

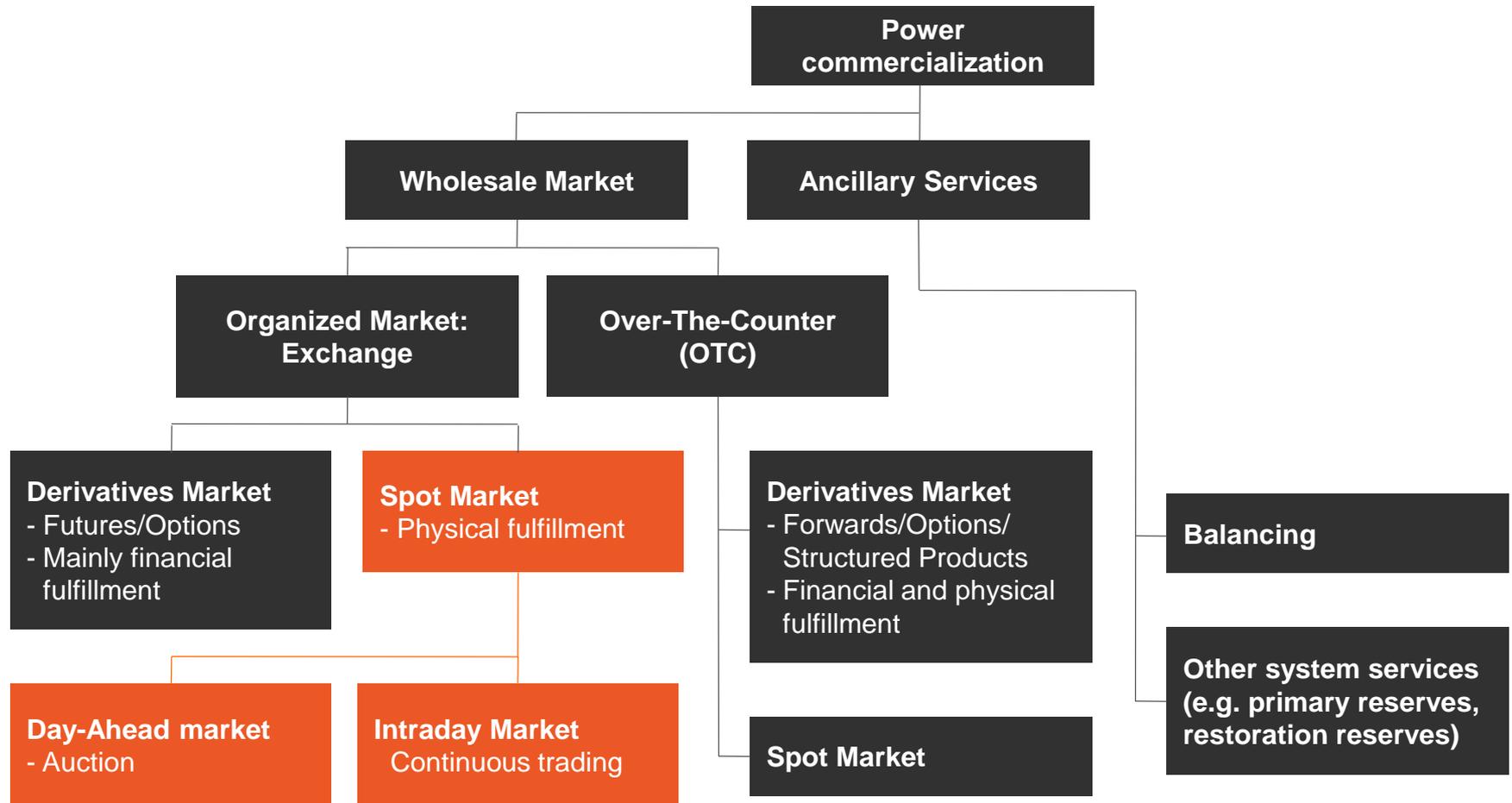
Design Elements for Implicit Intraday Auctions

