Trading across borders

- The key to manage portfolios at a regional scale

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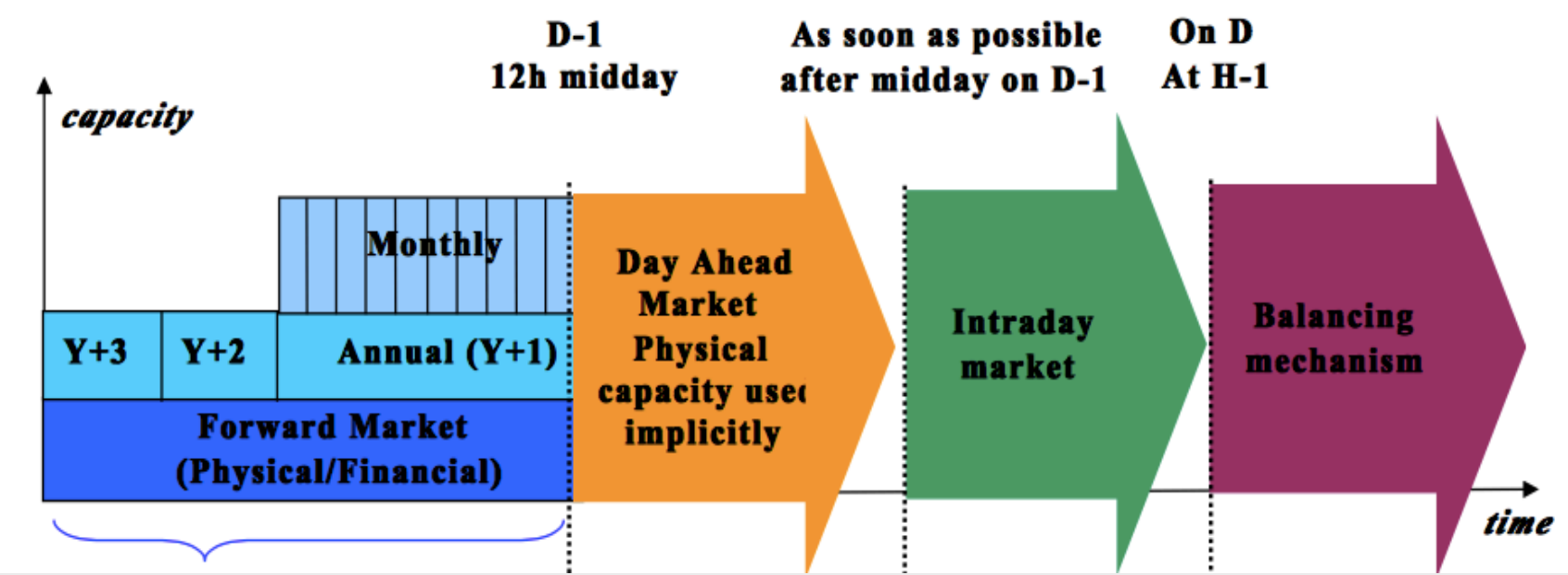
TRADING IN THE ELECTRICITY MARKET

Trading horizons



Source: European Commission

Market instruments: Spot, Forwards & Futures

- **Spot contract:** an agreement to buy or sell an asset today, for a certain price.

  >In the case of, for example, gas and electricity, this typically means day-ahead.

- **Forward contract:** an agreement to buy or sell an asset at a specific moment in time, for a certain price.

  > Normally traded *over-the-counter* (OTC); a deal between two institutions.

- **Future contract:** an agreement to buy or sell an asset at a specific moment in time, for a certain price.

  > Normally traded on an *exchange*; the exchange is the counterparty for both participants.

