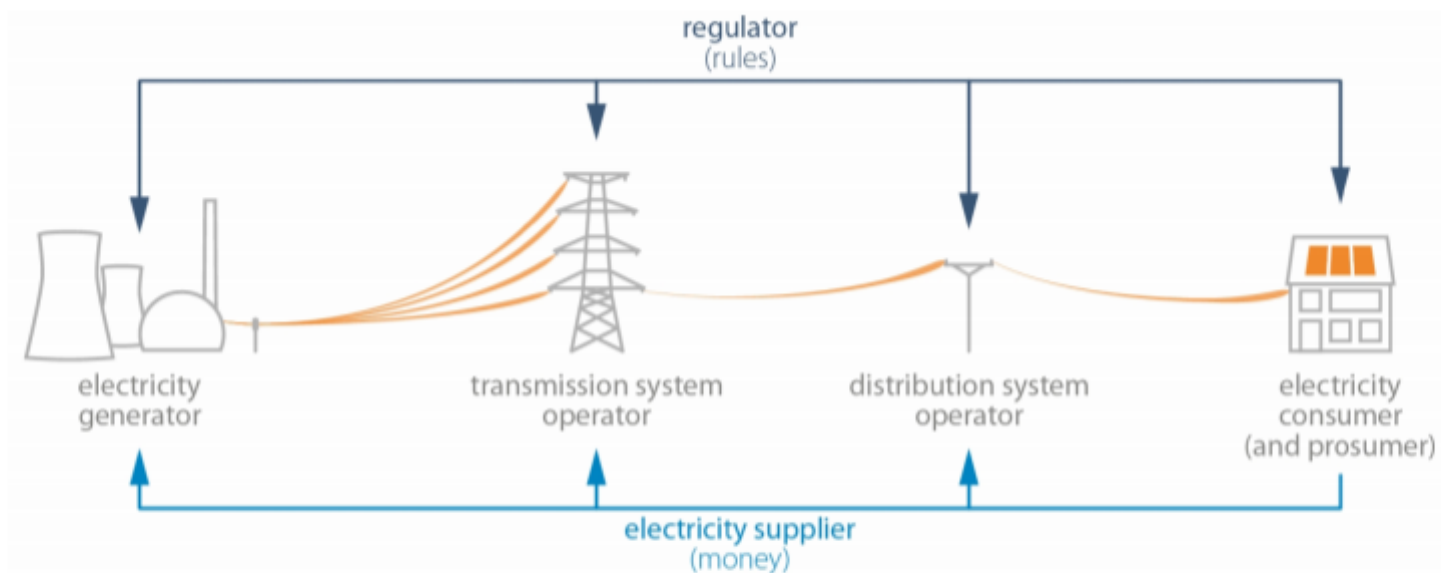


IEM: Electricity Market I.

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The electricity system



Networks

- **Transmission networks** are networked grids of long-distance power lines.
- Run by transmission system operators (TSOs)
- Usually a natural monopoly – heavily regulated.
- Unbundled (ISO, ITO, ownership unbundling).
- Balances the supply and demand of electricity, participates on allocation of available transmission capacity.
- **Distribution networks** take power from TSO and distribute it to consumers. Managed by distribution-system operators (DSOs). