

# Power Trading – ¼ h products

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# Agenda

1. Introduction
2. Market fundamentals
3. Market design and trading
4. Impact on the grid
5. Case study: solar eclipse
6. Summary and outlook

# Introduction

# Motivation – a changing energy system in Germany

Attribute	Conventional power plants	Renewable energy sources
<ul style="list-style-type: none"> <li>• Number #</li> <li>• Installed capacity P</li> <li>• Gradient <math>\Delta P/\Delta t</math></li> </ul>	<ul style="list-style-type: none"> <li>• 500</li> <li>• 100 GW</li> <li>• ~ +/- 50 GW/h (flexibility)</li> </ul>	<ul style="list-style-type: none"> <li>• 1.3 Mio</li> <li>• 93 GW</li> <li>• ~ +/- 10 GW/h (to be compensated)</li> </ul>

Weather-dependent power plants imply need for flexibility

# Market fundamentals

# 1/4h-products: an instrument for flexibility

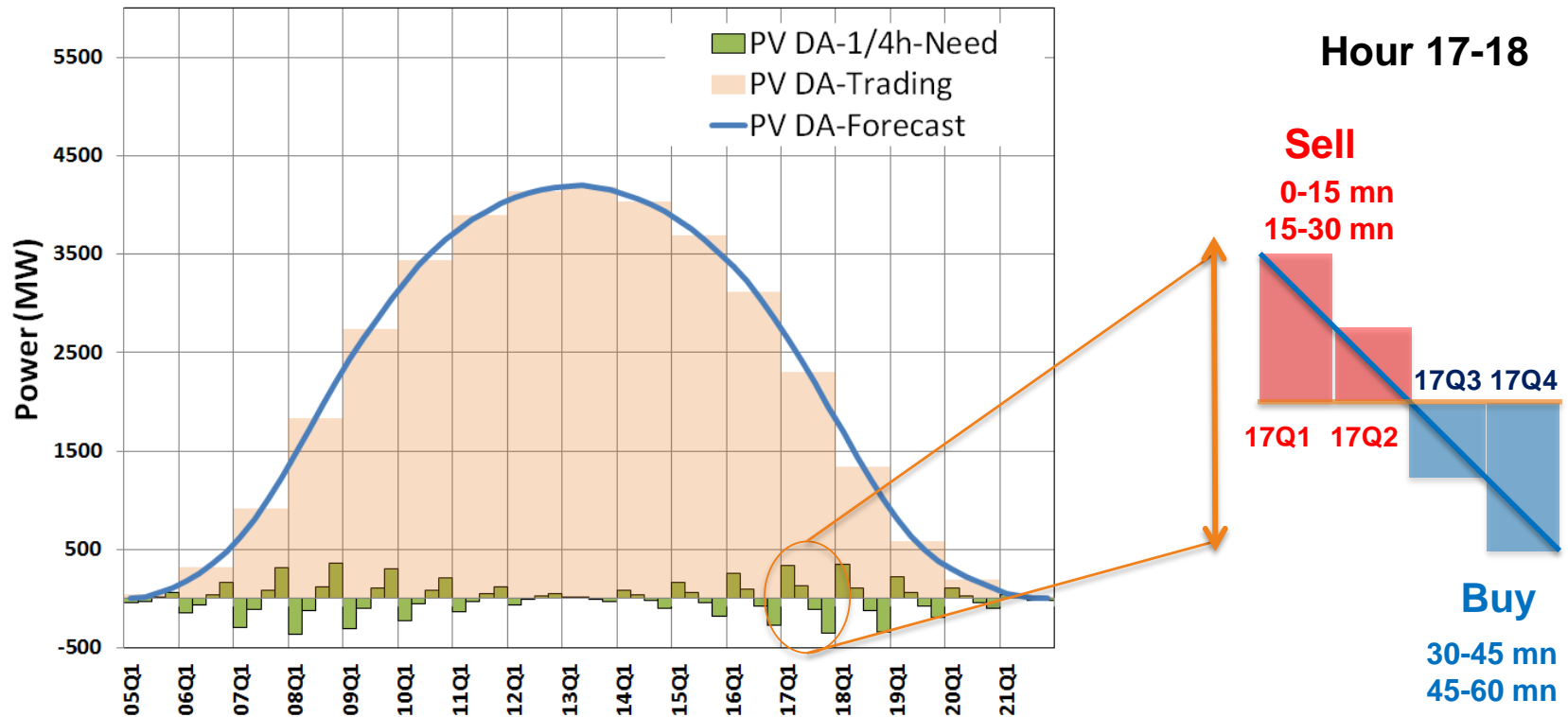
Who are the market players in Germany?