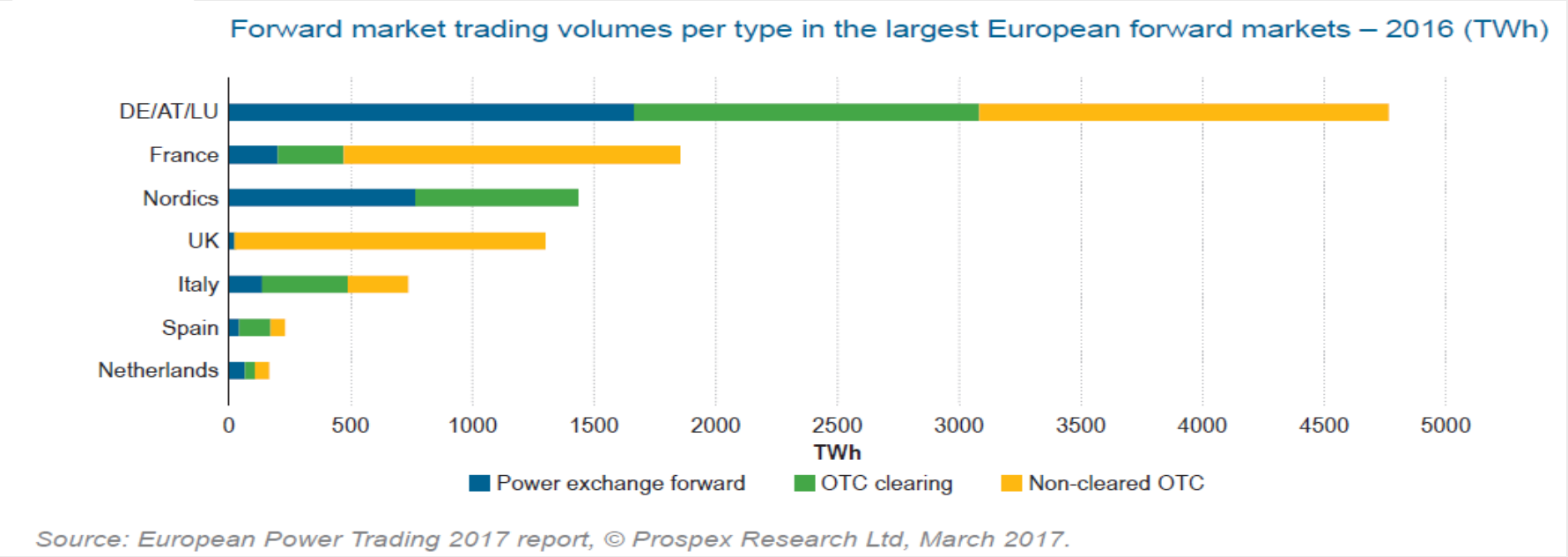
Trading OTC vs. on an Exchange

- Normally, *forwards* are traded *over-the-counter* (OTC) and *futures* are traded on an exchange.

- When trading on the **exchange** …
  - The contract is highly standardized, as defined by the exchange.
  - The two parties may be anonymous.
  - Settlement is via the exchange, making use of *margining.*

- When trading **over-the-counter** …
  - The contract can be less standard; so more instruments are possible.
  - The deal is done directly between two parties; perhaps facilitated by a broker.
  - Both parties are exposed to *credit risk*.

Traded volumes OTC vs. Exchange



Source: Acer

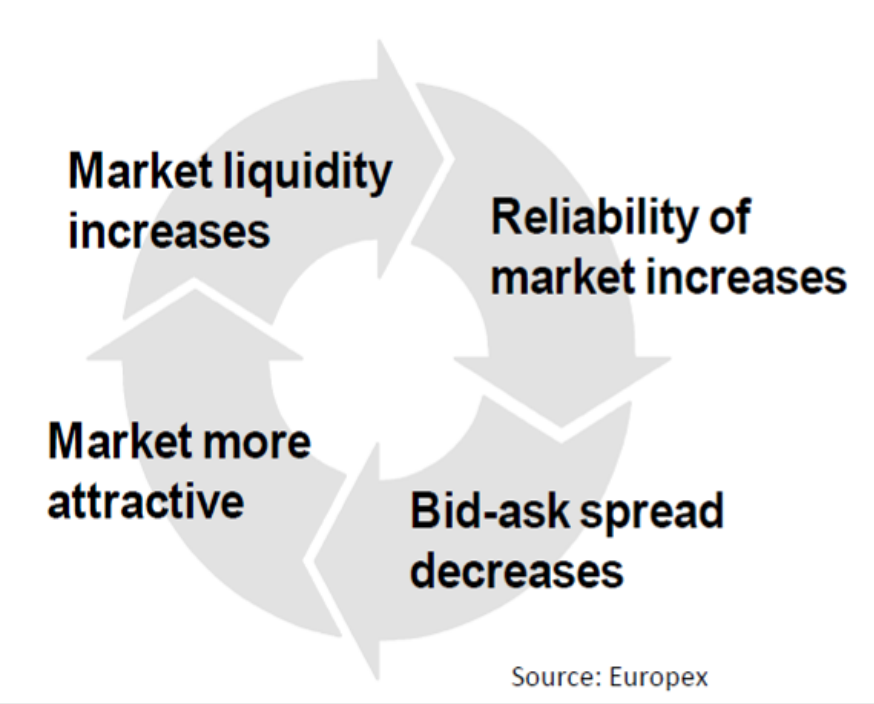
Physical & Financial Contracts

Contracts can be physical or financial …

- **Physical contracts:** the underlying asset is the physical delivery of a given commodity at the contract price.
  - For example, a physical electricity forward mean that physical electricity will be delivered at a specified point in time, to a defined market area, against the agreed contract price.