The Future of Power Markets

Dr. Philippe Vassilopoulos, EPEX SPOT

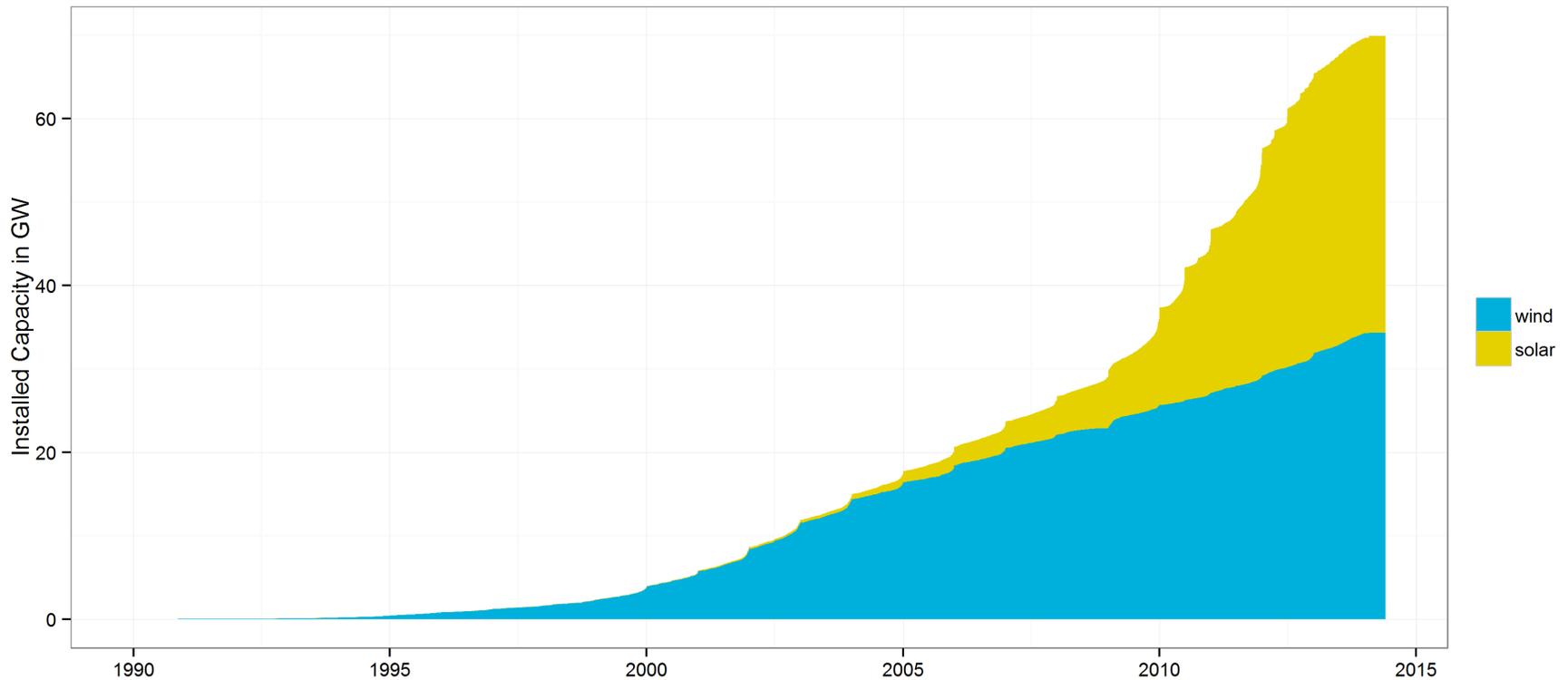
04/10/2016

Ways of trading power on European Wholesale markets



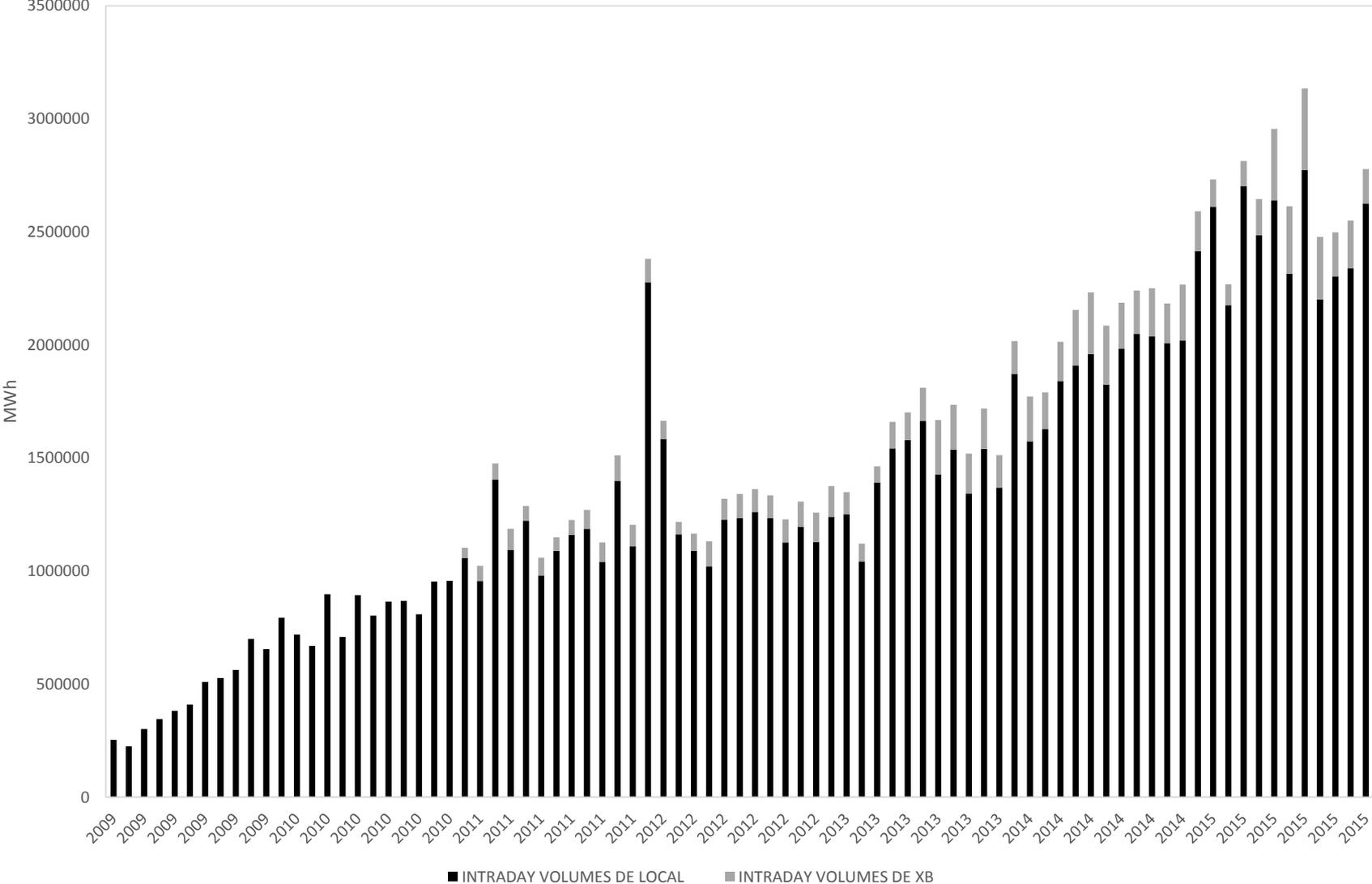
RES development has boosted need to balance on the Intraday market

Solar and Wind Installed Capacity in Germany



Source: Statkraft

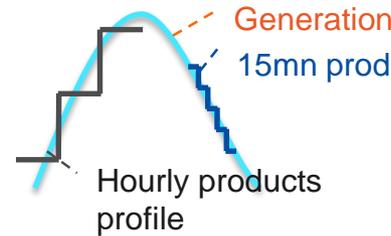
The German IDM liquidity has been boosted by iRES penetration



Balancing needs exacerbated by forecast errors

- **Generation ramps** handled with quarters
- **Forecast deviations** : Wind/solar forecasts can vary significantly from Day-ahead forecast to last Intraday Forecast

