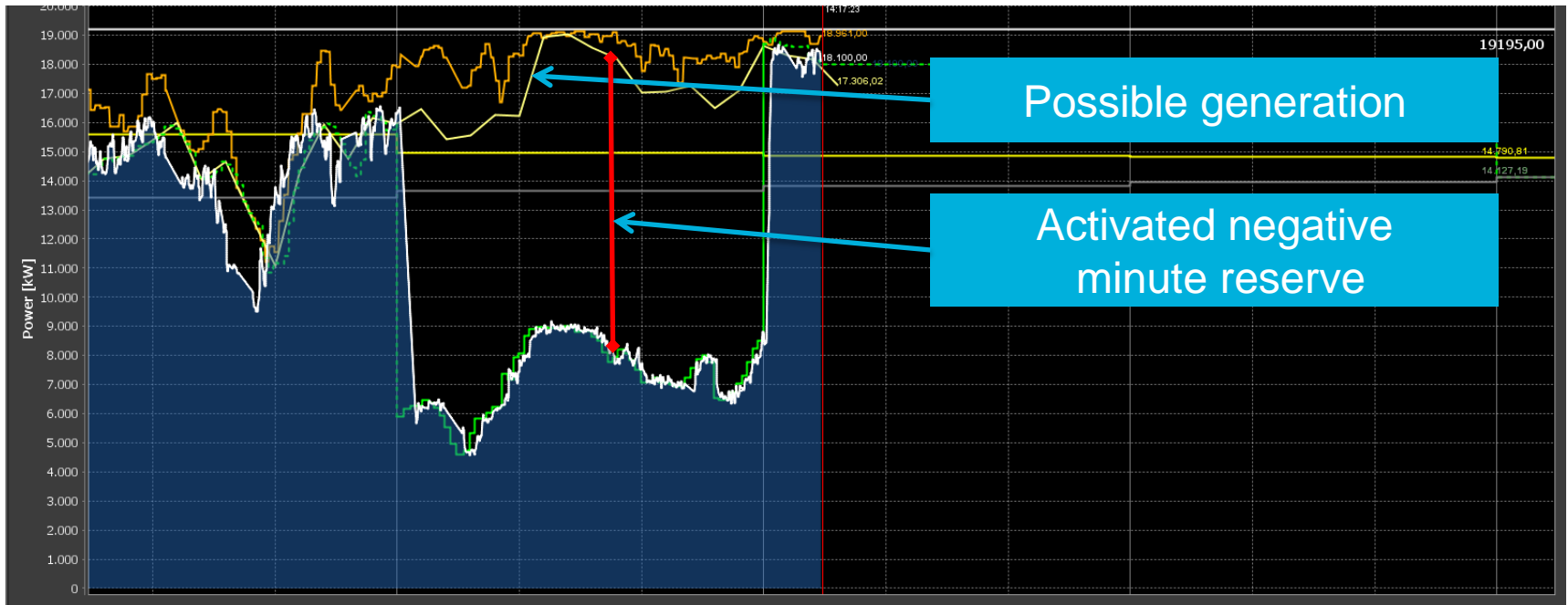
# Wind power delivering balancing services

- ▶ Wind has the potential to deliver negative balancing services
- ▶ **Denmark** already implemented framework such that wind power can participate in balancing actions. Prequalified capacity:
  - 2011: ~ 100 MW
  - 2015: ~ 1.700 MW
- ▶ **UK** has by default a mechanism so that “big” parks (>50 MW) will automatically participate in the balancing mechanism (> 5,000 MW)
- ▶ **Germany's** TSO worked out a pilot framework in the beginning of 2016 for the prequalification of wind power for negative minute (tertiary) reserve  
Currently prequalified capacity in Germany: ~ 100 MWs

New development in Germany, but mature approach in other countries

# How does it function technically?

- ▶ Statkraft prequalified the first wind park in Germany to deliver negative minute reserve



# Challenges & projections

- ▶ Demand for negative minute reserve today ~ 2500 MW  
Projection by experts: Within 2017 or 2018 wind power will most likely meet the demand for negative minute reserve (if sufficient wind forecasted)
- ▶ Market effects:
  - Market for negative minute reserve (capacity) will drop due to oversupply
  - Conventional power plants will have less attractive markets to gain money in
  - Imbalance price will get more volatile (and extreme) → Need for better balancing of trading position → Automated trading in the intraday market necessary?
- ▶ Challenges:
  - Remote controllability and the ability to floating downregulation major challenges for wind park owners
  - IT infrastructure is the key