- **Financial contracts:** the contract is settled financially based on the difference between the agreed contract price and specified index.
  - For example, a EEX financial electricity future will be settled based on the difference between the agreed contract price and the spot price published by the EEX for each day during the defined delivery period. The buyer receives the spot price minus the contract price for each MWh. If the value is negative, he pays this amount.

The virtuous circle of liquidity



Benefits of liquid markets:

- Better liquidity is an indication of effective competition
- Clarity on value of investments
- Greater ability to hedge positions
- Low transaction cost of the hedges that are available

Development of power volumes in Europe (Spot+Futures+OTC), 2012-2016:

Germany: **+ 30%**	(4.996 TWh)
France: **+ 293%**	(1.962 TWh)
Nordic: **-9%**	(1.825 TWh)
Total: **+ 35%**	(11.804 TWh)

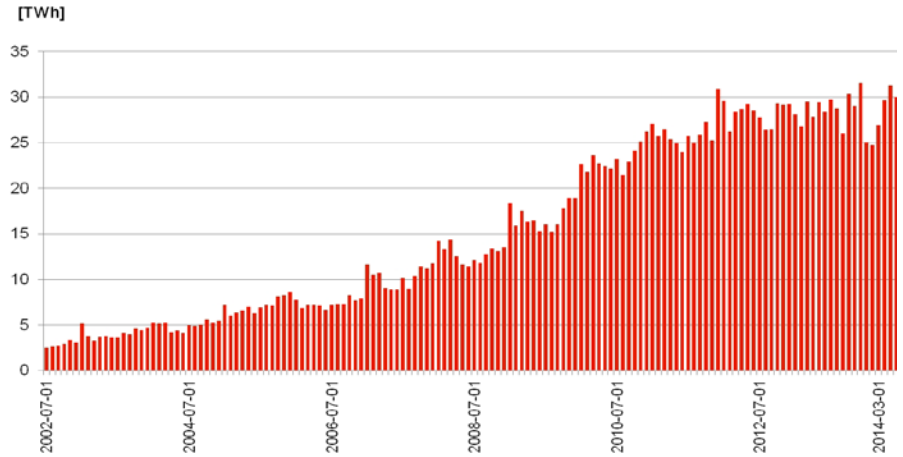
Source: prospex study „European Power Trading 2017"