Player	Need for 1/4h-products
TSOs	Solar (and wind) ramps
Direct marketers	Wind (and solar) ramps
Utilities	Power plant ramps
Electric supply companies	Profile of consumers

Different needs meet at the market

# Photovoltaic ramps

PV-Trading on 01.07.2015



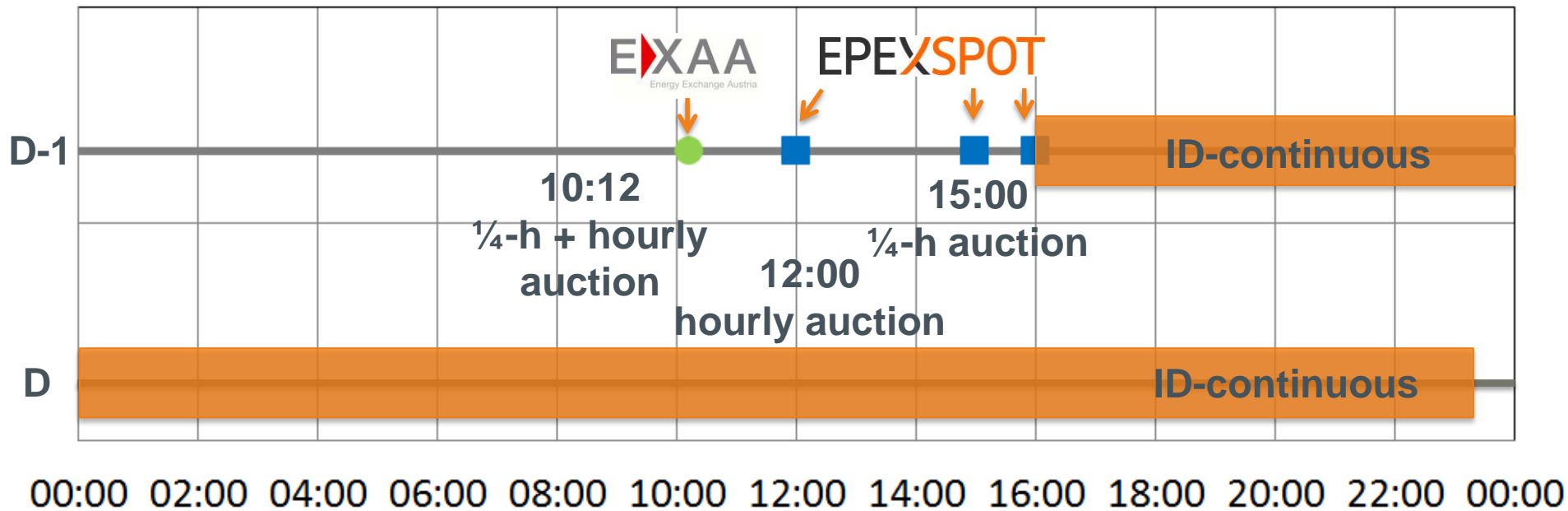
PV-ramps and market design lead to a need for 1/4h-products

