

# The Role and Importance of Power Exchanges

Arnold Weiss,  
Vienna, 18/10/18

# AGENDA

1. What Defines a Power Exchange?
2. Wholesale Power Trading on the Exchange
3. Focus on Risk Management
4. Contact and Exchange with Regulators
5. The Markets
6. The Products
7. Single European Market Coupling
8. Background on EPEX SPOT

# What Defines a Power Exchange?

# The impact of liberalisation on the energy value chain

## BEFORE LIBERALISATION

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PRODUCTION > TRANSMISSION > DISTRIBUTION

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## AFTER LIBERALISATION

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PRODUCTION > TRADING > DISTRIBUTION

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TRANSMISSION

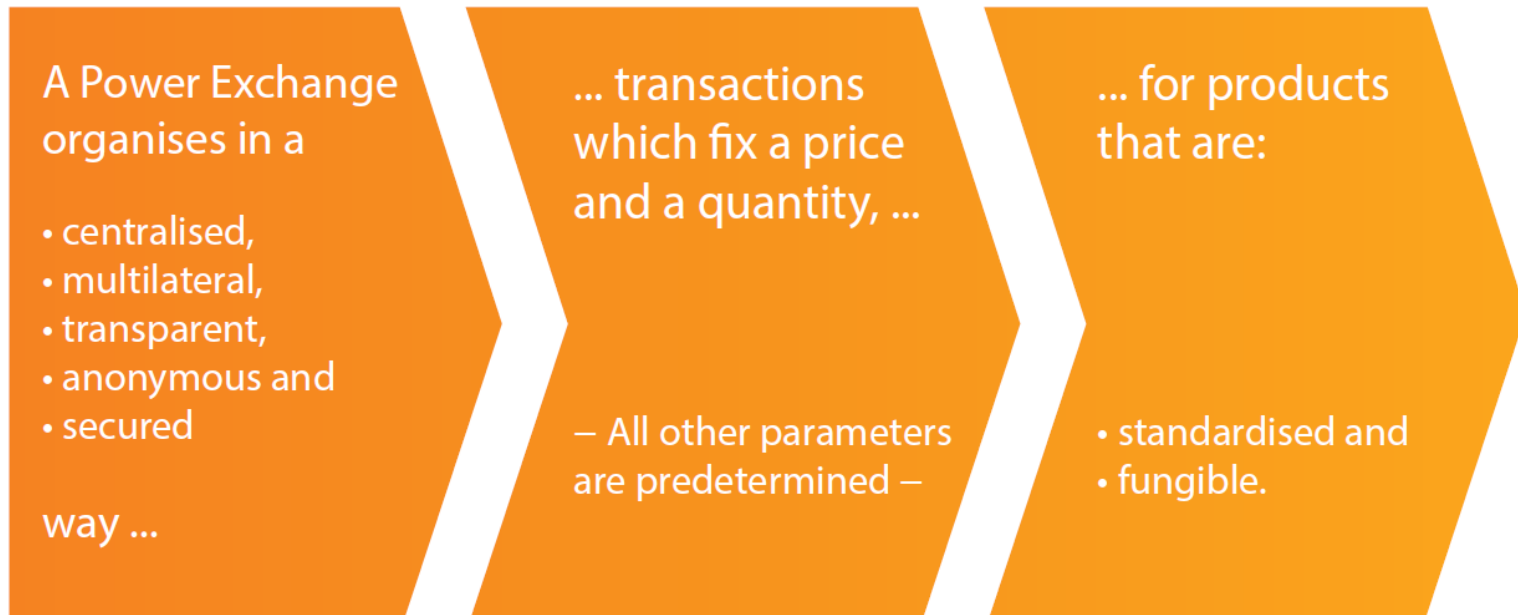
# The third pillar in the value chain



## The organized market:

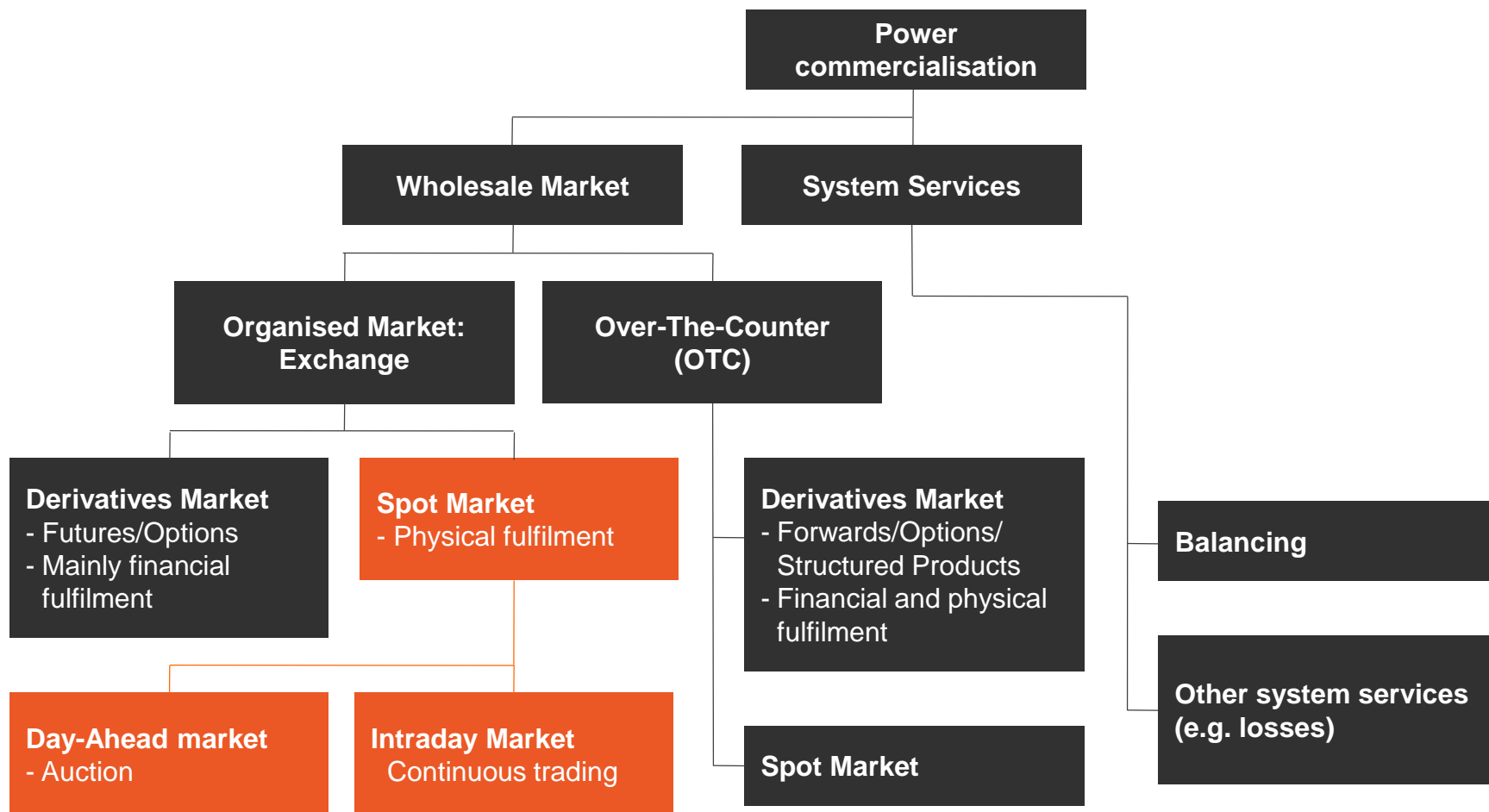
- Access to an anonymous market
- Level playing field between members
- Financial guarantees through the Clearing House
- Calculation and publication of transparent and fair price references

# Definition of a Power Exchange



Power Exchanges bundle supply and demand of companies and professionals of the power business (producers, utilities, banks, industrial consumers) and allow the creation of a **neutral market price** in a transparent, instant and fair manner.