Source: EEX

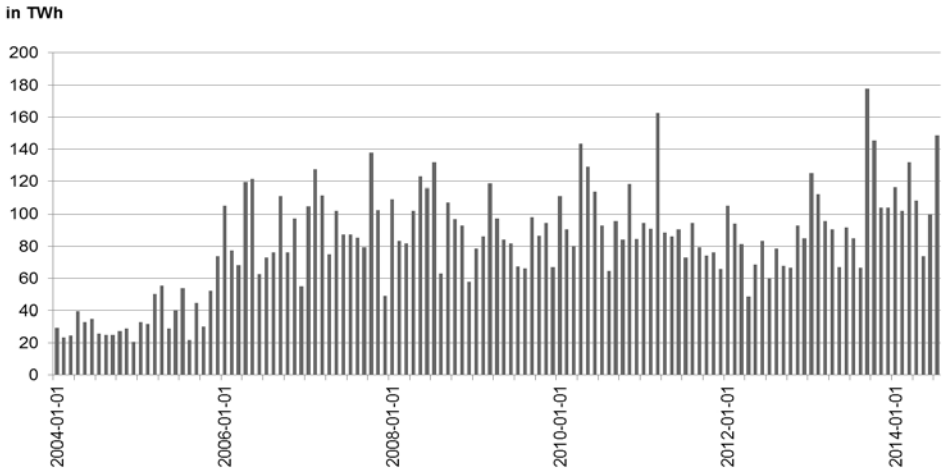
HEDGING RISKS IN THE MARKET

More short-term trading ≠ less forward trading

Intraday market DE
2004-2014



Forward market DE
2004-2014



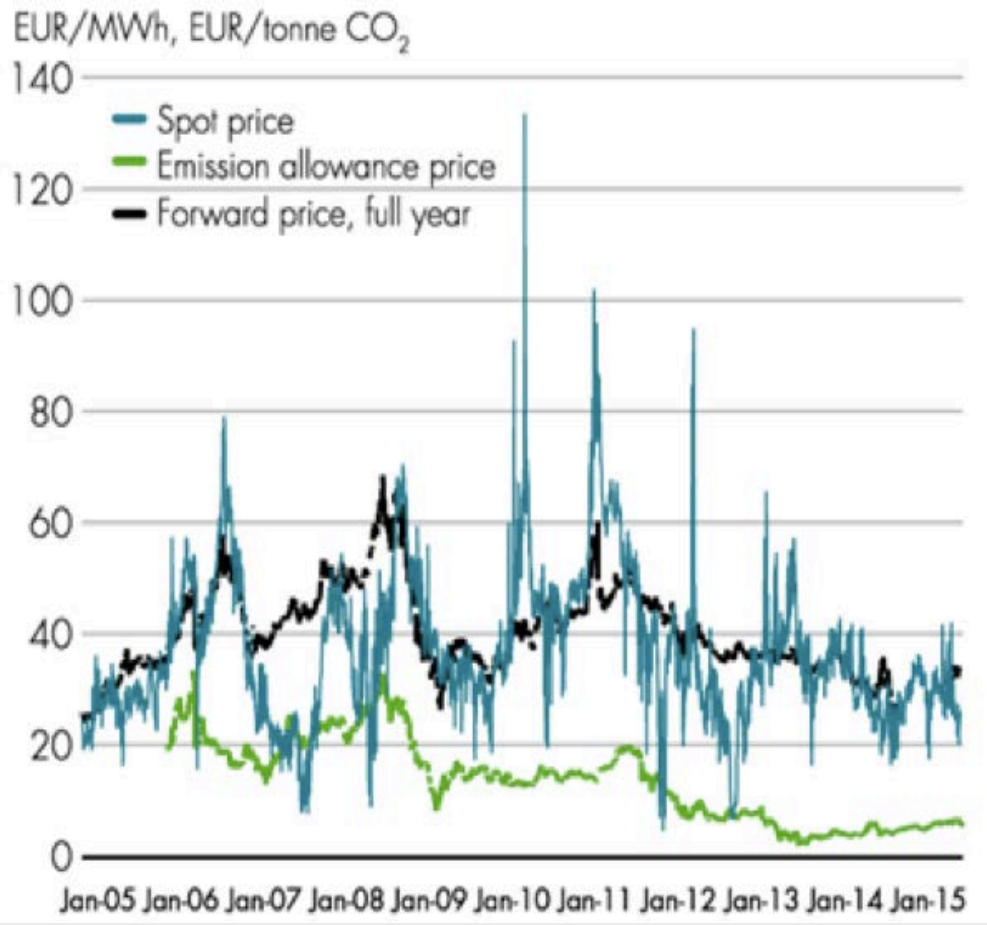
Source: EEX

Risk mapping and hedging

- A portfolio of assets is **by definition "risky"**
  - Price risk
  - Volume risk:
    - ✓ Uncertainty about the RES production
    - ✓ Uncertainty about the consumption
    - ✓ Possible outages of power plants
    - ✓ …
  - Regulatory risk
  - Counterparty risk
  - …

- First step when trying to mitigate risks is to **identify and classify/organize the risk factors**
- Second step is to accurately forecast the positions for each of **these risk factors**
- To mitigate the price and volume risks, market participants can then perform **hedging actions**

Hedging against price risks



Source: Svensk Energi

Example: hedging a CCGT plant

Example:

Power plant with 50% efficiency: input of 2 units of gas to produce 1 unit of power (no CO2)