# Market design and trading



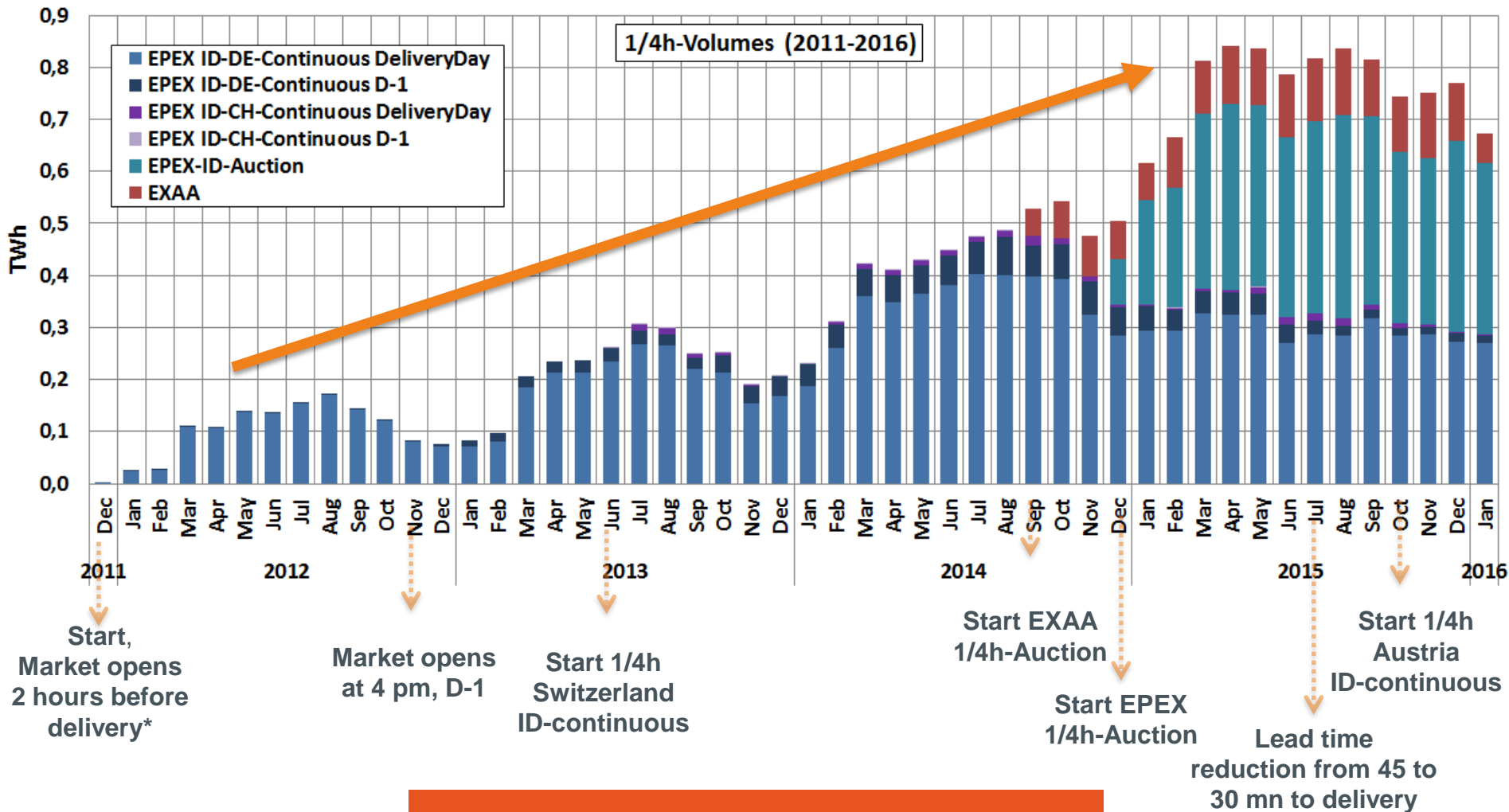
# A typical day for ¼ h products

**D: delivery day**      **Daily schedule for 1/4h products**



3 possibilities per day to trade 1/4h products in Germany

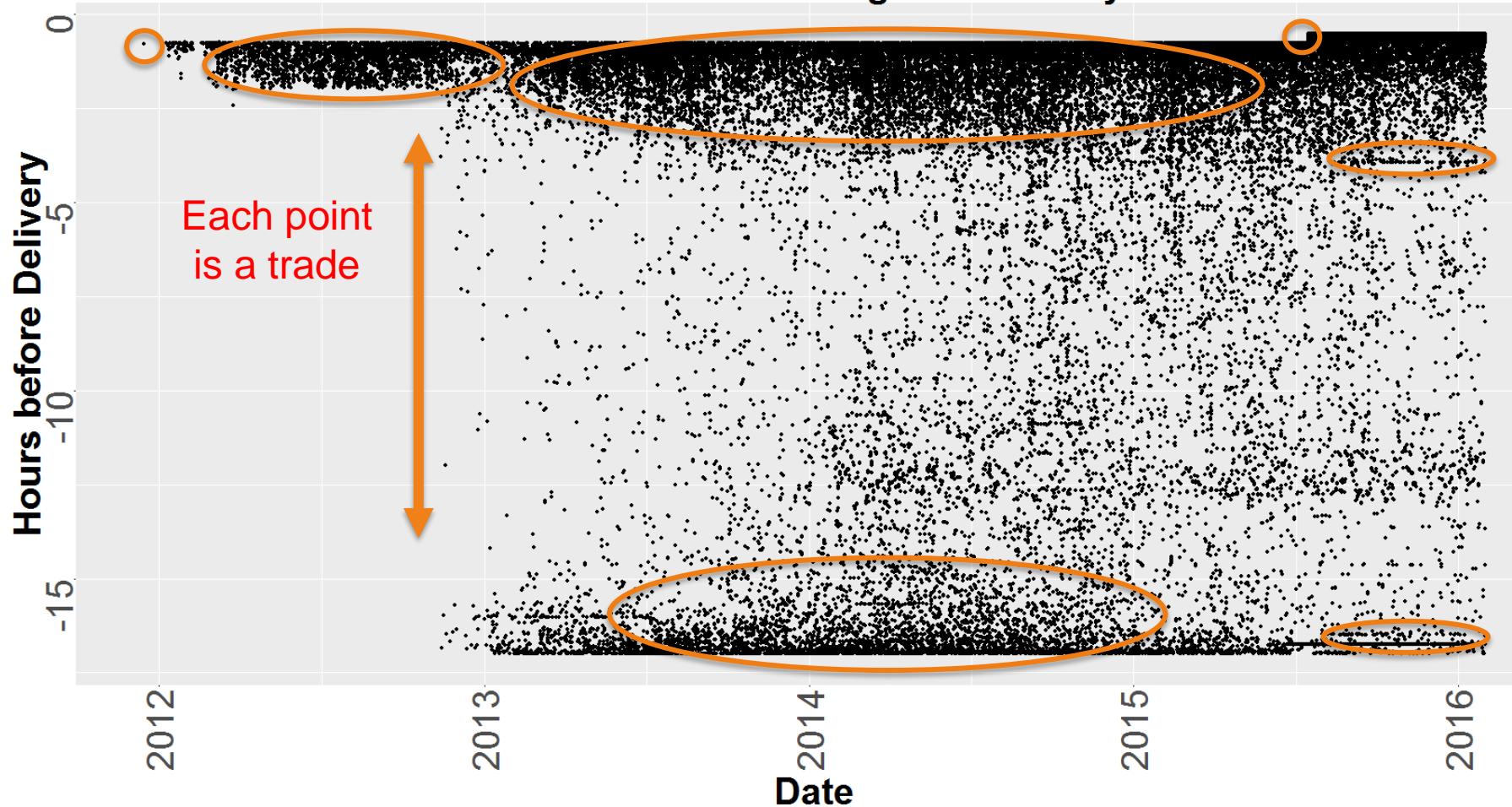
# Market design and volumes



Volumes driven by market design

# Evolution of the trading time (ID-continuous)

Product 09Q1-Trading Time History



Trading time driven by market design

# Market design: what comes next?

- **Nordpool: trading until delivery, since 02.2016 within each German control area**  
Better forecast for renewable energy sources: more volumes ?