# Ways of commercialising power



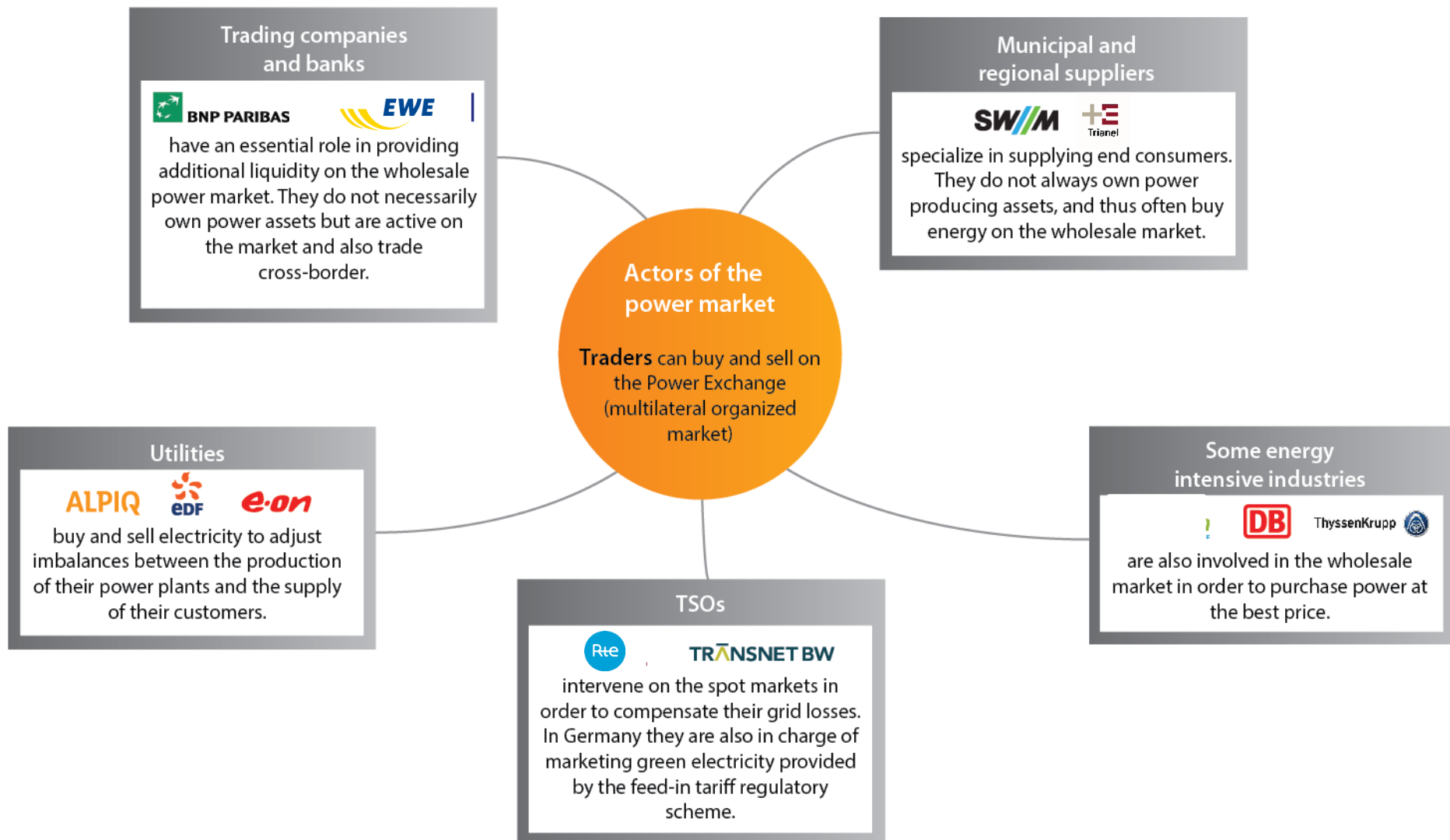


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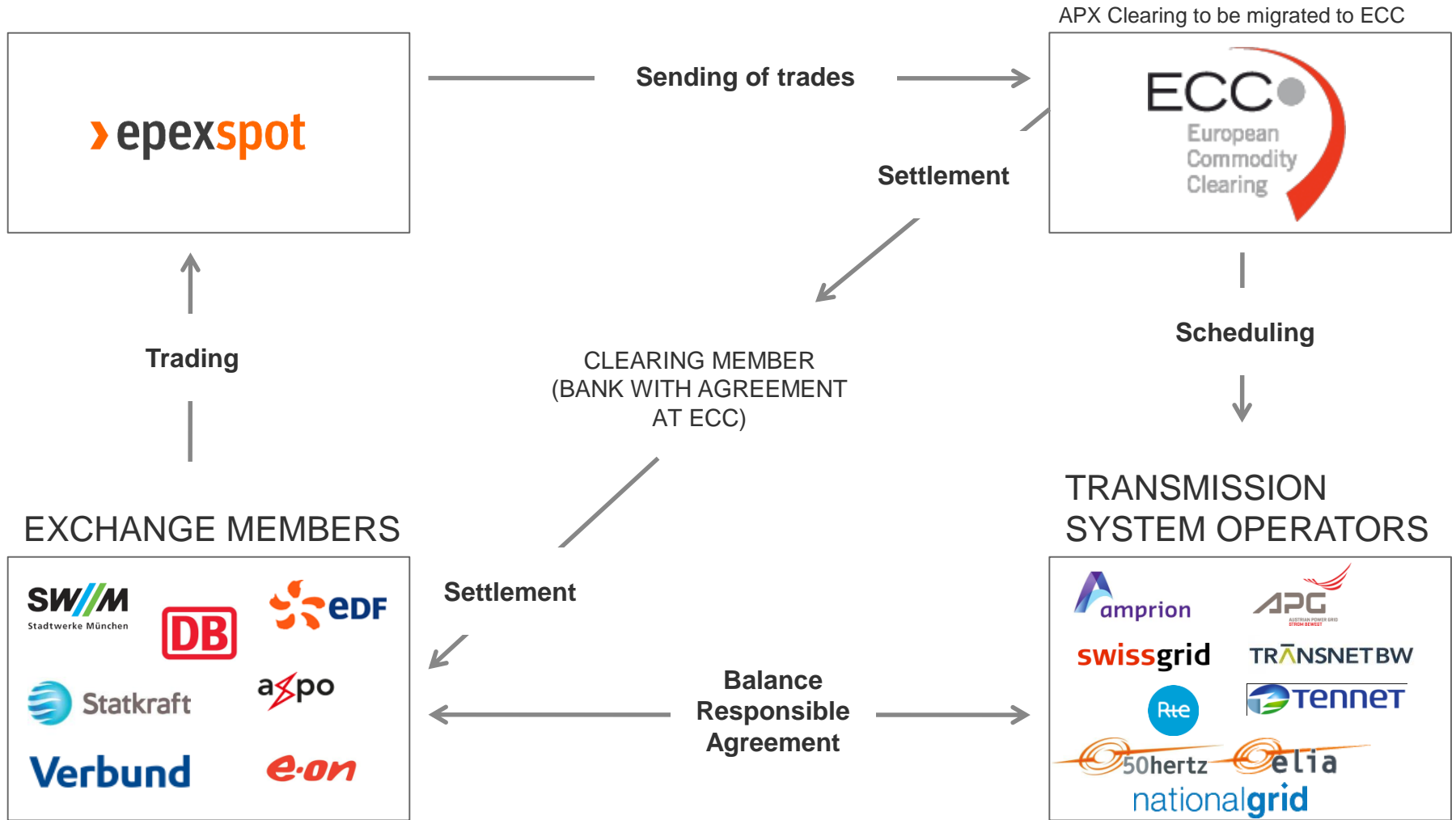
# Wholesale Power Trading on the Exchange



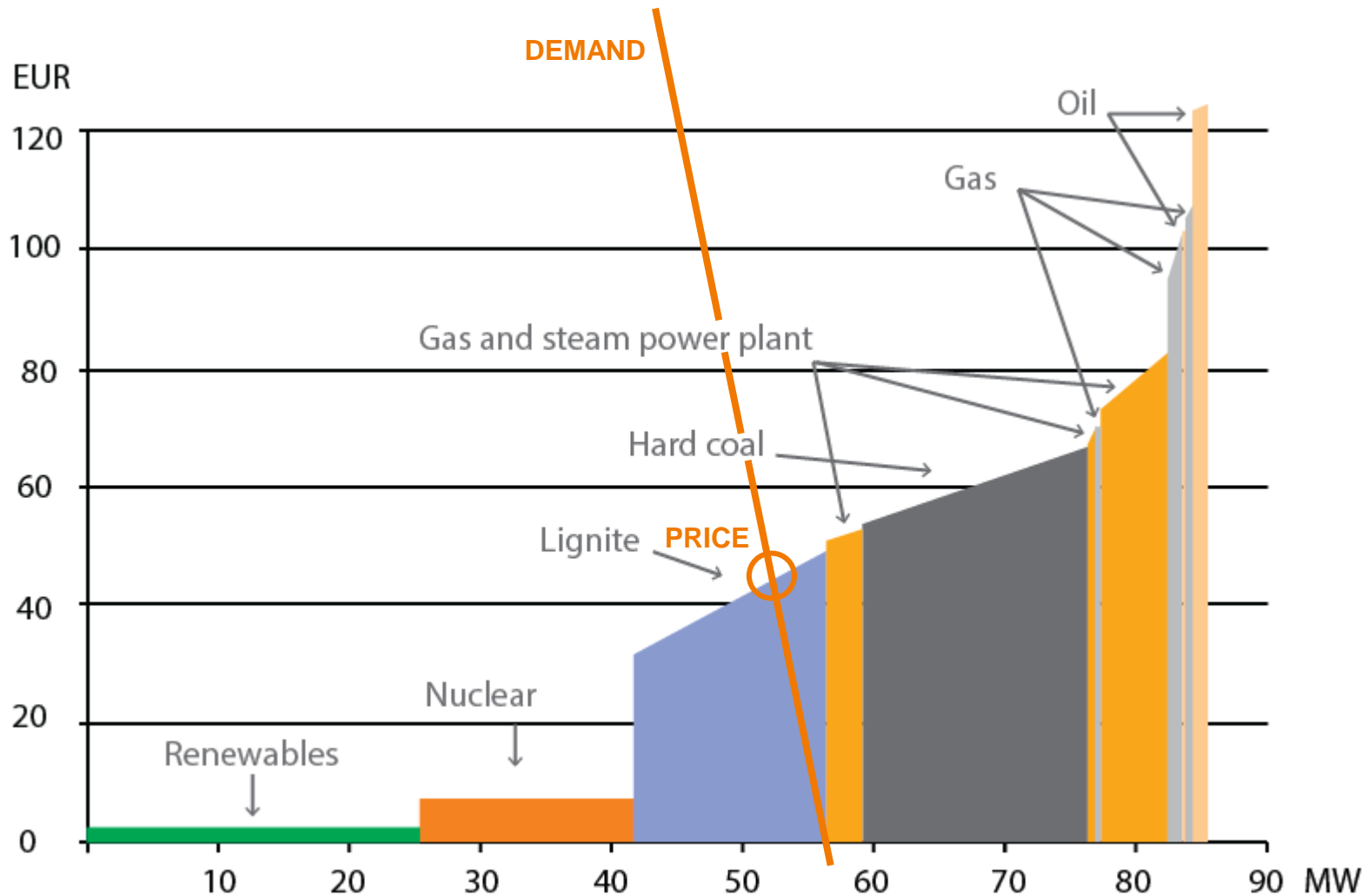
# Who are sellers and buyers on EPEX SPOT?



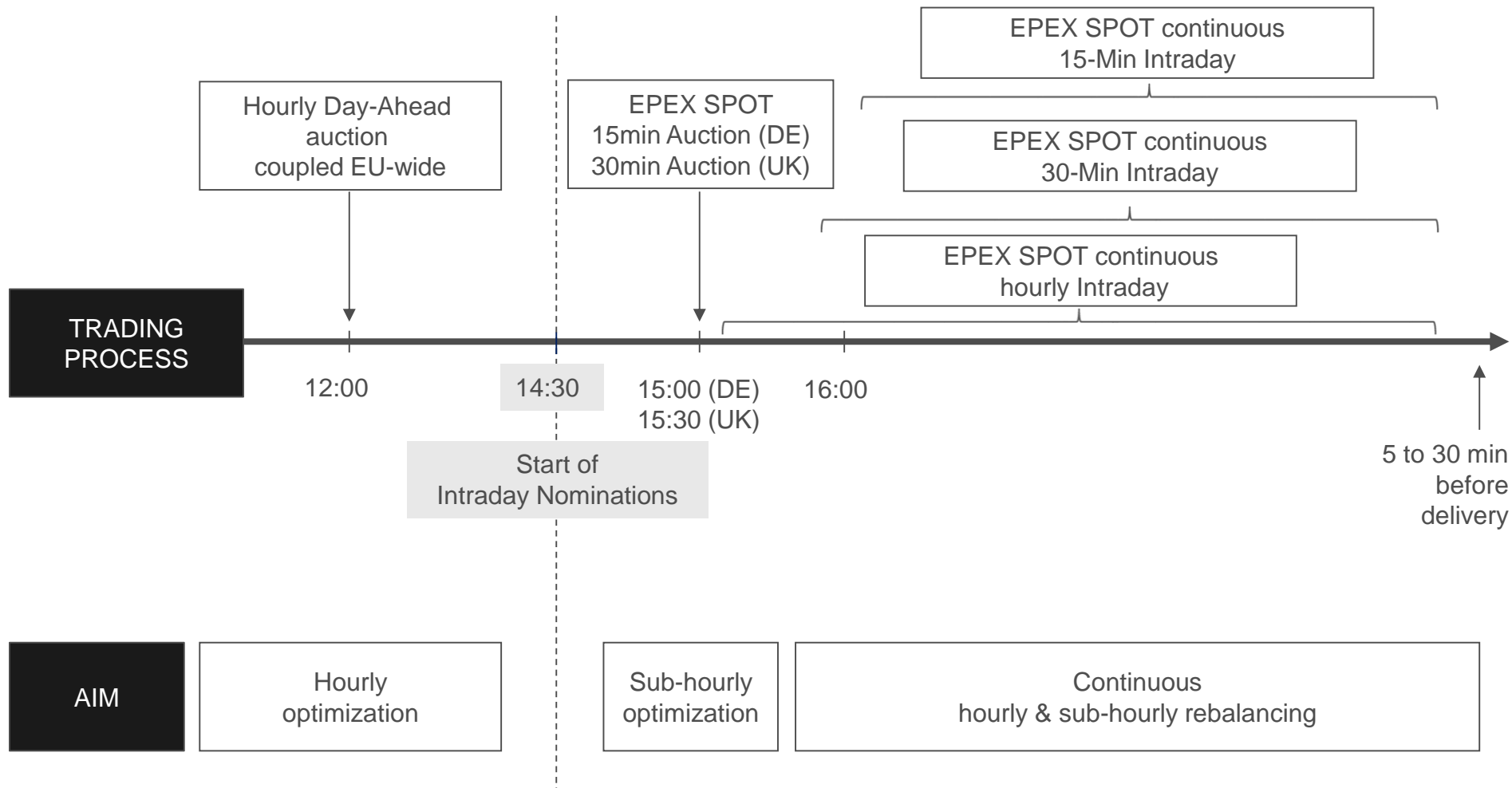
# Trading on the Exchange



# Merit Order: How prices are determined



# The power trading process at EPEX SPOT

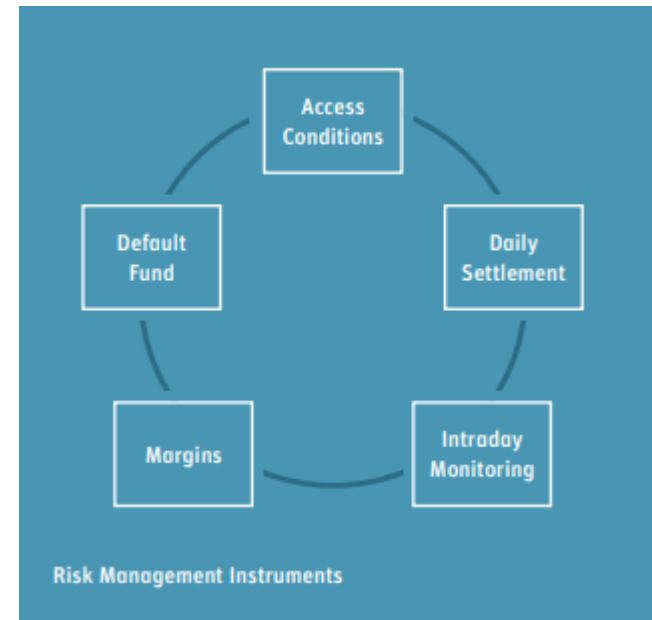


# Focus on Risk Management

# The Role of the Central Clearing Party (“CCP”) to Minimize Risks

The CCP mitigates risks to participants through a system consisting of many elements:

- Novation of trades as soon as they are matched or registered on the different markets. As a result, the trading participant is not exposed to the other trading participants’ credit risk.
- Strict criteria for the admission of Clearing Members. With the help of strict admission criteria CCP ensures that its clearing members have the necessary resources to fulfil the highest requirements.
- Daily settlement of profits and losses: Open positions are marked to market every day and profits and losses are paid out or collected on a daily basis.
- Margins are required on a daily basis – and, if necessary, intraday in volatile market conditions – to cover current and future exposures.
- Sharing of residual risk by the Clearing Members, who contribute to CCP’s Default Fund.
- CCP constantly reviews and improves its methods and risk tools to provide state-of-the-art risk management.