(1) Strategy ***"hedge and sleep"***

T1: forward gas 22 €/MWh ; power 50 €/MWh

⇨Forecast: Plant margin: 6 €/MWh => plant will run

⇨ Hedging: Sell power, buy gas, margin of 6 €/MWh

T2: forward gas 24 €/MWh ; power 45 €/MWh

⇨ Forecast: Plant margin: -3 €/MWh, but already hedged at 6 €/MWh

T3: forward gas 23 €/MWh ; power 48 €/MWh

⇨ Forecast: Plant margin: 2 €/MWh, but already hedged at 6 €/MWh

P&L: 6 €/MWh

(2) Strategy **"Option Value"**

T1: forward gas 22 €/MWh ; power 50 €/MWh

⇨Forecast: Plant margin: 6 €/MWh => plant will run

⇨ Hedging: Sell power, buy gas, margin of 6 €/MWh

T2: forward gas 24 €/MWh ; power 45 €/MWh

⇨ Forecast: Plant margin: -3 €/MWh, but already hedged at 6 €/MWh

⇨ Sell gas, buy power, additional margin 3€/MWh

T3: forward gas 23 €/MWh ; power 48 €/MWh

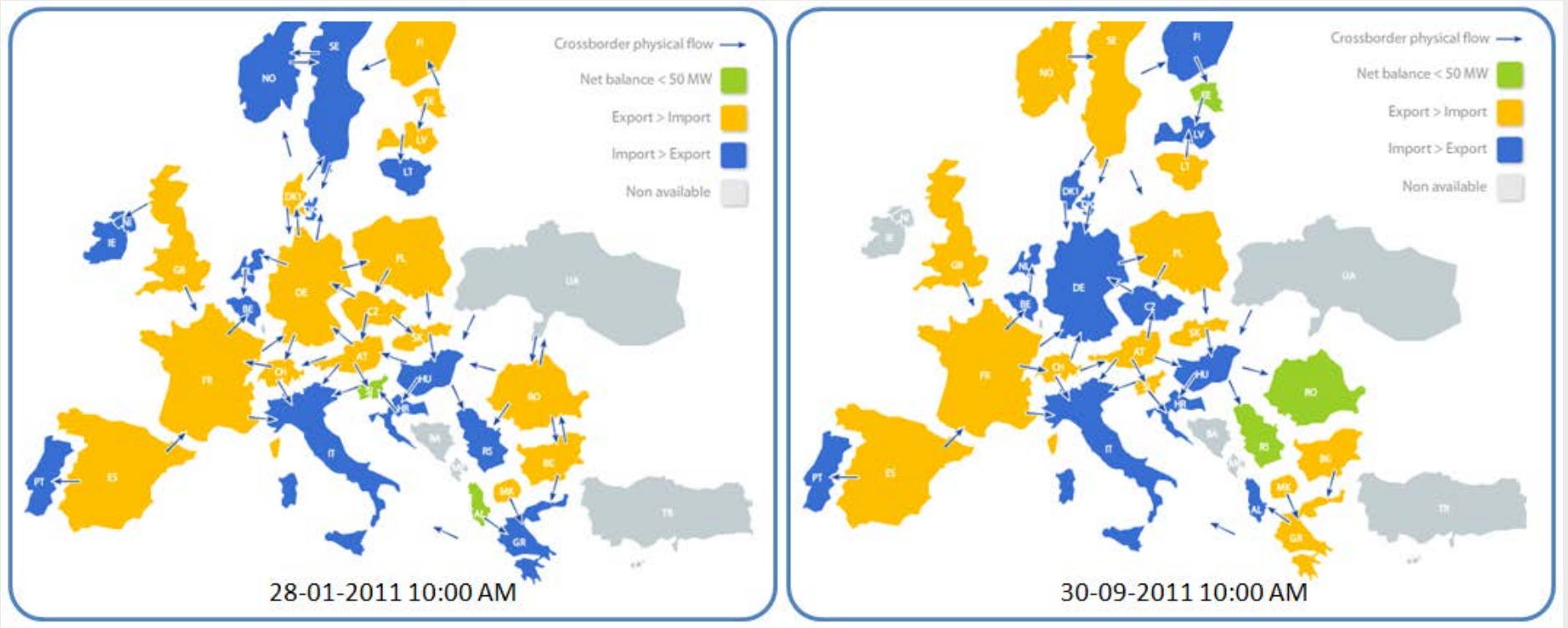
⇨ Forecast: Plant margin: 2 €/MWh, but already hedged at 6 €/MWh