- **EPEX Spot: 30-mn contracts for FR, DE, CH: around Q4 2016/Q1 2017**  
Implicit access to interconnection capacity and launch of these contracts on EPEX SPOT organised markets : planning under finalization



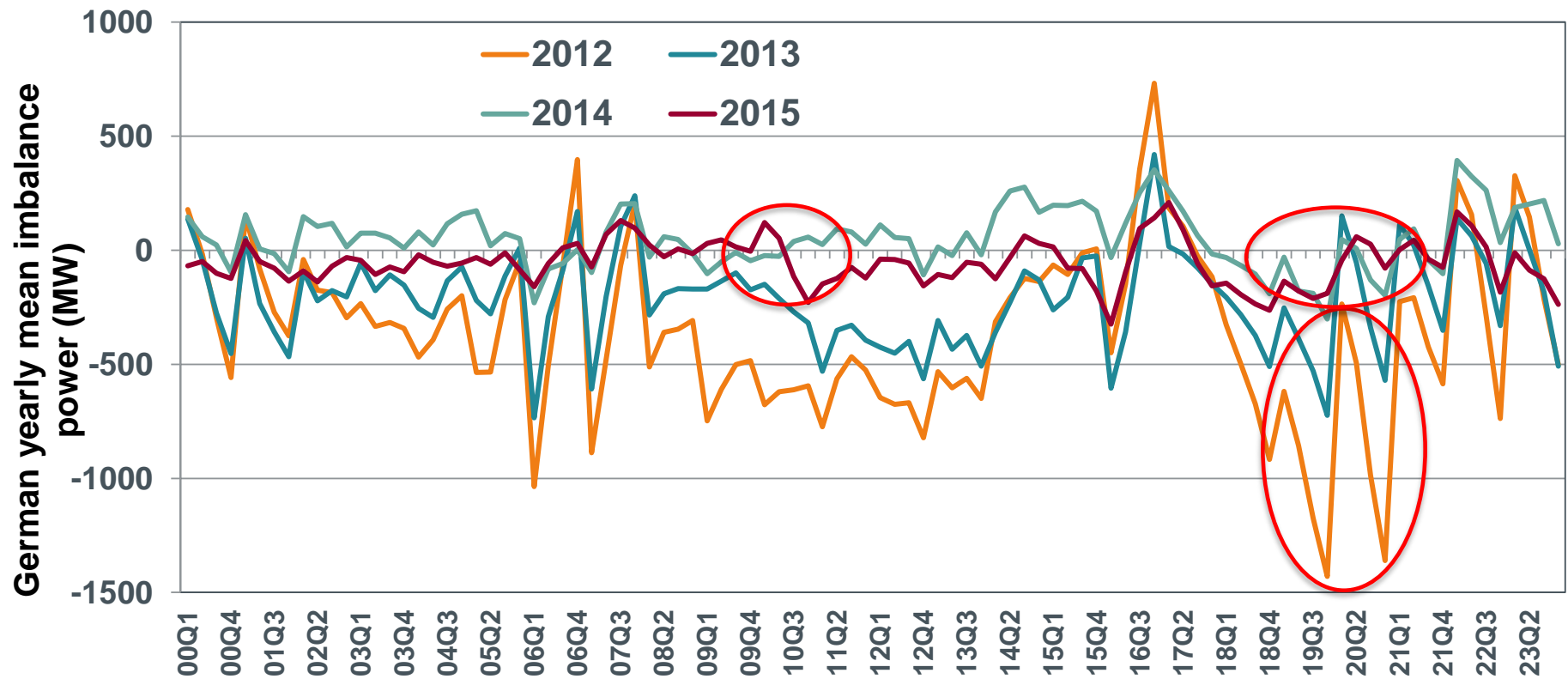
- **XBID Project: pan European Intraday-Market: around Q3/Q4 2017**  
Cross border trading until one hour before delivery