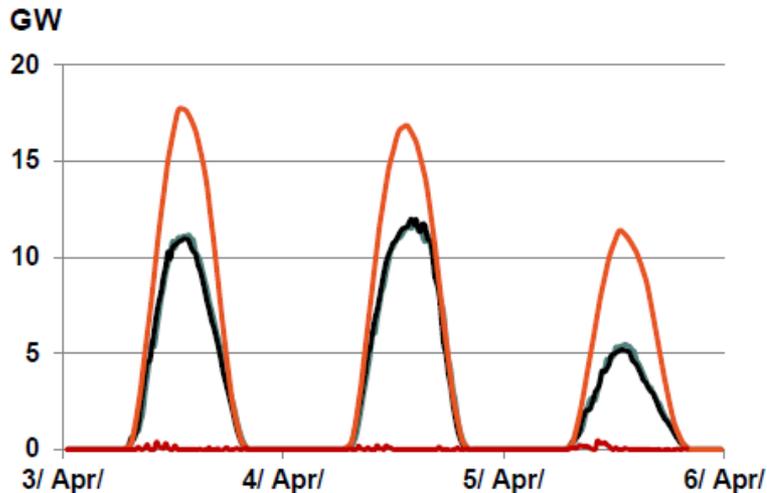
Generation Ramps



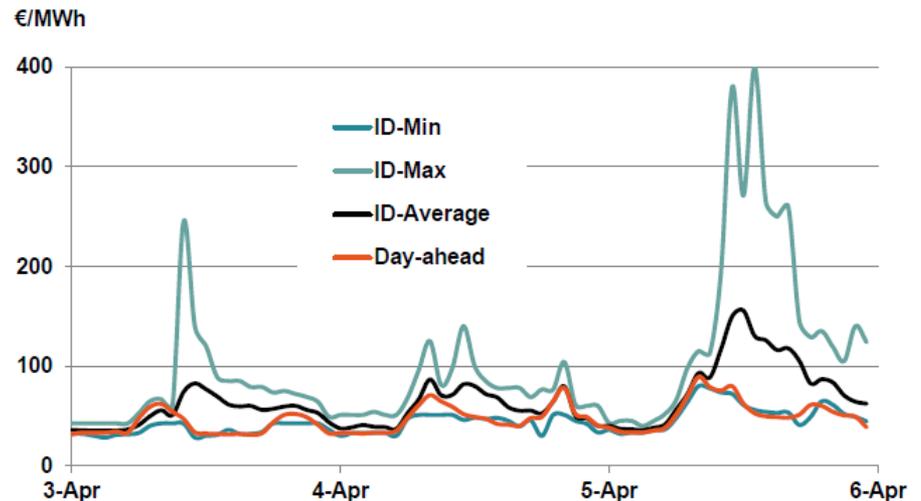
Forecast Deviations



Day-ahead PV forecast inaccuracy and Intraday price impact

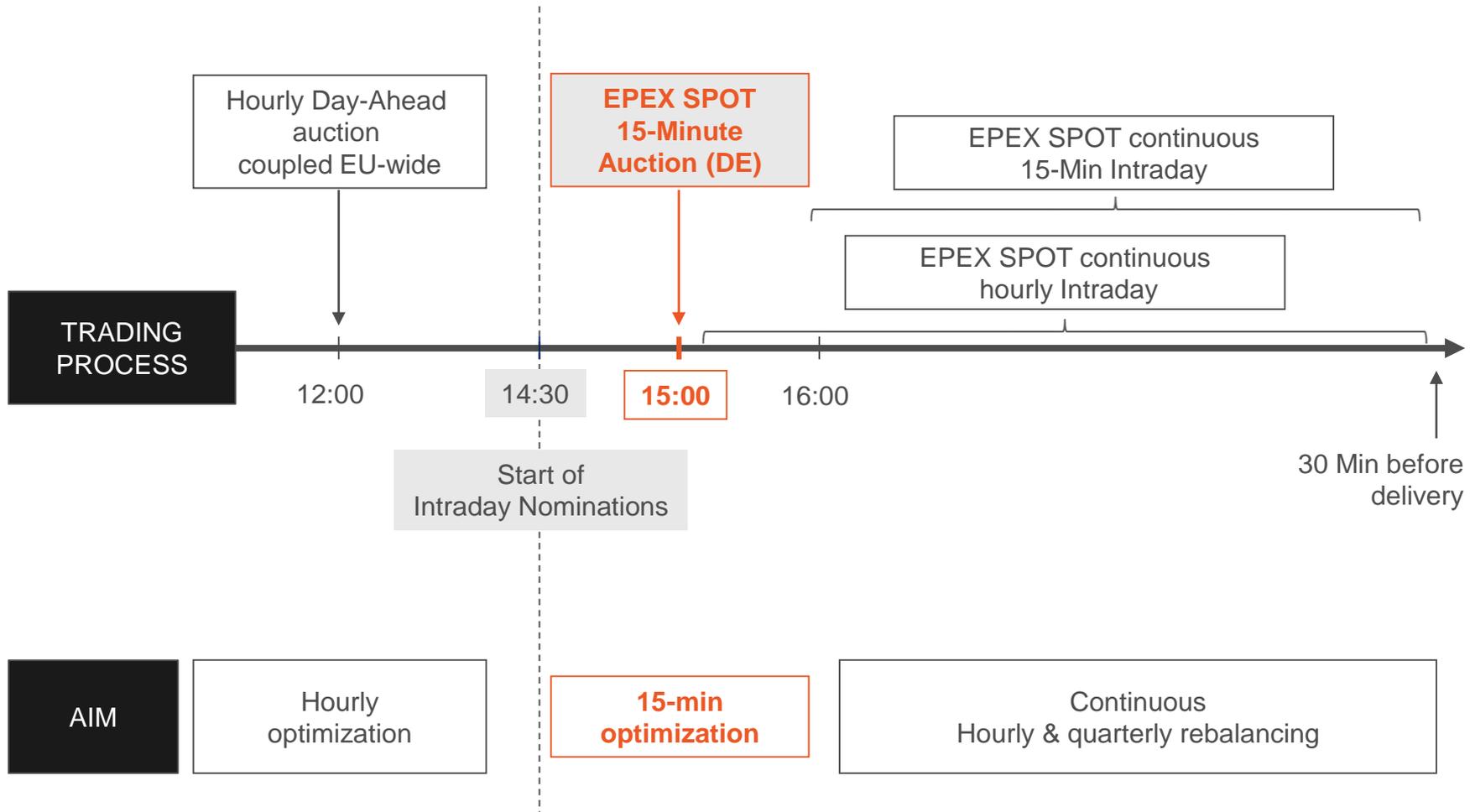


- Day-ahead PV forecast