⇨ Sell power, buy gas, additional margin 2€/MWh

P&L: 11 €/MWh

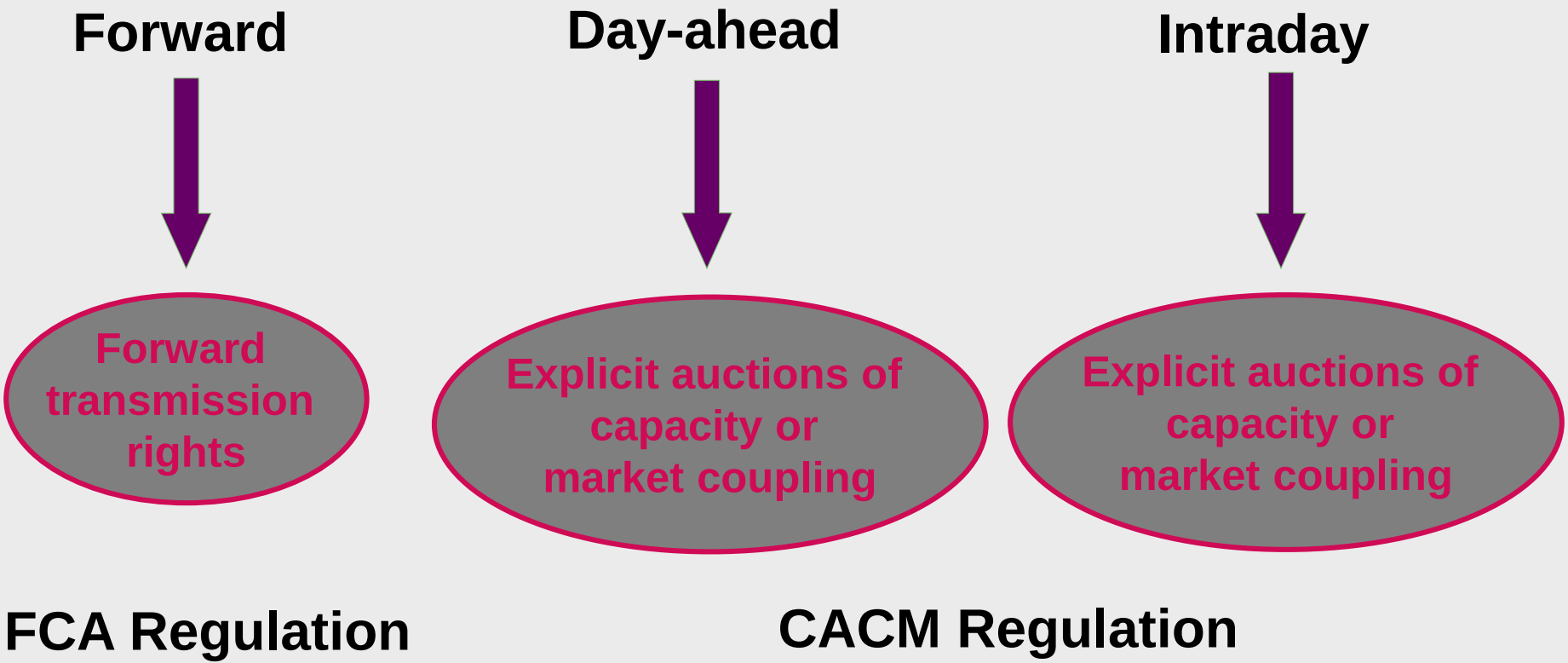
THE IMPORTANCE OF CROSS-BORDER ACCESS

Interconnection of networks



Source: ENTSO-E

Accessing cross-border capacity



PTRs and FTRs needed for XB forward trading

Forward transmission rights corresponding to trading horizon

> Spot price for transport = unhedged cross-border positions

> PTRs/FTRs help foster competition and liquidity

Rights must be financially firm

> (like any other commodity)

TSOs must sell sufficient rights

> Nordic EPADs don't provide the same hedge to the market

> Don't overly fragment delivery points

Regulatory framework should provide TSOs with incentives:

> To maximise sales of cross-border capacity

> To ensure firmness of capacity

Transparency and firmness of PTRs/FTRs

- Transparency on capacity calculation method/process,
- Early publication of NTCs and of their variations (price sensitive)
- Transmission rights shall be firm,
- In case of force majeure, compensation at initial price, otherwise compensation according to market spread
- TSOs to buy back in case of reductions in available capacity (market based management of the reduction)