# Potential Players in the Clearing of Transactions on a Regulated Market

## **Non-Clearing Members (NCM)**

- Trading participants on spot and/or derivatives markets cleared by CCP
- Connected to CCP through a clearing member that acts as a guarantor and payment agent for transactions concluded by the non-clearing member

## **Clearing Members (CM)**

- Account keeping and financial settlement for non-clearing members
- Trading participants on spot and/or derivatives cleared by CCP
- Guarantee for trades performed by non-clearing members on spot and/or derivatives markets connected to CCP
- Can provide access to exchange trading on own account and a large scale of additional services for trading participants

## **Direct Clearing Participant Clearing Members (DCP)**

- Trading participants on specific spot markets cleared by CCP
- Connected to CCP through a Settlement Bank that acts as payment agent for transactions of the DCP
- Pre-trade limits set in the trading system need to be collateralized in advance

# Contact and Exchange with Regulators



# Different Contact Points with Different Regulators

## CAs

### Competition

- EU treaty & national law
- Market power of market places
- Market abuse of dominant position in market
- Collusion with other market places

## RAs

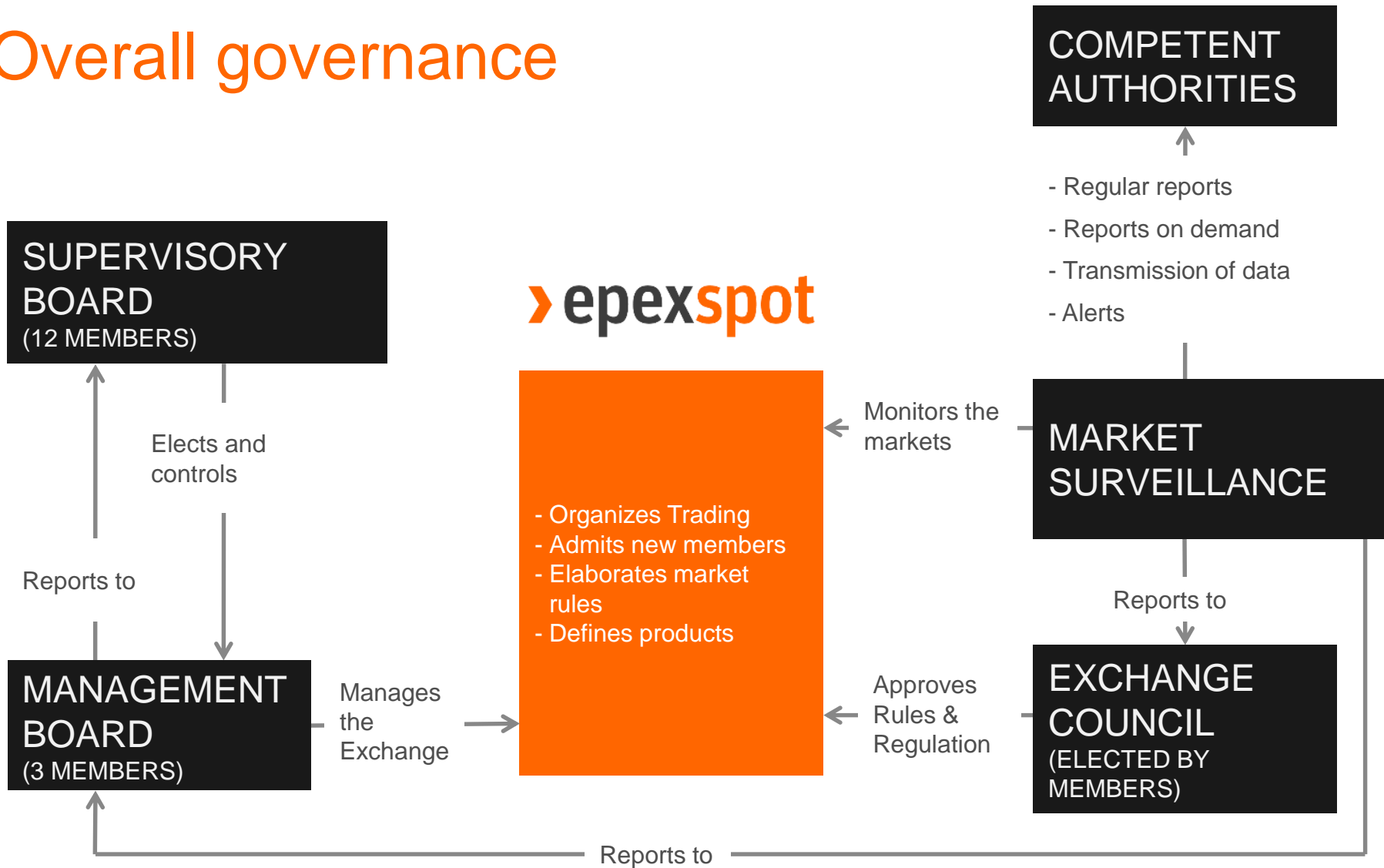
### Market Integrity and Transparency

- REMIT
- Reporting of transactional (and fundamental) data as a service
- Market surveillance to monitor own market (corresponding to duty to report suspicious behavior of market participants)
- Cooperation with regulators at a broader level

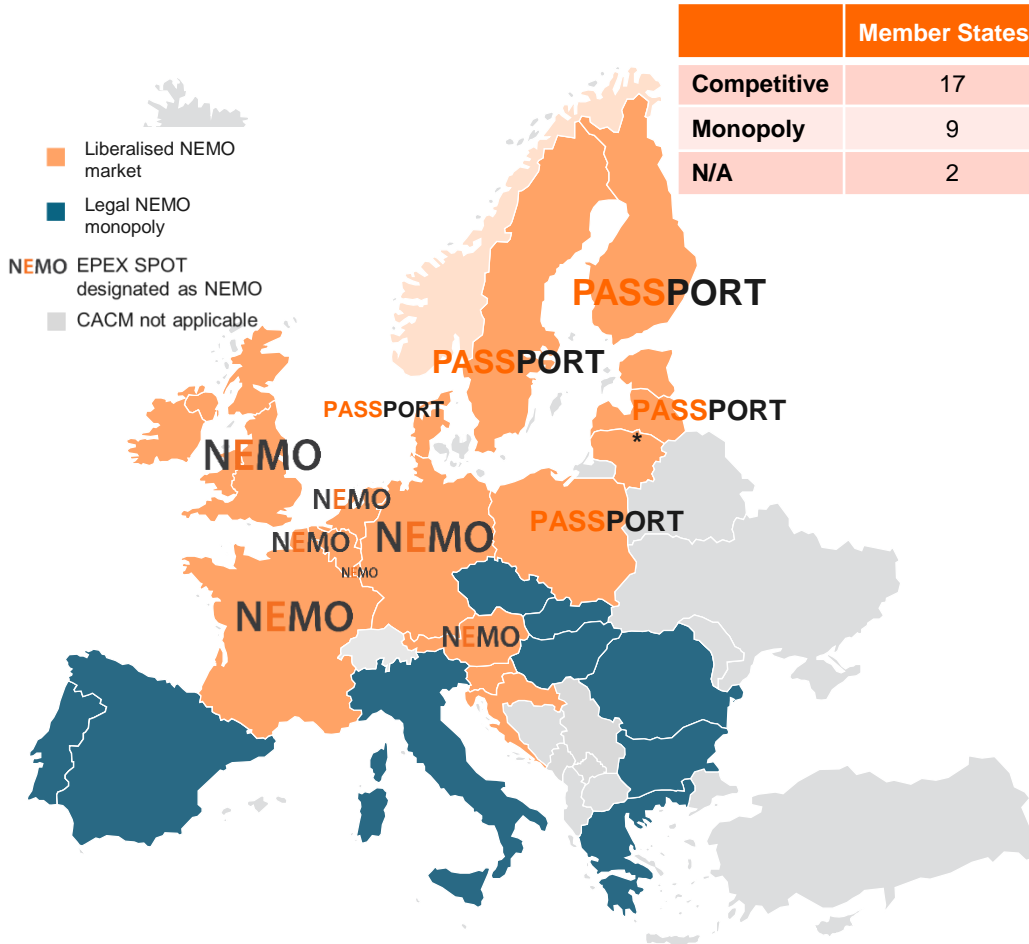
### Market Coupling

- CACM
- Designation as Nominated Electricity Market Operator (NEMO)
- Approvement of general conditions and methodologies
- Surveillance of market coupling function
- Approvement of cost sharing and recovery plans
- Non-discriminatory level playing field and multiple NEMO arrangements

# Overall governance



# NEMO Status in Europe (as of December 2017)



	Member States	% Production	NEMO (D-A / ID)	Country
<b>Competitive</b>	17	70.3%	<b>EPEX SPOT</b>	LU, DE, FR, GB, NL, AT, BE, DK, SE, PL, FI, EE, LV, LT
<b>Monopoly</b>	9	29.4%	<b>NORD POOL</b>	DK, EE, FI, LV, LT, SE, AT, FR, GB, NL, DE, BE, PL, IRL
<b>N/A</b>	2	0.2%	<b>EXAA</b>	Austria
			<b>POLPX</b>	Poland
			<b>EIRGRID, SONI</b>	Ireland, Northern Ireland
			<b>BSP</b>	Slovenia
			<b>CROPEX</b>	Croatia
			<b>OMIE</b>	Spain*, Portugal*
			<b>GME</b>	Italy*
			<b>HUPX</b>	Hungary*
			<b>OTE</b>	Czech Republic*
			<b>OKTE</b>	Slovakia*
			<b>OPCOM</b>	Romania*
			<b>LAGIE</b>	Greece*
			<b>IBEX</b>	Bulgaria*

\* Legal monopoly

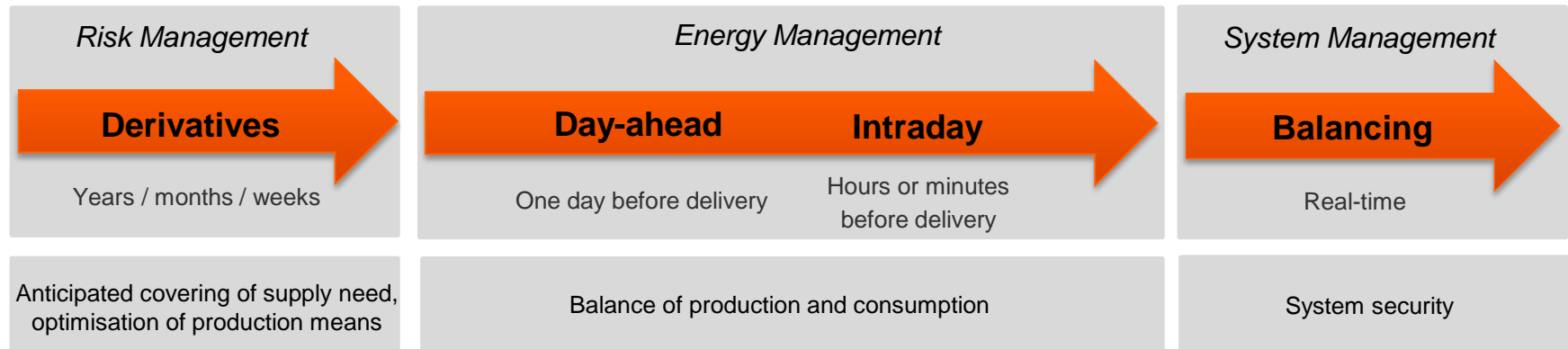
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# The Markets