# Batteries for primary frequency response

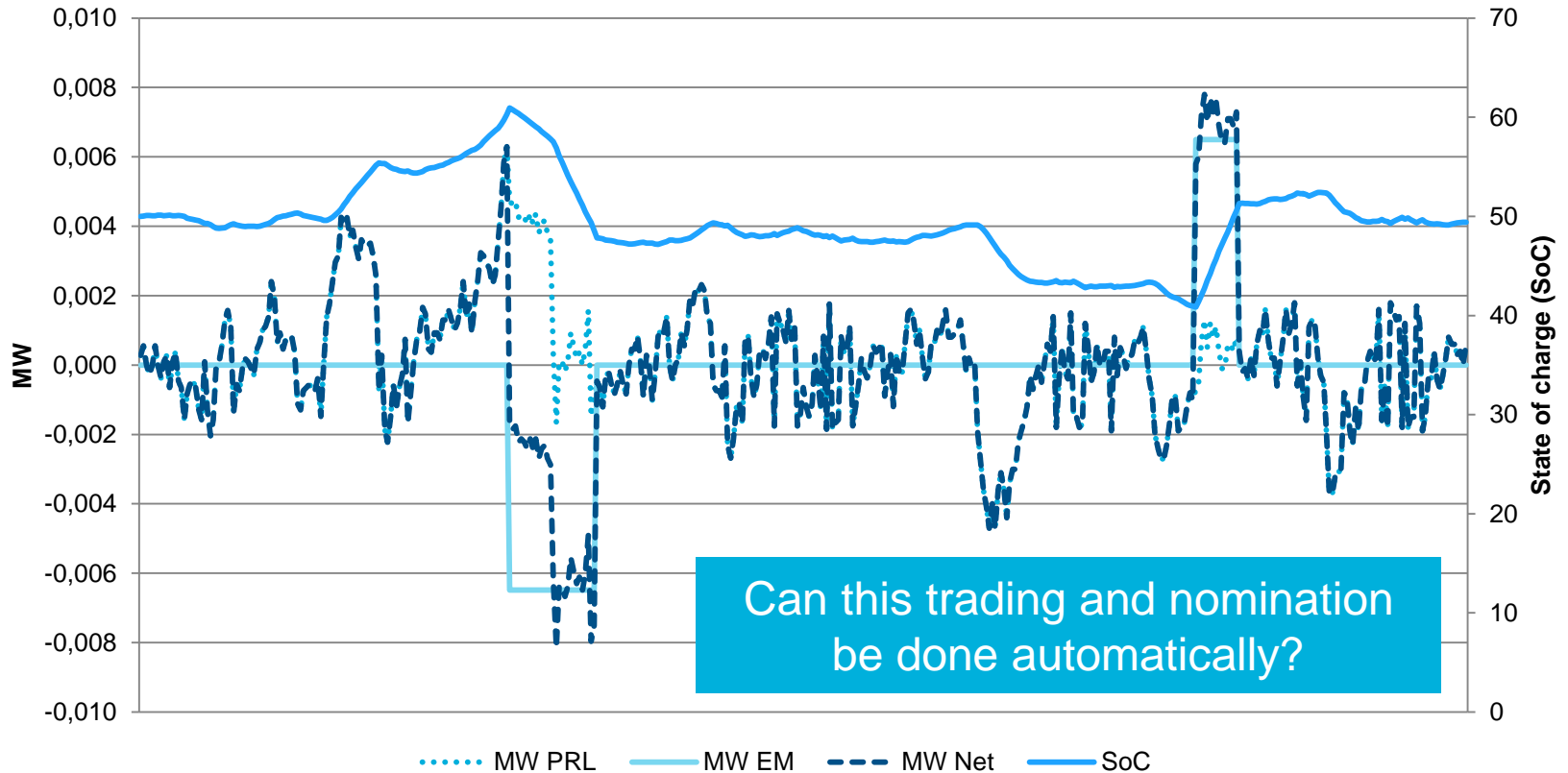
- ▶ Batteries can offer a decentralized opportunity to deliver primary frequency response (PFC)
- ▶ Status quo in Germany\*:
  - Built and prequalified for PFC: 8 MW
  - Consented: 15 MW
  - In planning: 86 MW
- ▶ Main challenges:  
Intelligent management of charging and de-charging given the energy level within the battery



Statkraft's example: 3 batteries in Doerverden  
Capacity of one rack: ~ 1 MW  
Energy storage: ~ 1 MWh  
Prequalified for primary frequency response.