Probable impact on volume and prices

# Impact on the grid

# Impact on the grid – Imbalance power

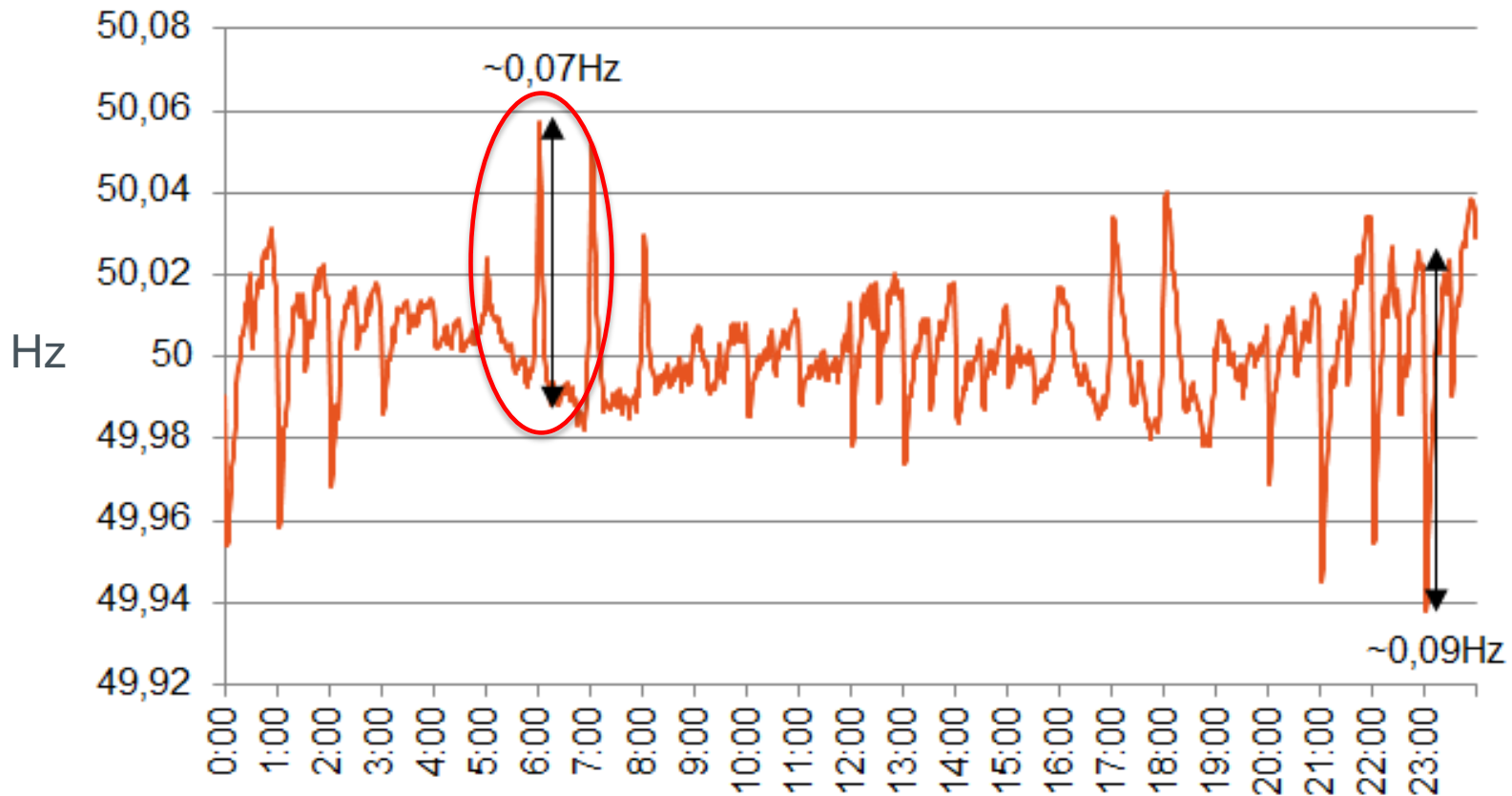


Netzregelverbund („NRV“-Value): imbalance power in Germany

Significant improvement

# Impact on the grid - Frequency

Mean daily evolution of the frequency in the 50Hertz control area  
January – Mai 2012