# Our role in the timeline of the market



## DAY-AHEAD AUCTION

- Optimisation of liquidity via an auction
- Market areas: Germany/Austria/Luxembourg, France, Great Britain, the Netherlands, Switzerland and Belgium

## CONTINUOUS INTRADAY

- Flexibility through continuous trading
- Market areas: Germany/Luxemburg, France, Great Britain, the Netherlands, Switzerland, Belgium and Austria

# Products – how Day-Ahead and Intraday complement each other

## DAY-AHEAD MARKET

### Hourly auction (all markets)

- Auction at noon, 7 days a week, year-round
- 24 hours of the following day are traded
- Hourly and block contracts available for trading
- Integrated in Multi-Regional Coupling which encompasses Germany/Austria/Luxemburg, France, Belgium, the Netherlands, Great Britain, the Nordics and Baltics, Spain, Portugal, Italy and Slovenia
- Reliable and robust trading platform through the EPEX Trading System (ETS) for DE/AT, FR, CH, NL & BE; EuroLight for UK; both systems using the Euphemia algorithm for European coupling

### Half-Hour Day-Ahead 15:30 auction (UK)

- Auction at 3:30 pm, 7 days a week, year-round
- 48 half hours of the following day are traded
- Traded on EuroLight, the trading system used for UK Day-Ahead and Intraday markets

## INTRADAY MARKET

### Continuous trading (all markets)

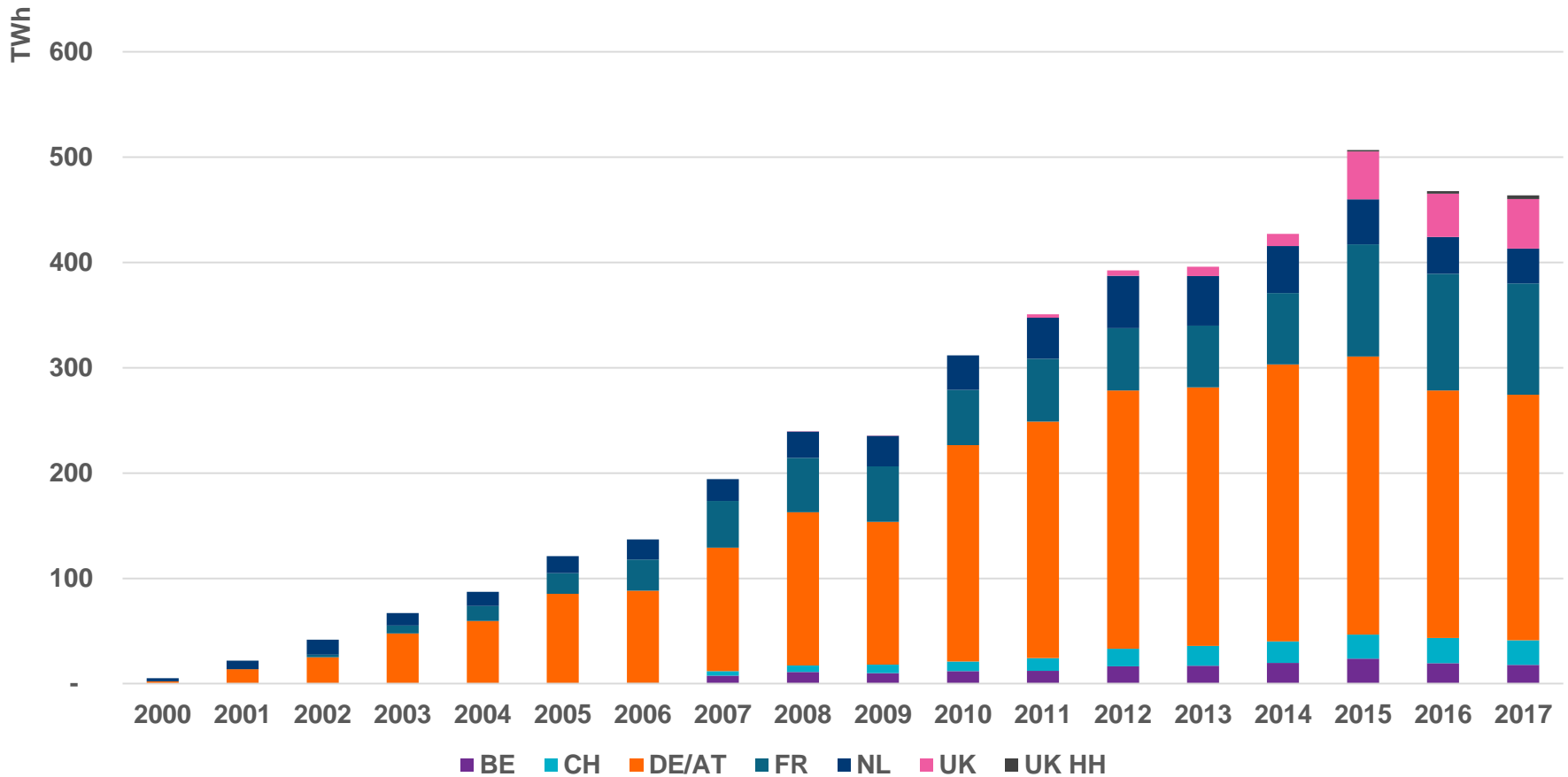
- Continuous trading and price formation, 24 hours a day, 7 days a week, year-round
- Hourly and block contracts available for trading
- In the NL, BE and DE contracts can be traded until 5 minutes before the delivery; in AT, FR and UK 30 minutes and in CH 60 minutes before the beginning of delivery
- 15-minute contracts on German, Swiss and Austrian markets and half-hourly contracts on UK market allow flexible balancing of portfolio
- Cross-border trading between DE, FR, AT & CH on the one hand and between NL, BE & NO
- DE, FR, AT, CH, NL & BE trading on M7; UK trading on EuroLight

### 15-minute call auction (Germany)

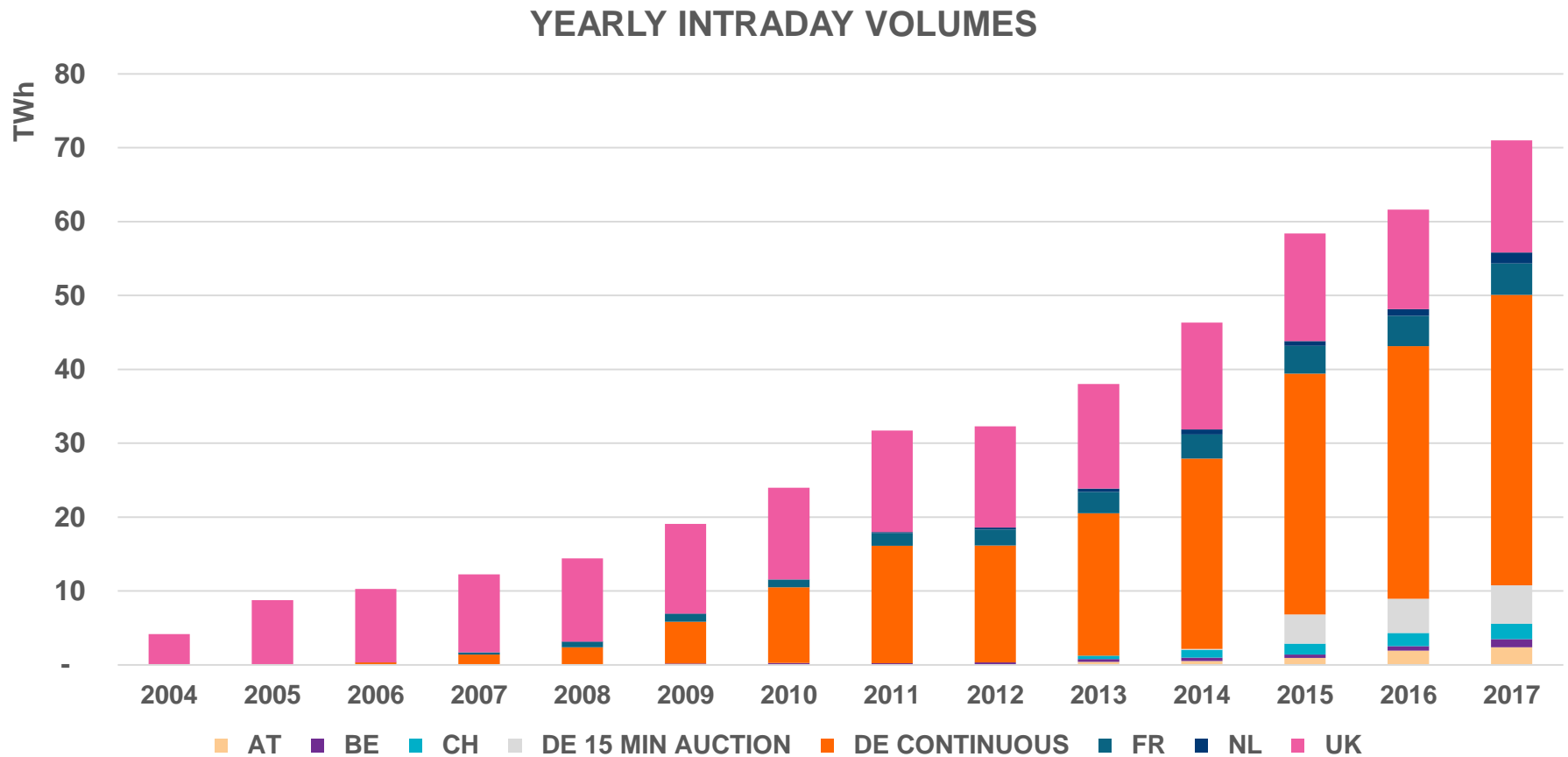
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# Day-Ahead markets: Traded volumes

## EPEX SPOT YEARLY DAY-AHEAD VOLUMES



# Intraday markets: Traded volumes



- Intraday markets are very active both locally and cross-border
- Cross-border trades represent on average 20% of total traded volume





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# The Products

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# Price Caps and Second Auction

## DAY-AHEAD MARKET

### Price Caps

- No bidding possible above EUR 3.000,--
- No bidding possible below EUR -500,--
- Escalation regime of 60% of the maximum is reached once (until the max price cap of the IDM is reached): increase price cap by EUR 1.000,--

### Second Auction

- Order books are reopened and a second auction is performed if one of the following thresholds is reached in the Euphemia computation:
  - Prices below EUR -150,--
  - Prices above EUR 1.500,--
  - GBP prices apply for GB

## INTRADAY MARKET

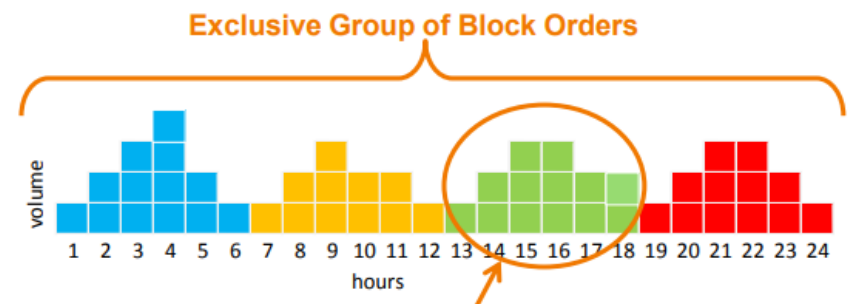
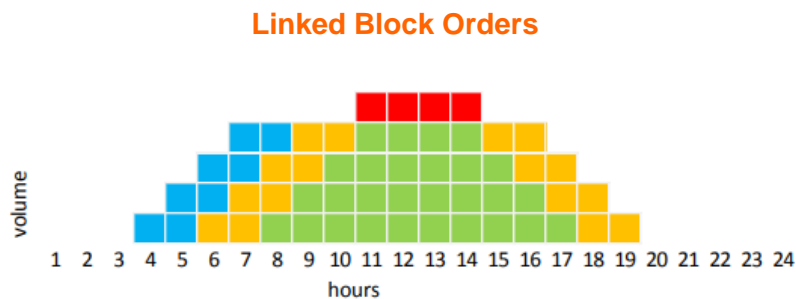
### Price Caps

- No bidding possible above EUR 9.999,--
- No bidding possible below EUR -9.999,--
- Escalation regime applies if the DAM price cap has already reached the IDM cap (i.e. synchronous increase with DAM)

# Day-ahead Market: Single Hours & Block Orders

Hourly products as the basis contract (and tick size). A block combines more than as single hour and adds a “all-or-none” condition.

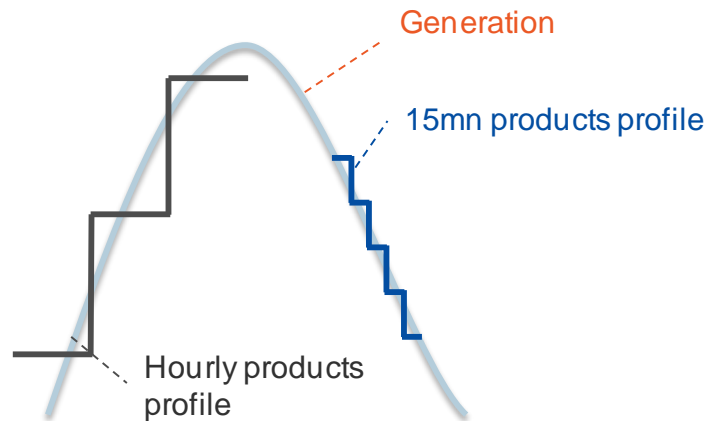
- Pre-defined blocks (e.g. base, peak)
- User-defined blocks (any other combination)
- Big blocks (exceeding certain number of blocks or size)
- Smart blocks (linked and exclusive blocks)



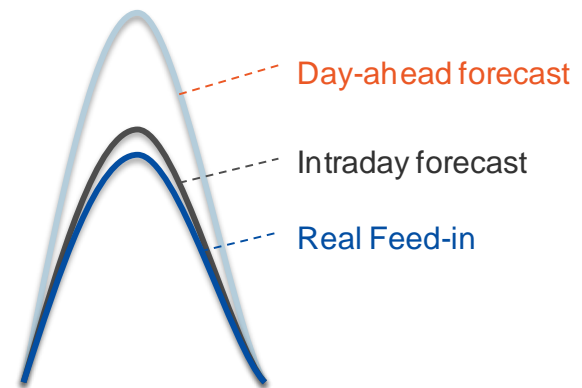
Danger of so-called Paradoxically Rejected Blocks (PRBs).

# Intraday Market: used to balance forecast errors and to price flexibility

## PRODUCTION RAMPS



## FORECAST ERRORS



- 1**

Adjust purchase and sale based on the results of the day-ahead auction
- 2**

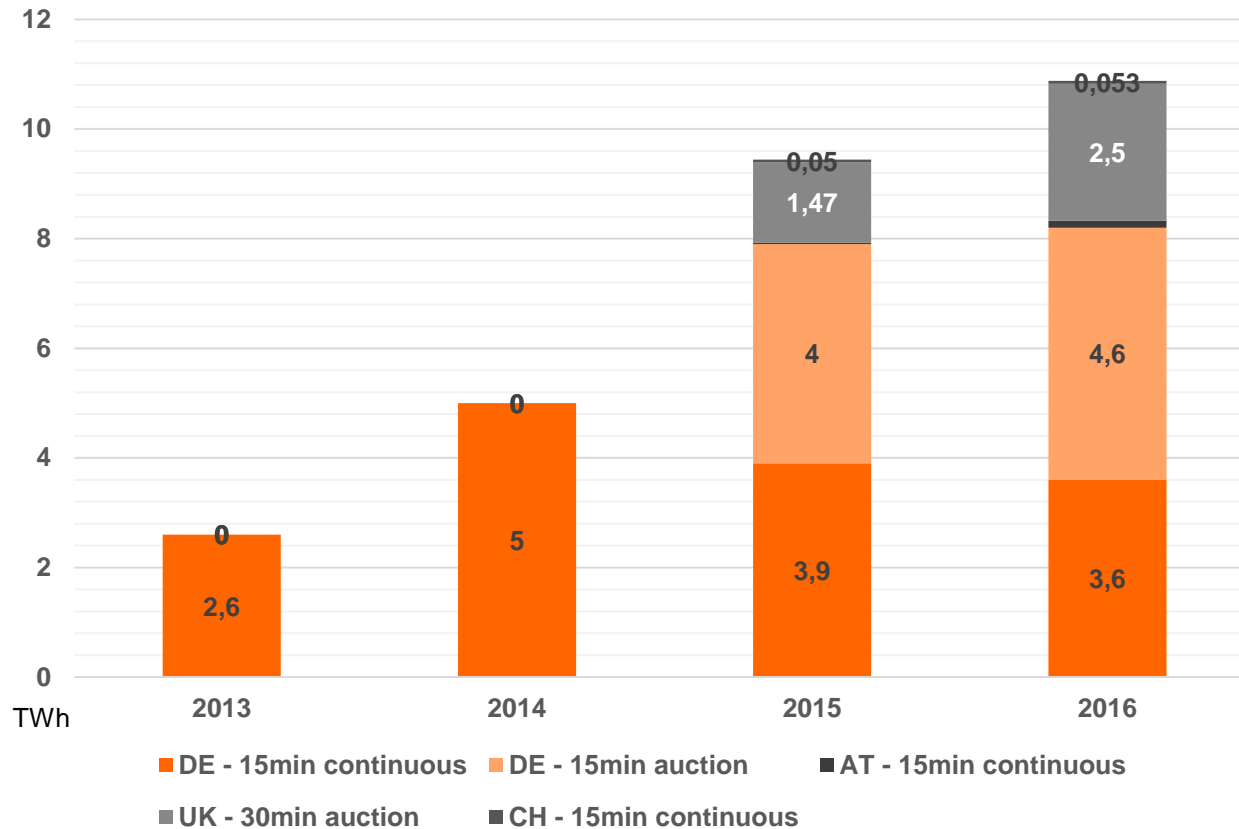
Run and plan power generation closer to delivery
- 3**

Manage unforeseen events such as power plant outage or renewable forecast errors
- 4**

Enable arbitrage between neighboring countries, provide opportunities for cross-border trading
- 5**

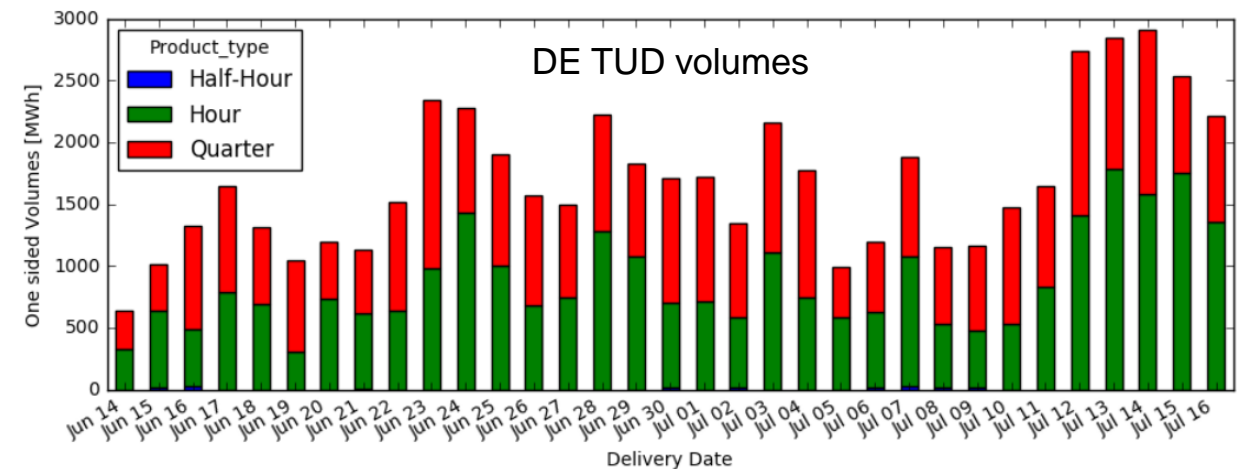
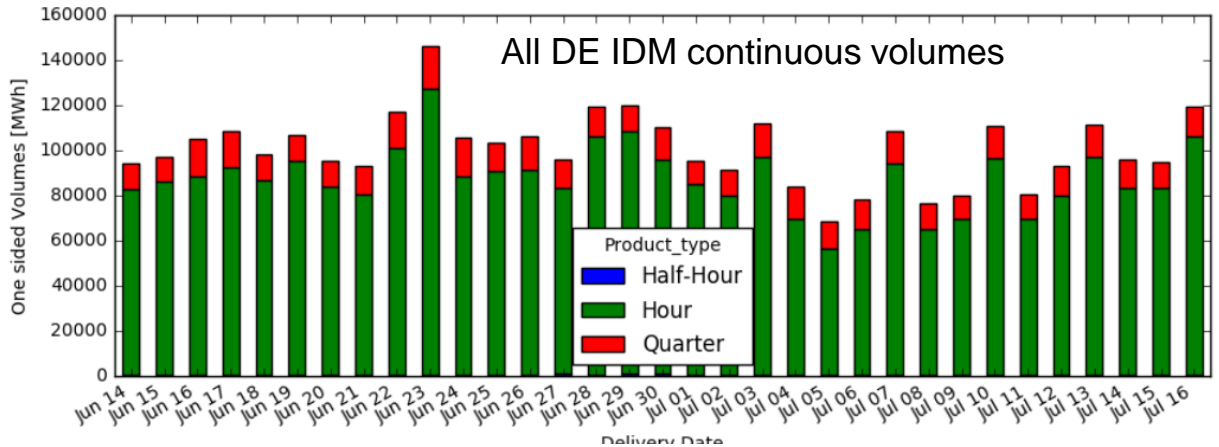
Offer flexibility to manage ramping constraints or intra-hour variation, adjust from hourly to sub-hourly positions

# Intraday Market: Subhourly contracts - products responding to market needs



- Stronger need to have products corresponding to the TSOs settlement period because of stricter balancing constraints imposed on market participants.
- Seasonal effect due to PV generation identified.

# Intraday Market: Volumes of TUD Contracts



- DE trades until delivery (TUD): the daily volumes amount to **1 - 2 GWh**, which represents **~ 1 - 2 %** of the entire DE IDM continuous volumes
- Some contracts have not been traded as TUD yet
- The TUD volumes show a higher share of 15 min contracts than the all DE IDM continuous volumes
- Small share of TUD volumes for 30 min contracts

\*In the following charts are taken into account all trades, with one leg, in DE on continuous IDM 1h, 30 min and 15 mins, between the 14/06/2017 and the 16/07/2017 included (33 full days). Unless stated otherwise, volumes charted are TUD (Traded Until Delivery) volumes, i.e. with a lead time <=30 min . The volumes shown are « one-sided volumes »