\* Source: Claus Hodurek, 50 Hertz Transmission GmbH

# Energy management of a battery



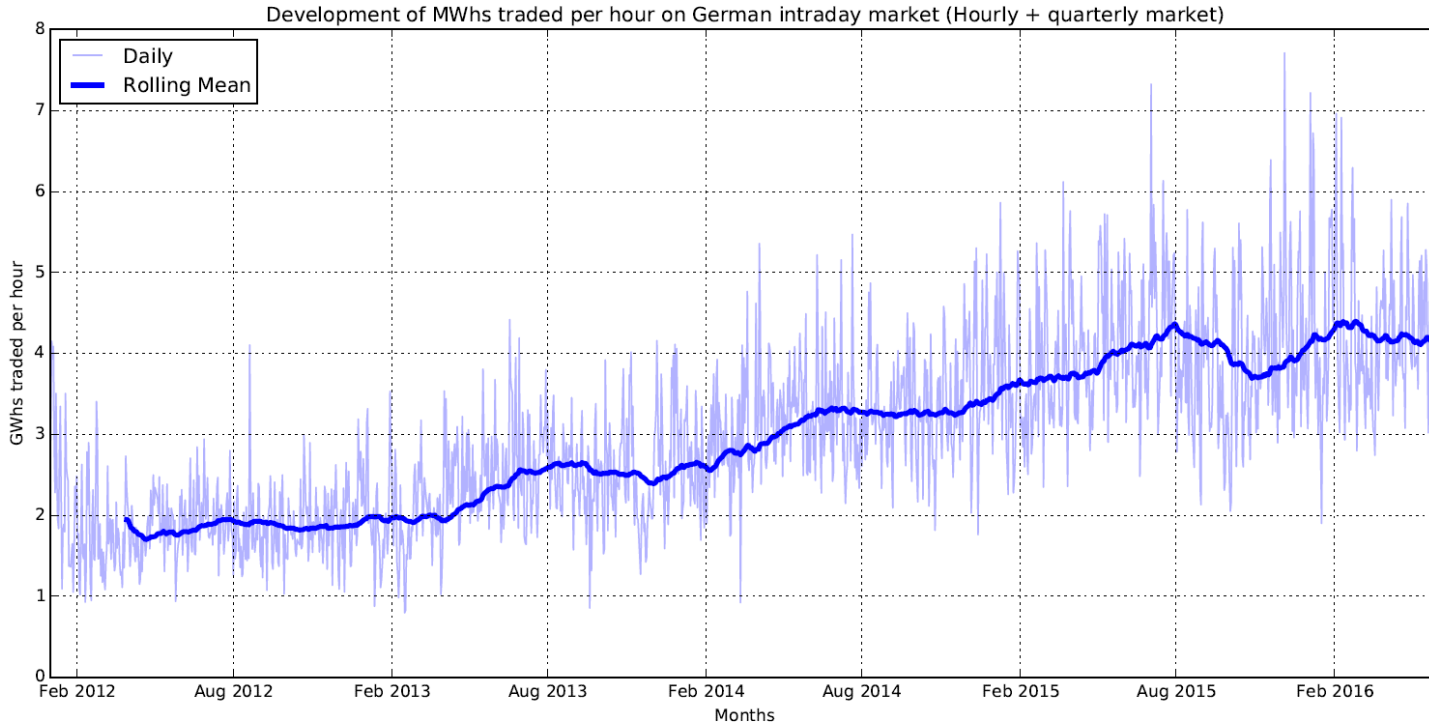
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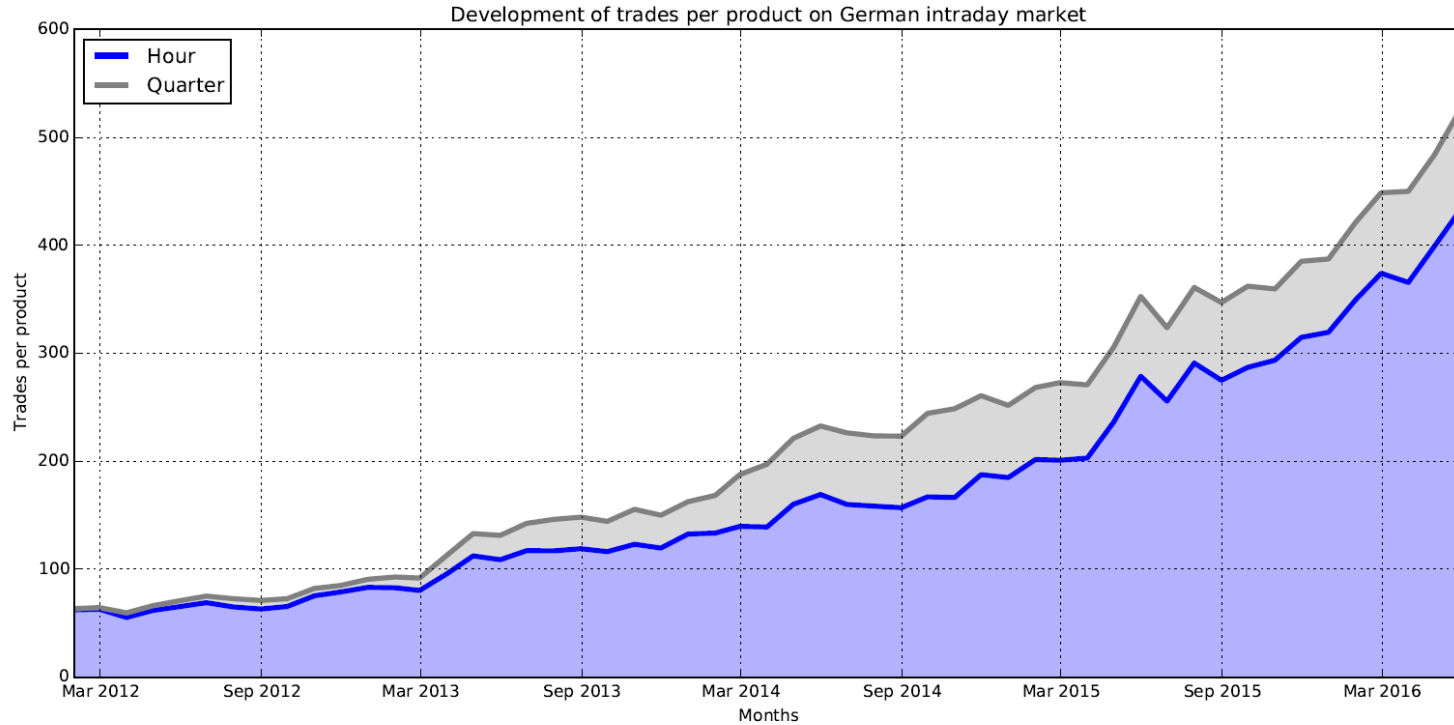
# German intraday market