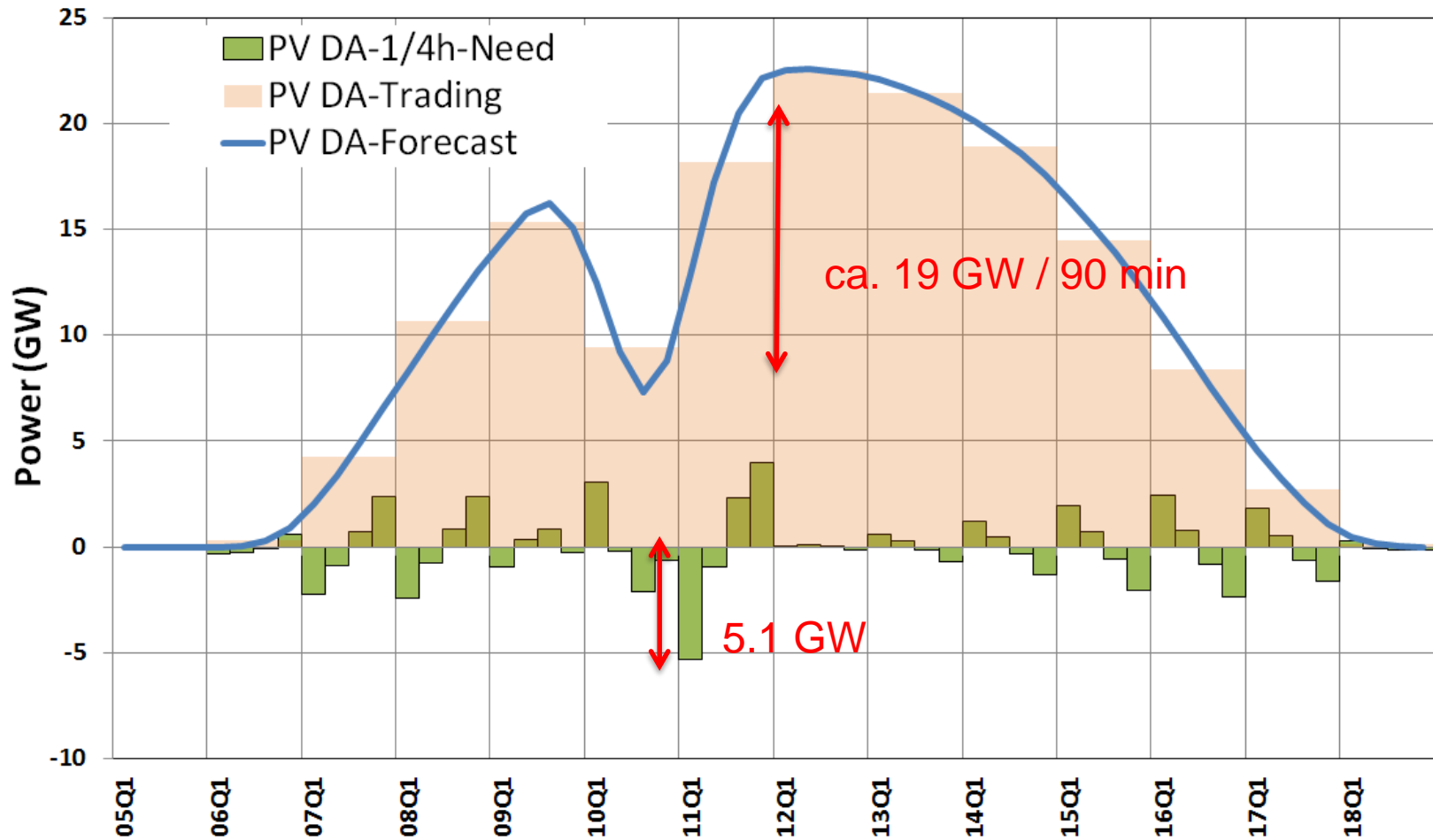
Significant impact on the frequency

# Case study: solar eclipse



# Solar eclipse on March 20th, 2015

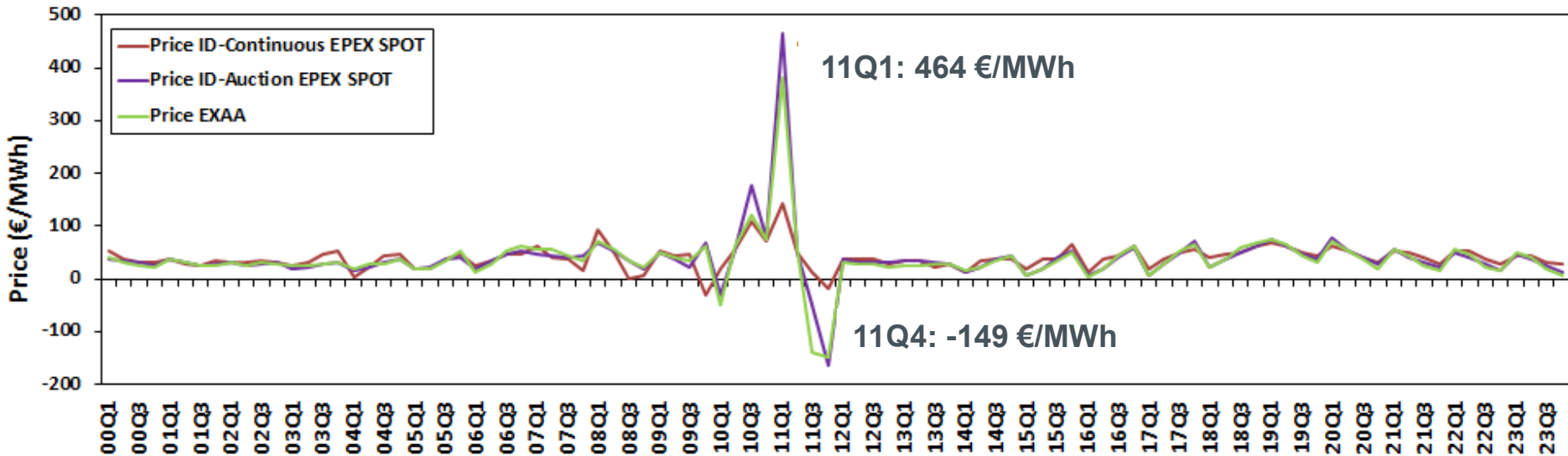
PV-Trading on 20.03.2015 for all Germany (TSOs and direct marketers)