- Last intraday PV forecast
- PV extrapolation



Source: 50 Hertz, EPEX SPOT

The wholesale energy trading process

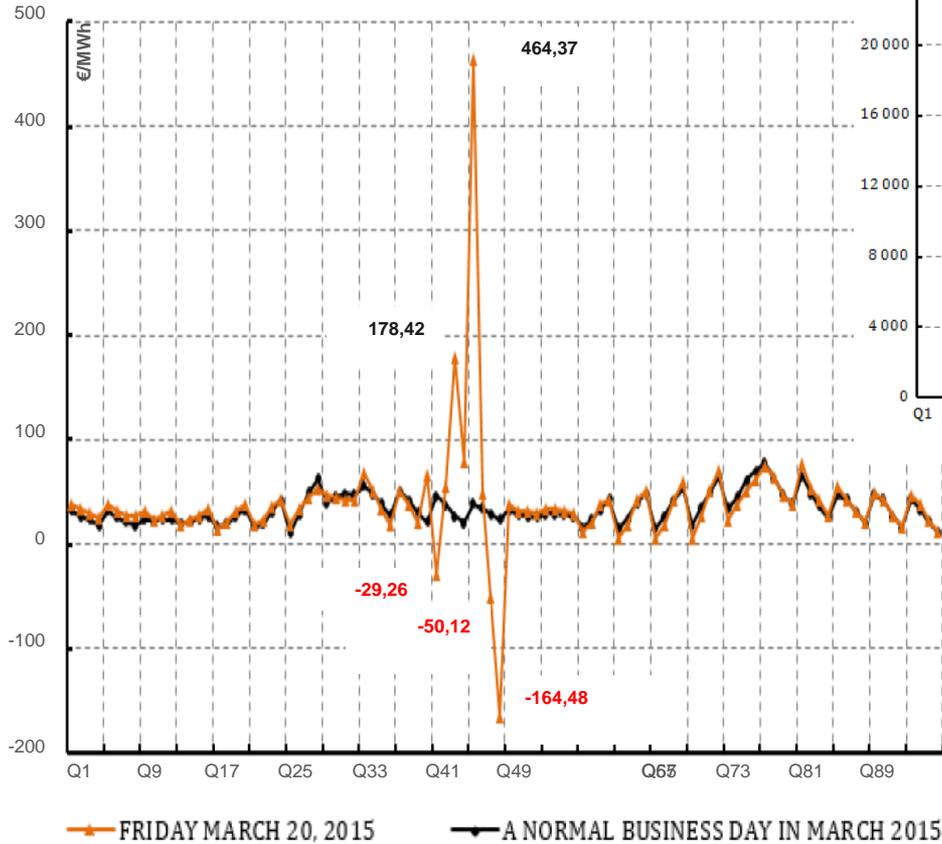


The market depth of the auctions shows participants willingness to offer flexibility