Coupling of markets in day-ahead & intraday

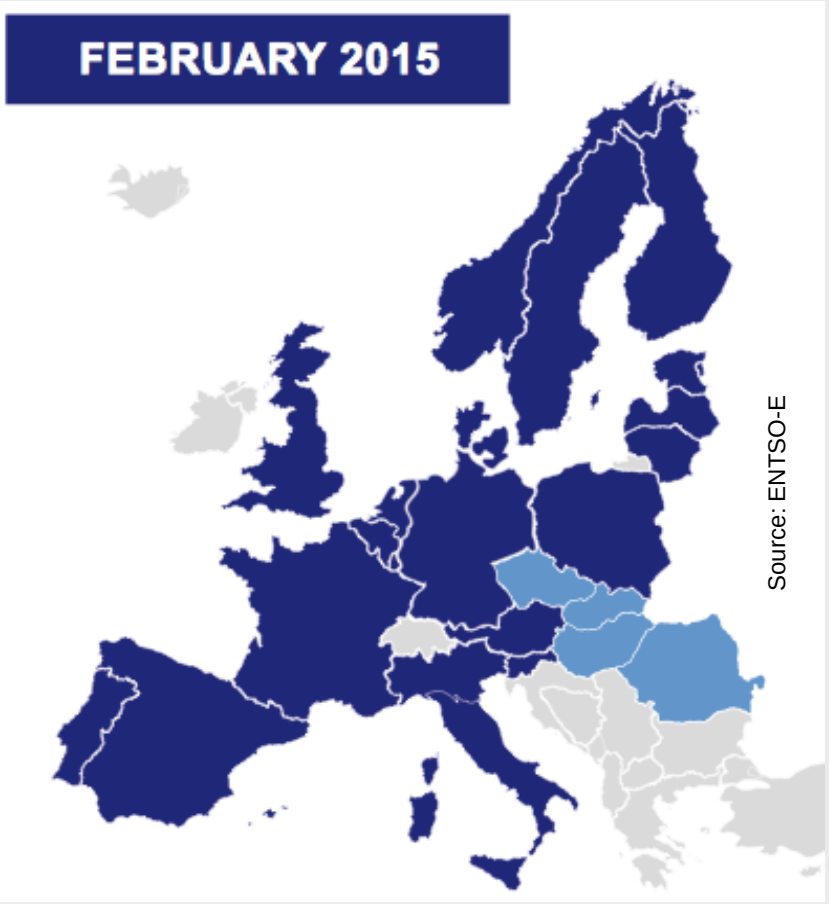
Well advanced in **day-ahead** (MRC, 4MM)

In progress for **intraday** (XBID)