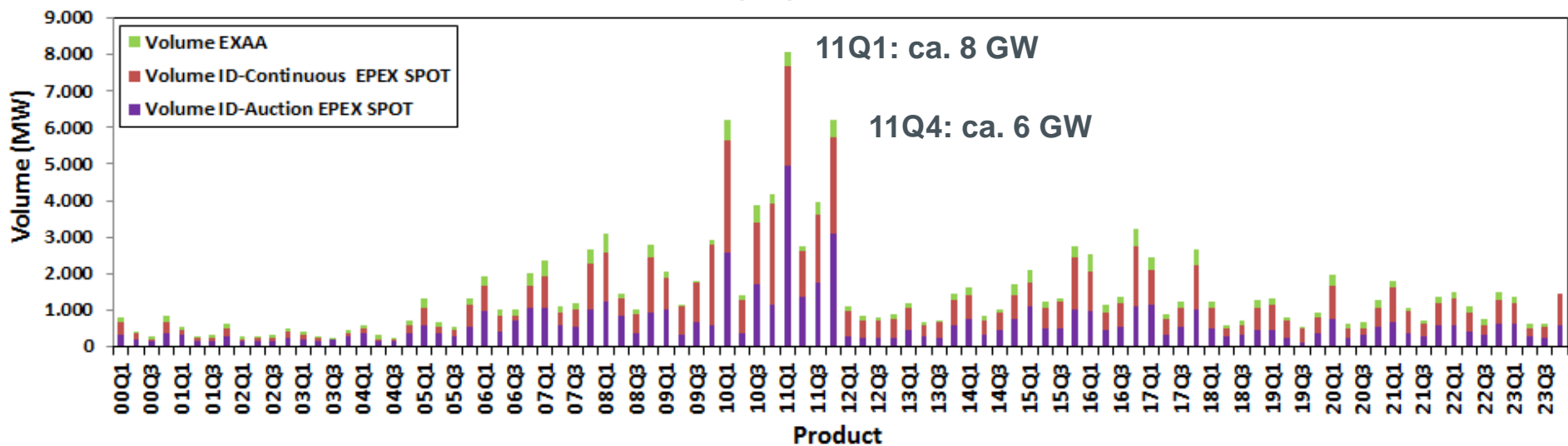
Historical Value (Wind+PV) on November 9th, 2013: 10.5 GW / 90 min

# Market prices and volumes on March 20th, 2015

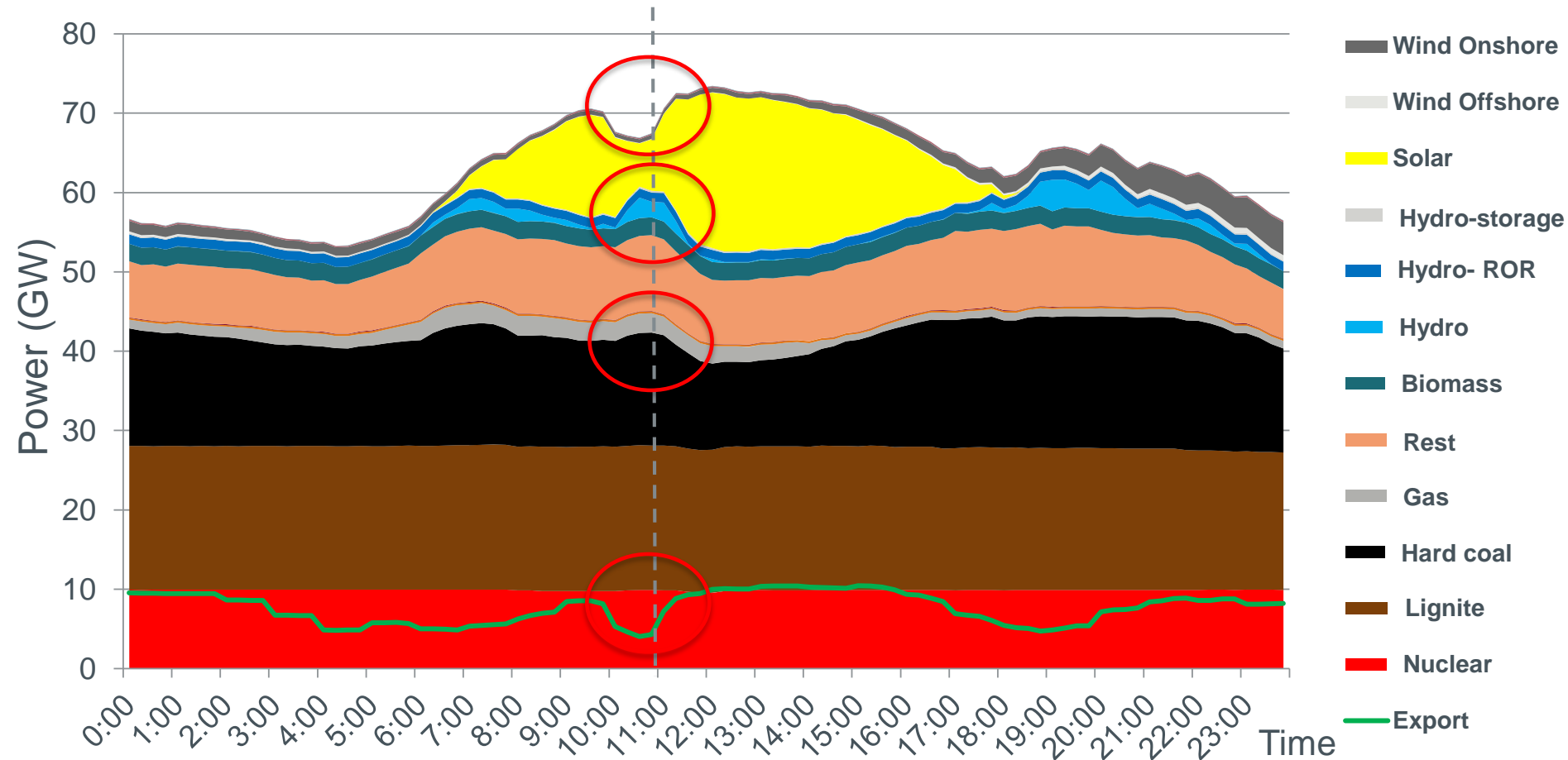
Prices for 1/4h products



Volumes for 1/4h products



# Solar eclipse on March 20th, 2015 : supply



To a significant extend, the eclipse was exported, and to some extend leveled out in Germany by hard coal and pumped hydro.