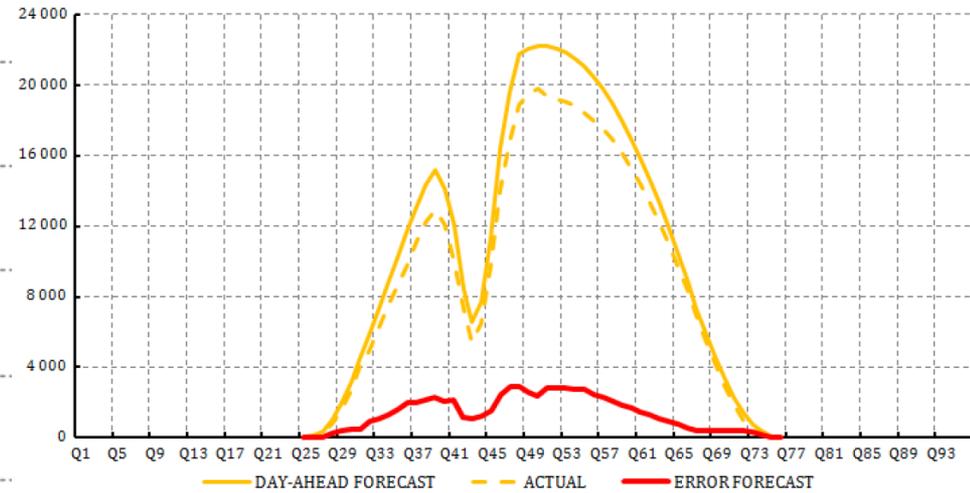


European power exchange as a component of security of supply during the solar eclipse

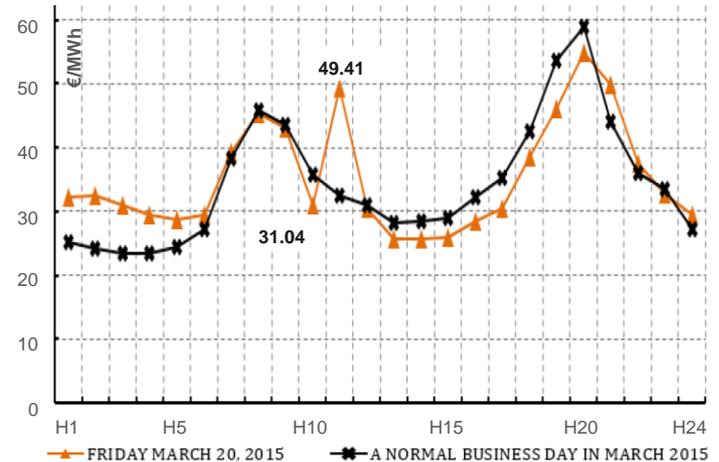
INTRADAY PRICES



SOLAR FORECAST



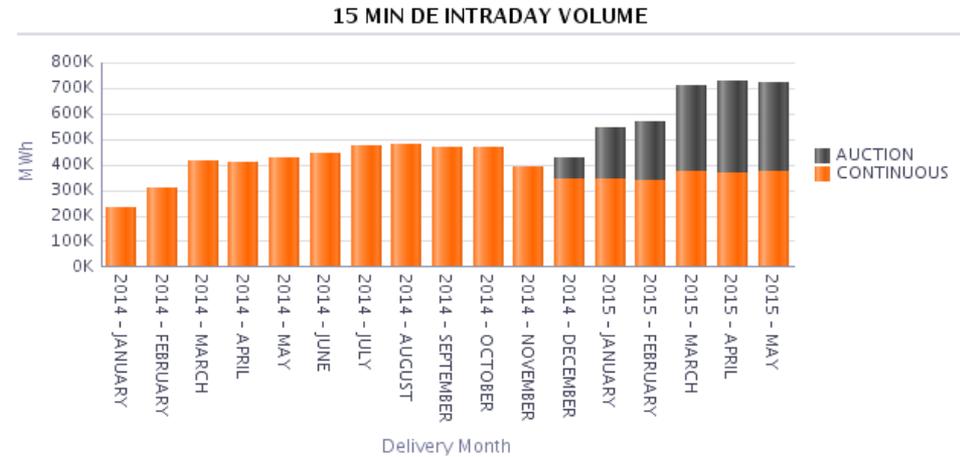
DAY-AHEAD PRICES



Source: EPEX SPOT, TSOs

Intraday auctions as a complement to continuous trading for a flexible target model