# Single European Market Coupling

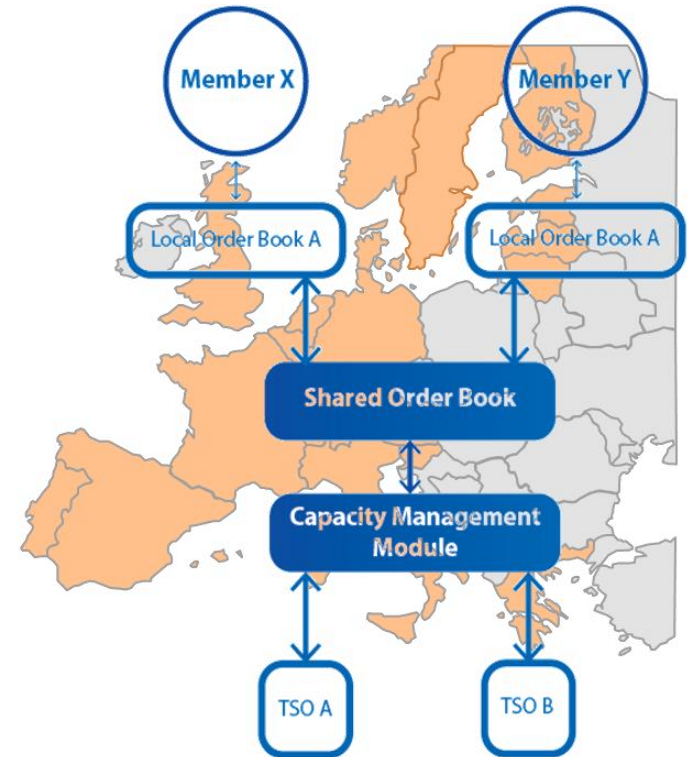


# EPEX SPOT couples markets across Europe since 2006

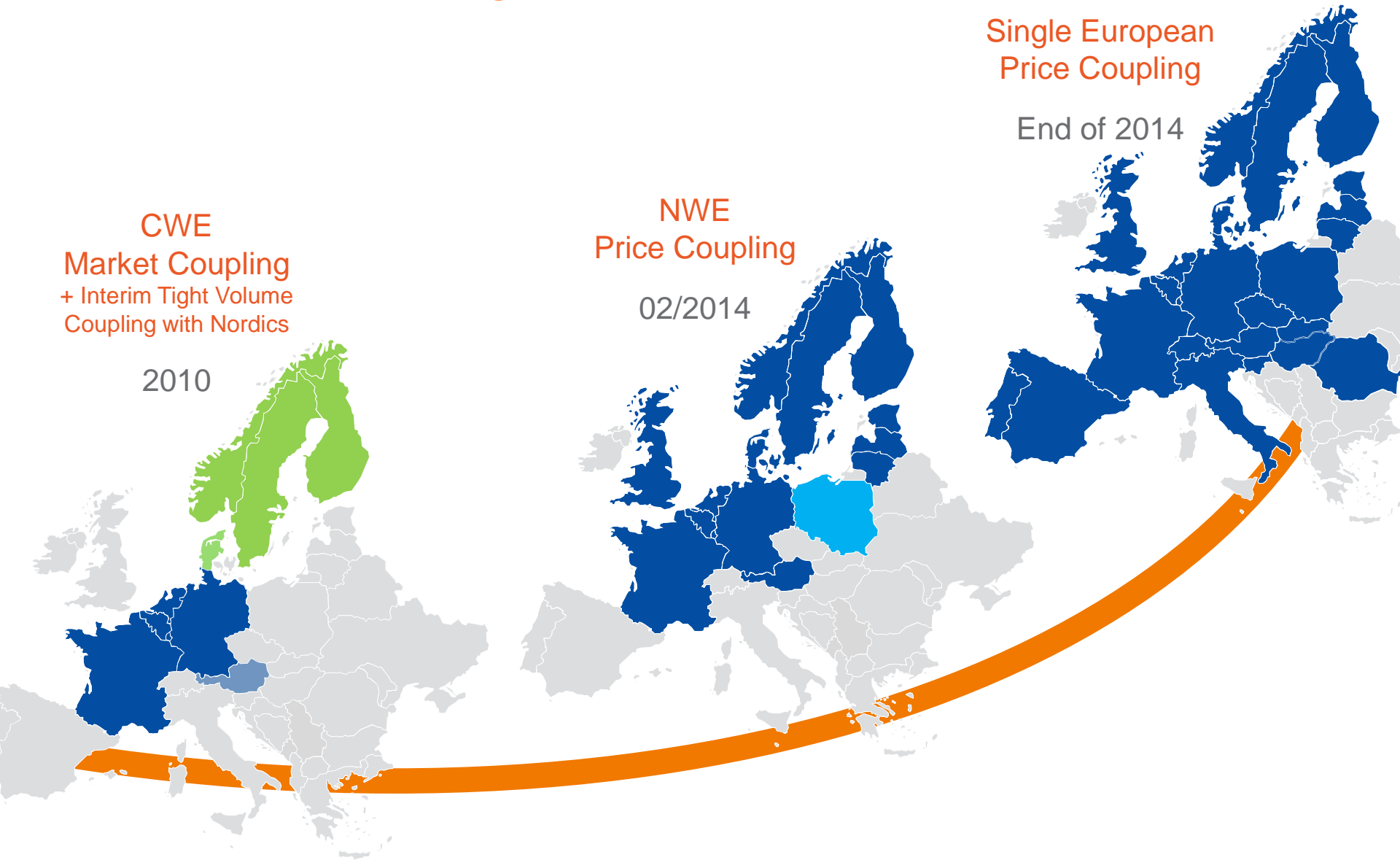
## Day-Ahead Market Coupling



## Intraday Market Coupling



# Market Coupling Initiatives: Overview



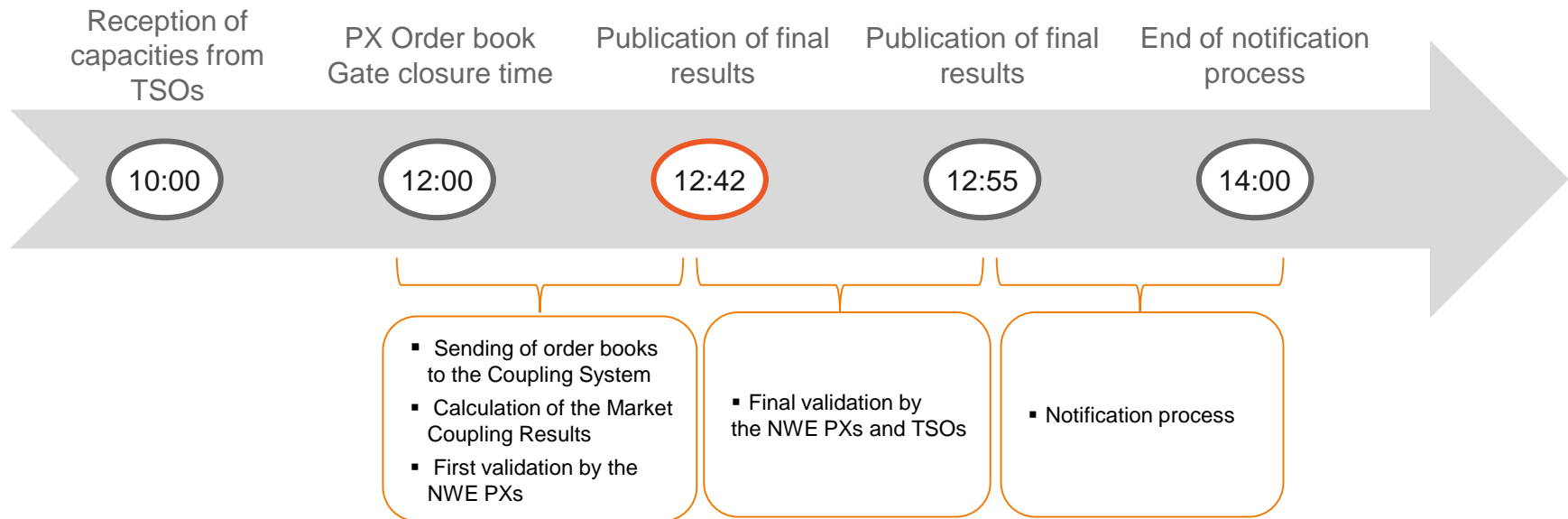
# European Market Coupling Benefits

- 1 Optimal use of interconnectors facilitating congestion management
- 2 Price convergence of market areas in case of sufficient border capacity
- 3 Smoothing effect on negative or positive price spikes
- 4 Attenuation of extreme weather conditions (i.e. cold wave, storm front) on other market areas
- 5 Higher security of supply through market integration and no longer depending on the individual country