# Summary and outlook

# Summary

- ¼-h trading: an important flexibility product
- Volumes growth through market design
- Trading of ¼-h products impacts the grid
- Solar eclipse: a successful stress test for the market

# Outlook

- Wish: 1/4h-Trading at 12:00 DA !
- More renewable installed capacity in the future
- Flexibility on the consumer side
  - Demand side management
  - Power-to-X

# Many thanks for your attention!

Vincent Thevenin  
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Front Office

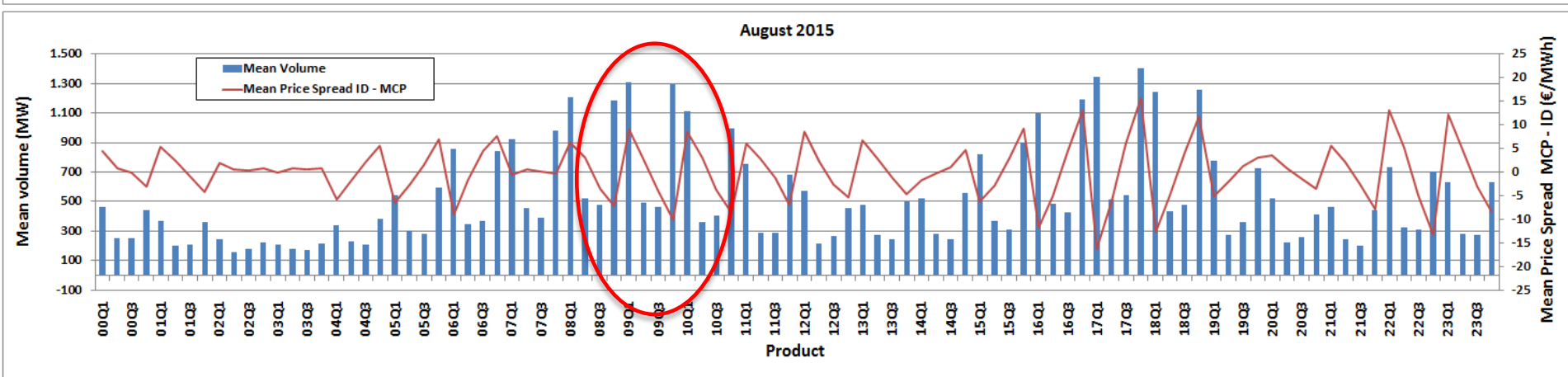
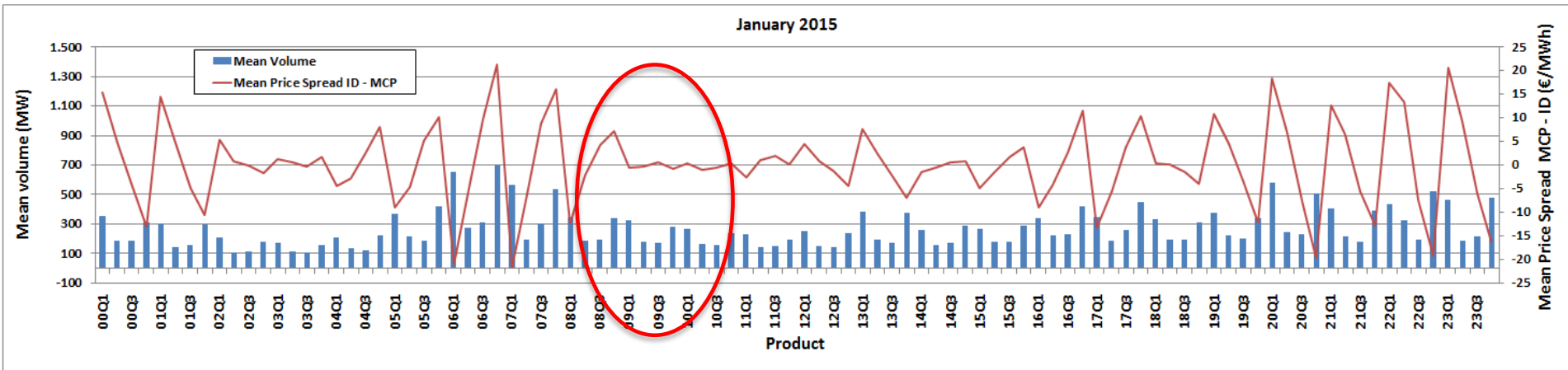
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# Prices and volumes



MCP: Market Clearing Price, Day-Ahead Expe Spot

Seasonal effects play a role for volumes and prices