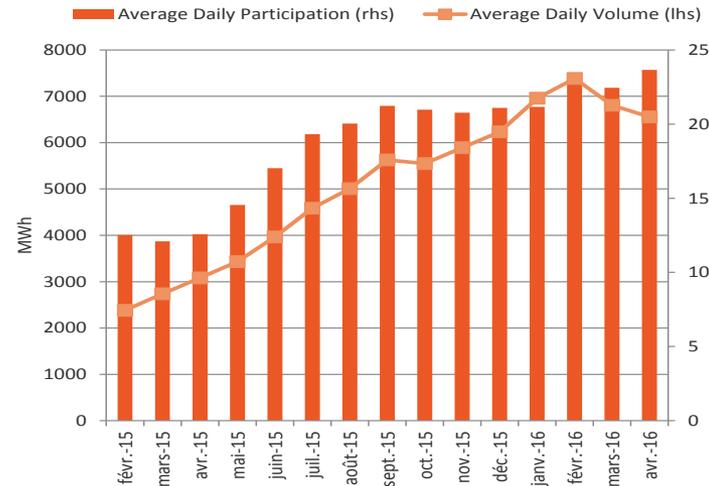
- **A short-term price signal** to reward flexibility
- **A question of liquidity:** Concentrating liquidity during times of varying market conditions can help ALL market players!
- **The power exchange can facilitate trading/Valuing of flexibility:** Decreased lead-time, 15mn products, local DE Auction
- **Some pros/cons of Intraday auctions Vs Continuous**
 - Liquidity (15mn auction \approx 10-15GWh/day)
 - Uniform pricing Vs Pay As Bid
 - Continuous Vs Discrete
 - Transmission capacity pricing
 - Problem complexity (15/30/60mn+Block products, Smart blocks, multi-part bids)
 - Level-playing field : no arms race
 - Reliability
- **Regulations have an important role to play**
 - **Flexible regulatory framework**
 - **Target model** needs to be flexible enough to accommodate the evolution in market conditions



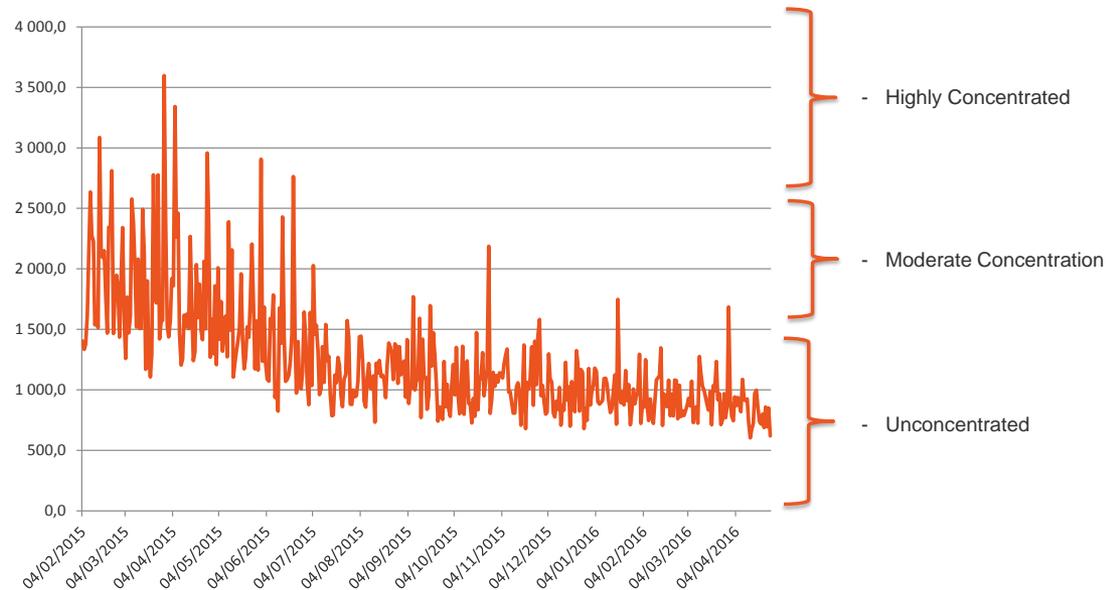
Source: EPEX SPOT

HHDAM Auction Results in GB very encouraging since launch

- Some of the highlights of the HHDAM auction held everyday at 3:30pm UK time:
 - Inc. liquidity & participation
 - Low market concentration (HHI index)
 - Relatively high market Depth
- Blocks would allow participants to put greater volumes of to the auction



	Accepted Quantity	Submitted Quantity	Ratio
mean	424	3,013	14%
min	-	21	0%
25%	158	2,166	6%
50%	323	2,919	11%
75%	580	3,753	19%
max	3,356	9,356	99%



The rationale for implicit Intraday auctions

Complex products

Transmission capacity pricing

Integration of network constraints

No arms race (Time/speed)