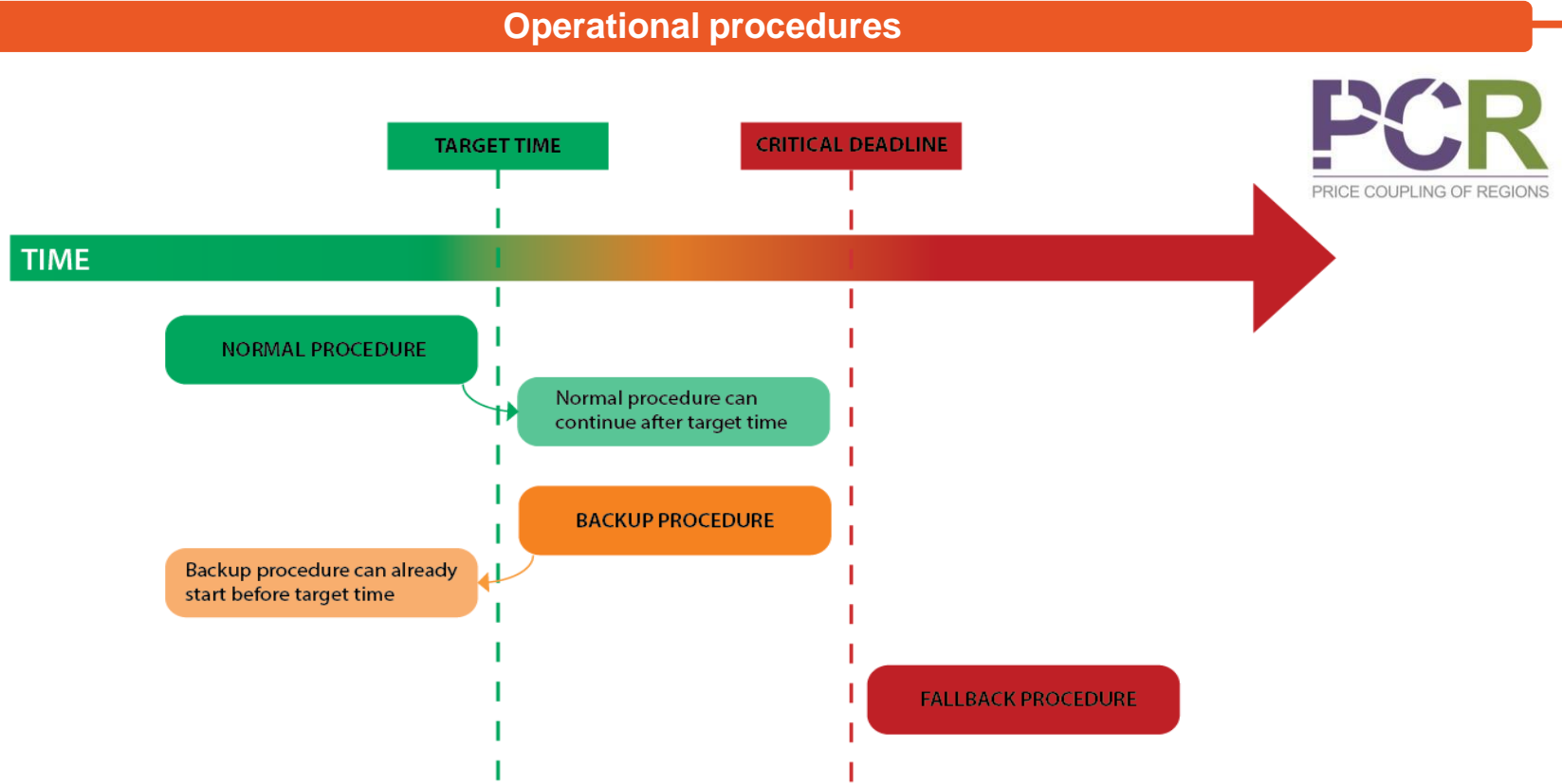


## 2. Procedures

### Day-ahead Market coupling process timing



## 2. Procedures



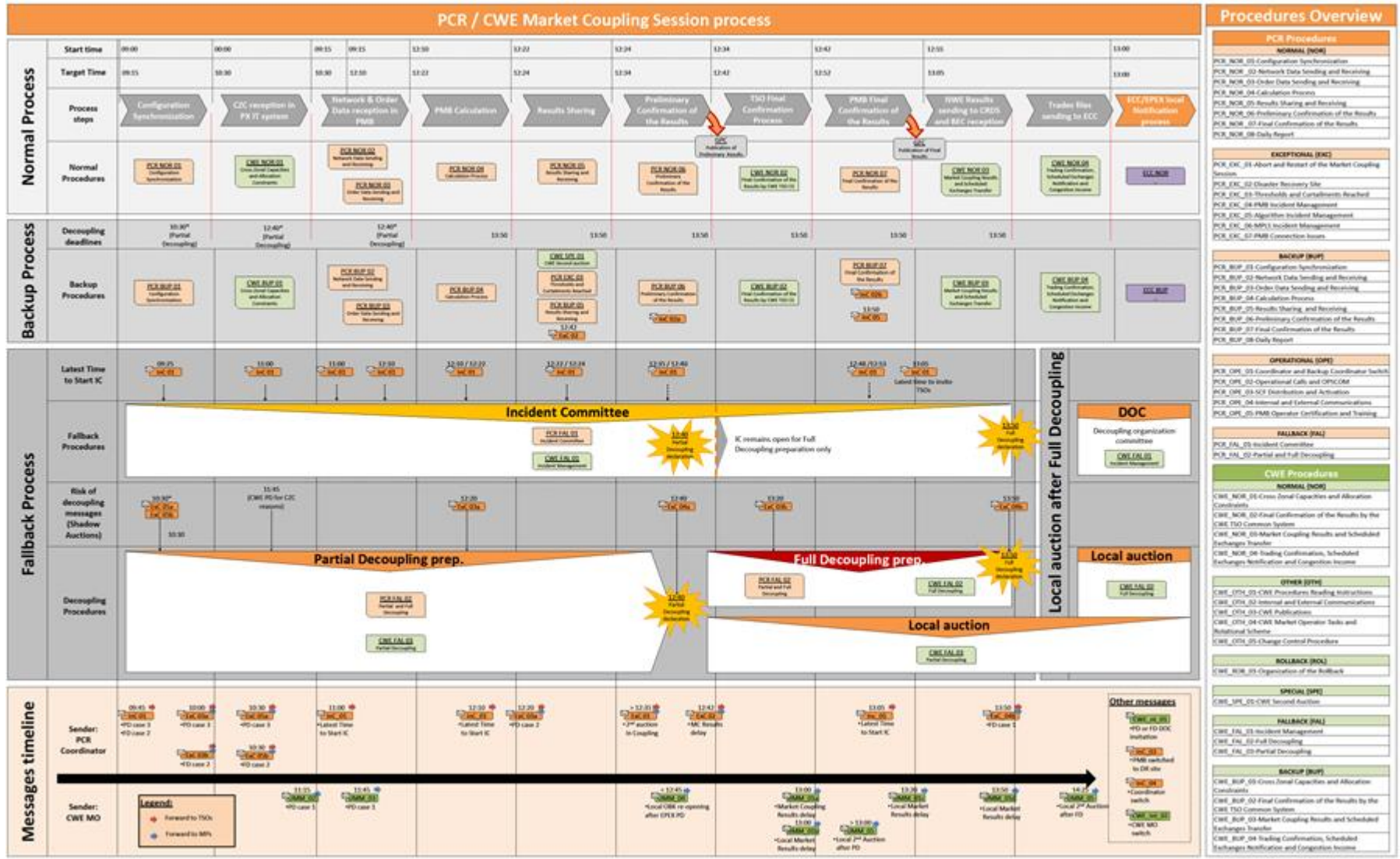
All operational procedures are systematically classified into:

- normal procedures
- back-up procedures
- fallback procedures.



# 2. Procedures

## PCR/CWE Procedures and messages

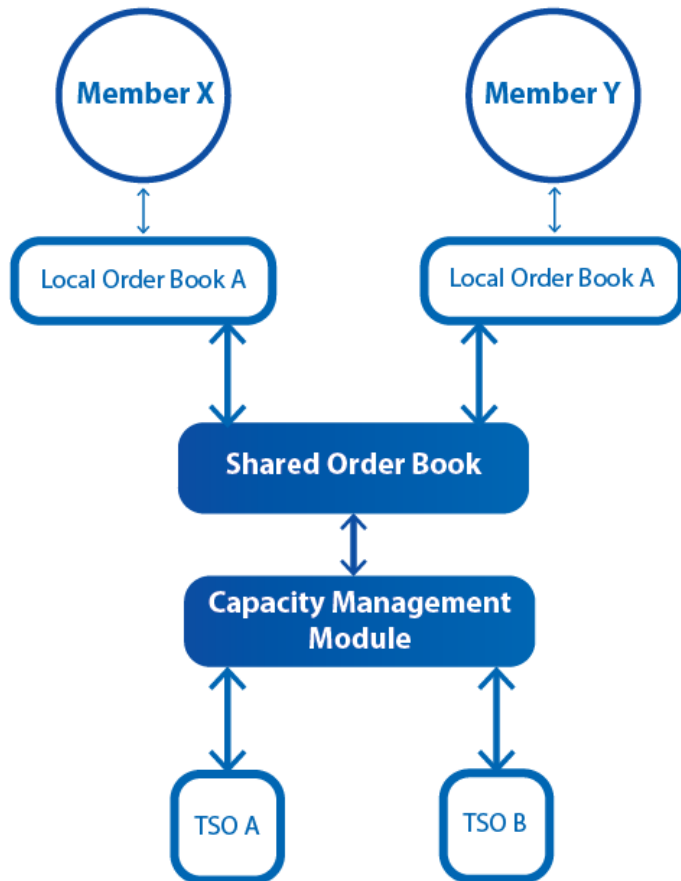


### Procedures Overview

- PCR Procedures**
  - NORMAL (NOR)**
    - PCR\_NOR\_01 Configuration Synchronization
    - PCR\_NOR\_02 Network Data Sending and Receiving
    - PCR\_NOR\_03 Order Data Sending and Receiving
    - PCR\_NOR\_04 Calculation Process
    - PCR\_NOR\_05 Results Sharing and Receiving
    - PCR\_NOR\_06 Preliminary Confirmation of the Results
    - PCR\_NOR\_07 Final Confirmation of the Results
    - PCR\_NOR\_08 Daily Report
  - EXCEPTIONAL (EX)**
    - PCR\_EX\_01 Abort and Restart of the Market Coupling Session
    - PCR\_EX\_02 Disaster Recovery Site
    - PCR\_EX\_03 Thresholds and Constraints Reached
    - PCR\_EX\_04 PMB Incident Management
    - PCR\_EX\_05 Algorithm Incident Management
    - PCR\_EX\_06 MPPS Incident Management
    - PCR\_EX\_07 PMB Congestion Issues
  - BACKUP (BUP)**
    - PCR\_BUP\_01 Configuration Synchronization
    - PCR\_BUP\_02 Network Data Sending and Receiving
    - PCR\_BUP\_03 Order Data Sending and Receiving
    - PCR\_BUP\_04 Calculation Process
    - PCR\_BUP\_05 Results Sharing and Receiving
    - PCR\_BUP\_06 Preliminary Confirmation of the Results
    - PCR\_BUP\_07 Final Confirmation of the Results
    - PCR\_BUP\_08 Daily Report
  - OPERATIONAL (OP)**
    - PCR\_OP\_01 Coordinator and Backup Coordinator Switch
    - PCR\_OP\_02 Operational Calls and OPCS/COM
    - PCR\_OP\_03 S-CY Distribution and Activation
    - PCR\_OP\_04 Internal and External Communications
    - PCR\_OP\_05 PMB Operator Certification and Training
  - DOC**
    - Decoupling organization committee
    - PCR\_FAL\_01 Incident Committee
    - PCR\_FAL\_02 Partial and Full Decoupling
  - CWE Procedures**
    - NORMAL (NOR)**
      - CWE\_NOR\_01 Cross-Zonal Capacities and Allocation Constraints
      - CWE\_NOR\_02 Network Data Sending and Receiving
      - CWE\_NOR\_03 Order Data Sending and Receiving
      - CWE\_NOR\_04 Calculation Process
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      - CWE\_NOR\_06 Preliminary Confirmation of the Results by the CWE TSO Common System
      - CWE\_NOR\_07 Market Coupling Results and Scheduled Exchanges Transfer
      - CWE\_NOR\_08 Trading Confirmation, Scheduling/Exchange Notification and Congestion Incentive
    - OTHER (OTH)**
      - CWE\_OTH\_01 CWE Procedures Reading Instructions
      - CWE\_OTH\_02 Internal and External Communications
      - CWE\_OTH\_03 CWE Publications
      - CWE\_OTH\_04 CWE Market Operator Tasks and Relational Scheme
      - CWE\_OTH\_05 Change Control Procedure
    - ROLLBACK (ROL)**
      - CWE\_ROL\_01 Organization of the Rollback
    - SPECIAL (SPE)**
      - CWE\_SPE\_01 CWE Special Auctions
    - BACKUP (BUP)**
      - CWE\_BUP\_01 Cross-Zonal Capacities and Allocation Constraints
      - CWE\_BUP\_02 Network Data Sending and Receiving
      - CWE\_BUP\_03 Order Data Sending and Receiving
      - CWE\_BUP\_04 Calculation Process
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      - CWE\_BUP\_07 Market Coupling Results and Scheduled Exchanges Transfer
      - CWE\_BUP\_08 Trading Confirmation, Scheduling/Exchange Notification and Congestion Incentive



# The Intraday Target Model: What and why



- One European integrated solution, handling the trading and the capacity allocation functions
- PXs are in charge of both functions using a single IT provider
- **The model is made mandatory by law (defined in the CACM Network Codes and governed by the Day-Ahead / Intraday Governance Guidelines)**
- PXs outside of the cooperative agreement will not be able to offer cross-border trading to their members anymore, since all cross-border capacity will be allocated on the single SOB/CMM solution
- Explicit capacity allocation to enable OTC trading will be allowed on certain borders, for an interim period only

## Objectives:

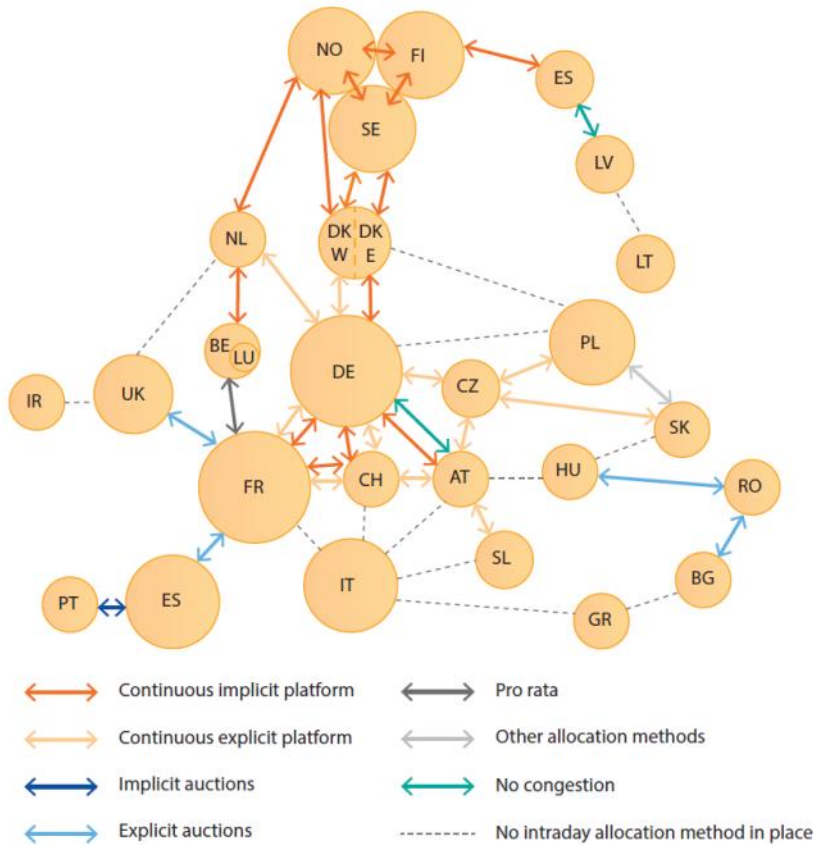
1. Allocate implicitly all the Intraday cross-border capacity on a single platform
2. Pool all the PXs' Intraday liquidity on a single trading screen

## Benefits expected by the Authorities:

1. Facilitated cross-border access to Intraday markets
2. Improvement of the intraday liquidity and price-signal
3. Better short-term management of the power system, especially with regard to intermittent energy



# Challenges of the Intraday Target Model



- Performance and availability requirements of the trading system
- Equal treatment between:
  - Explicit and implicit allocation
  - Orders coming from different PXs
- Shipping is very challenging in the intraday context:
  - More operational risks, due to several continuous nominations close to real-time
  - Complex and limited harmonization in the nomination process over Europe
- **In a pan-European context...**