Data: EPEX Spot



# German intraday market



Data: EPEX Spot

# Requirements to an intraday trader

Trade different products at a time

Trade different countries at a time

Decentralization leading to smaller trade / nomination sizes

Process multiple renewable forecast updates at a time

Make money – outperform the market

Higher reporting needs due to regulations (REMIT)

Overlook different markets and their influencing factors

Where does this lead to?

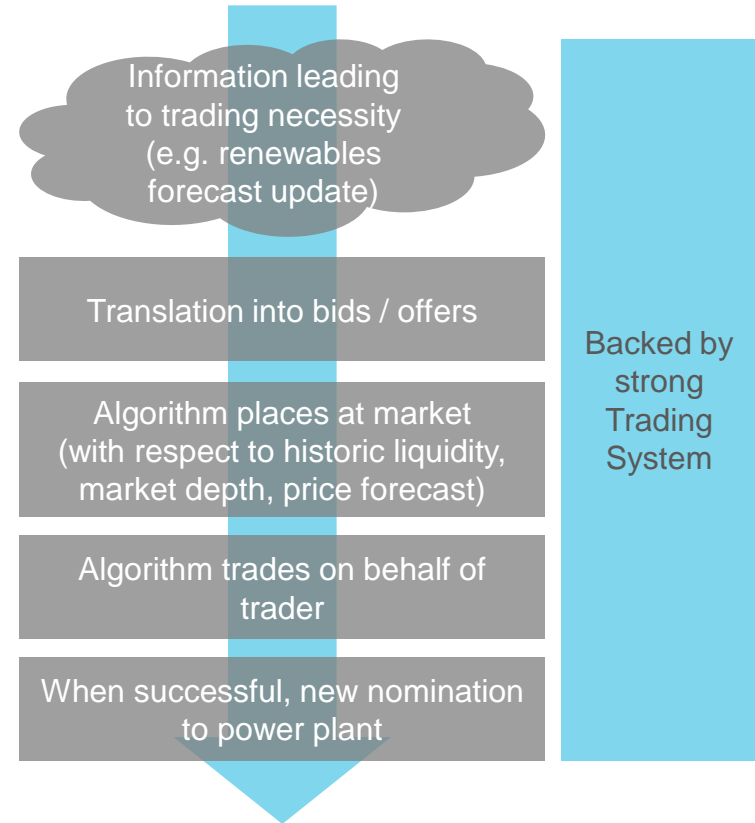
# Can this be done (only) by humans?



Source: [www.makeuseof.com](http://www.makeuseof.com)

# Automated Trading

- ▶ Development due to standardized intraday markets, strong APIs (EPEX, Nordpool), higher liquidity (220 registered companies on intraday market at EPEX) and necessity to trade (renewables)
- ▶ Concept: Algorithm / Machine is placing automatically bids / offers or even executes bids / offers on given logic
- ▶ Big trend at e.world 2016:
  - > 5 vendors of such software present
- ➔ Its not (!) the future, it is happening right now







# THANK YOU

Christopher Geisel  
Commercial Manager – Analysis, Algorithms & Automation

+ 49 (0) 163 912 07 14  
christopher.geisel@statkraft.com



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