Robust price reference

Liquidity

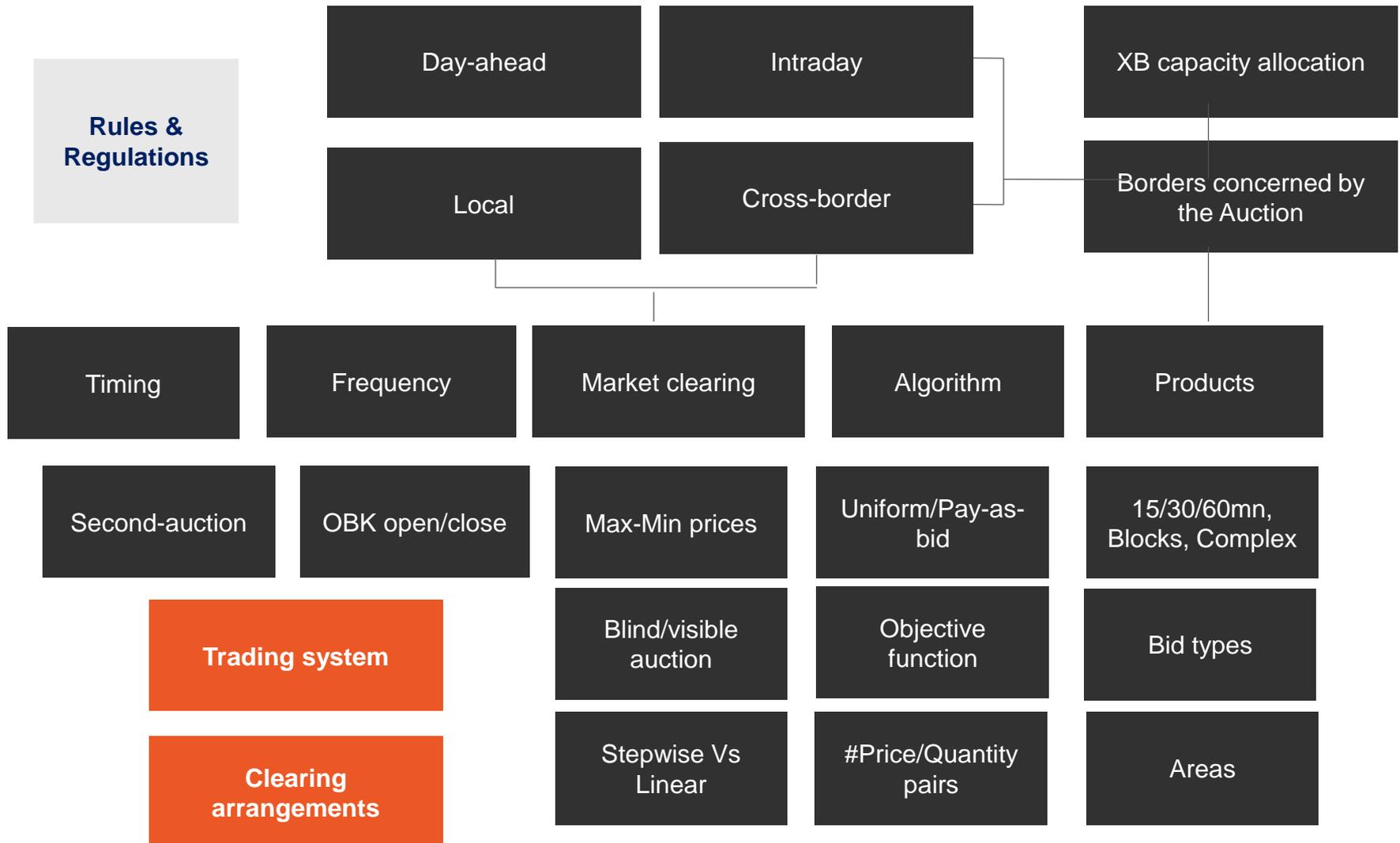
Reliability

- Auctions allow to increase market complexity level in a discrete process that is based on a powerful algorithm (not instantaneous)
- Optimization can be achieved at the Day-ahead stage but rebalancing is still needed with continuous trading
- Allows pricing capacity more easily
- Allows integrating network constraints

- Success of 15 auction confirms market interest for optimization products Intraday.
- Empirical evidence suggests MPs behavior different between continuous and auctions

- Active/liquid markets are a prerequisite
- Legal framework not that clear on this topic and prone to free-riding problems.

Some design options for implicit cross-border Intraday auctions (not exhaustive)





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