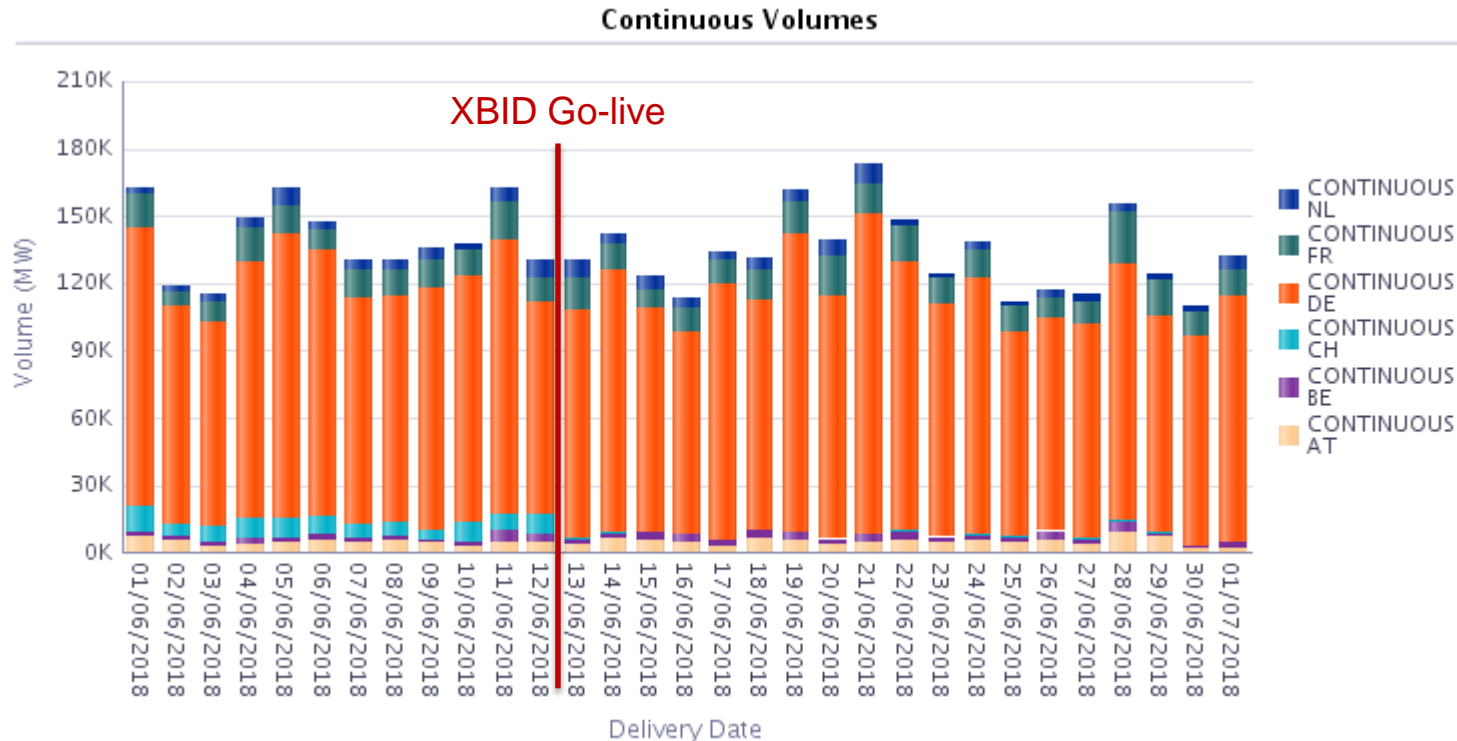
# Successful XBID go-live on 12/06 (with delivery on 13/06), accross 10 LIPs



- Countries coupled in 1<sup>st</sup> wave
- Countries coupled in 2<sup>nd</sup> wave

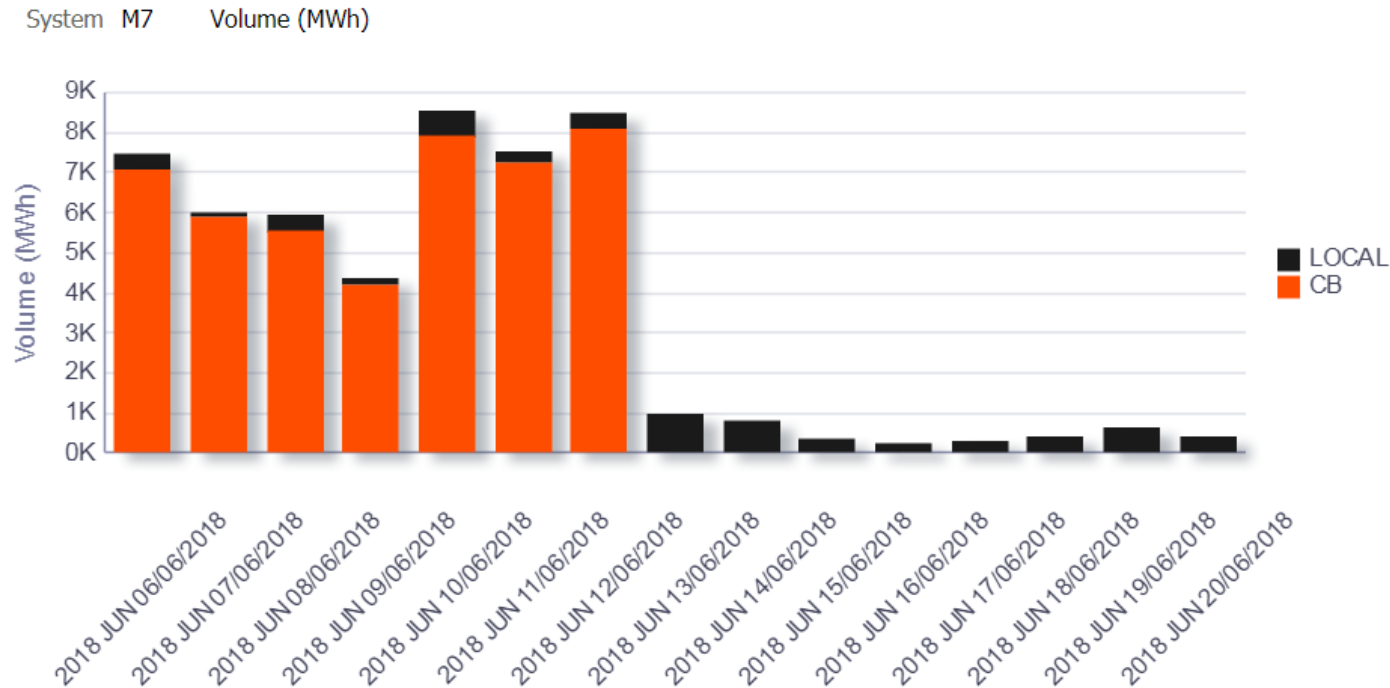


# Smooth go-live on 12/06 with first deliveries on 13/06



- First XBID EPEX trade recorded a few seconds after the re-opening of the markets at midnight on 13th June ; first cross-border trade DE-FR recorded at 12:03 CET
- Volumes of continuous markets stable since the 12th of June (c.130 GWh daily)
- Vast majority of trades contain both buy and sell sides with an EPEX member

# Impact of the XBID Go-Live on CH Intraday



**90% decrease of volumes in the CH markets**, due to disconnection of implicit access to the other EPEX intraday continuous markets – average daily volume in CH Intraday market :

- Before XBID : **7,4 GWh/day**
- Since XBID : **0,5 GWh/day**



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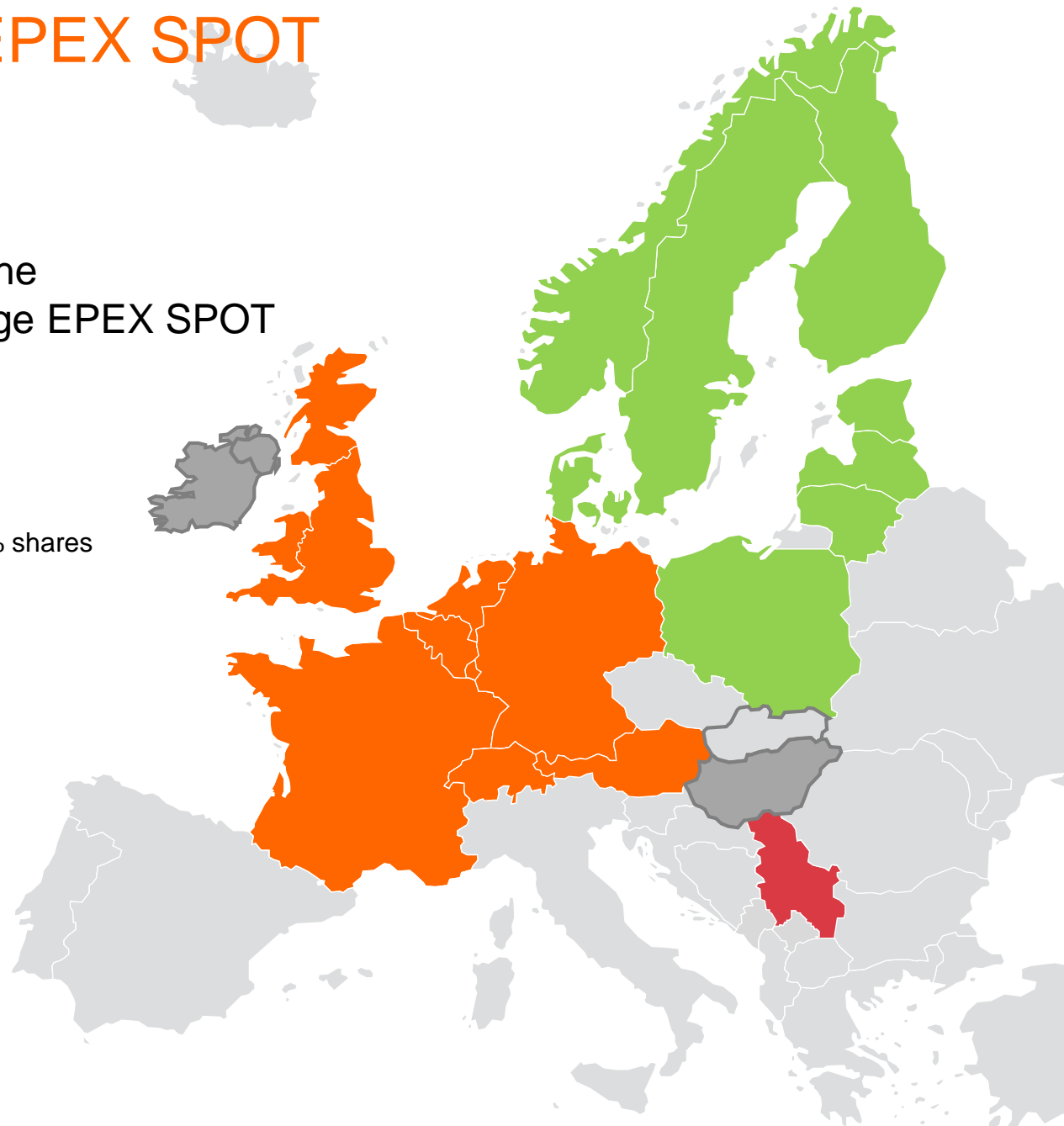
# Background on EPEX SPOT

# The markets of EPEX SPOT

## Markets and services of the European Power Exchange EPEX SPOT

- Current EPEX markets
- Market Expansion
- Market operation services and 25% shares
- Market operation services
- Market coupling services

- Over 275 Exchange Members
- 530 TWh of traded volume in 2016
- 21 borders among them and neighbouring countries



# Market review 2016: Volumes and delivery zones

**DE/AT/LU: 275 TWh**

Thereof intraday: 41 TWh

Share in consumption: 50%

Delivery zones: 50Hertz, Amprion, APG, TenneT, TransnetBW



**FR: 115 TWh**

Thereof intraday: 4 TWh

Share in consumption: 24%

Delivery zone: RTE



**NL: 36 TWh**

Thereof intraday: 1 TWh

Share in consumption: 33%

Delivery zone: TenneT

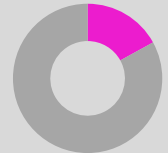


**UK: 57 TWh**

Thereof intraday: 13 TWh

Share in consumption: 17%

Delivery zone: National Grid



**BE: 20 TWh**

Thereof intraday: 1 TWh

Share in consumption: 24%

Delivery zone: Elia



**CH: 26 TWh**

Thereof intraday: 2 TWh

Share in consumption: 43%

Delivery zone: Swissgrid



Thank you for  
your attention!

**EPEX SPOT SE**

Mayerhofgasse 1/19

1040 Vienna

Austria

Arnold Weiss

Head of Vienna Office

[a.weiss@epexspot.com](mailto:a.weiss@epexspot.com)

+43-1-8909526