> Implicit allocation of capacity

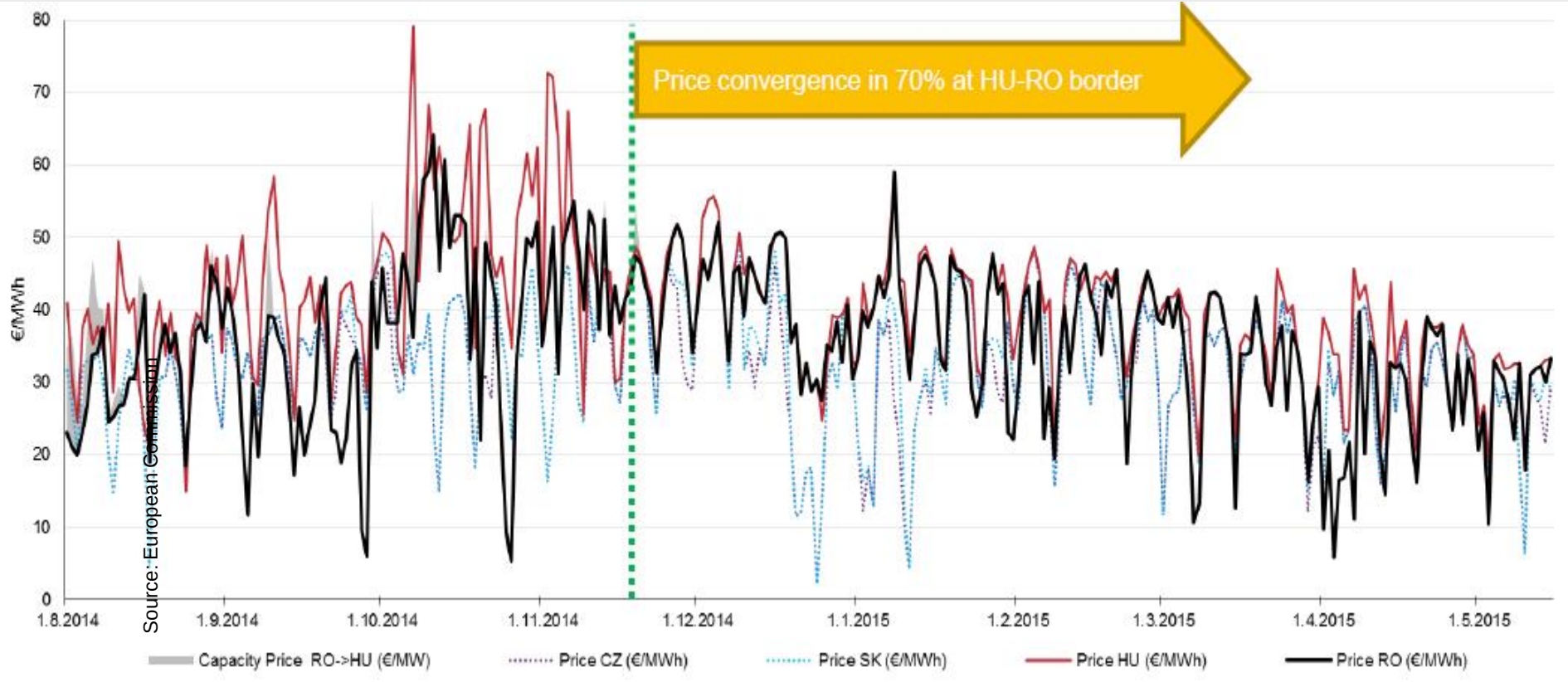
> Greater competition across borders

> Increased price convergence



Source: ENTSO-E

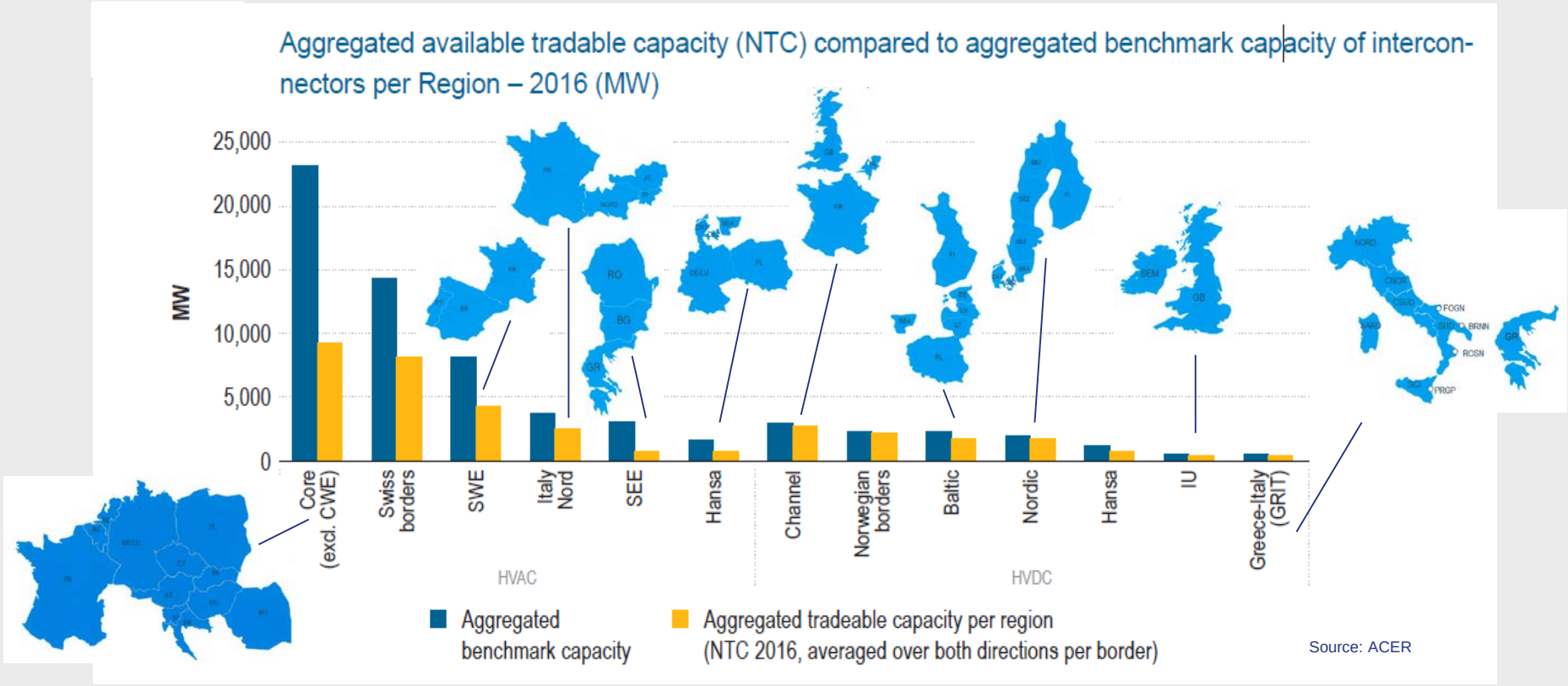
Example of price convergence in 4MM (DAMC)



Source: European Commission

Source: ENTSO-E

Availability of cross-border capacities

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BACK-UP SLIDE

Distinction between PTRs/FTRs and CfDs

as e.g. applied in Nordic markets

- Not issued by the TSO but by market participants, which engage with each other via a central clearing house
- Pay out the difference in energy price between a price area (bidding zone) and the system regional price (which is virtual)
- No link to the underlying physical transmission of capacity (CfDs don't reflect the transmission path), thus complementary
- It is a purely financial market managed by the industry, not TSOs
- The market does not benefit from the natural hedge owned by TSOs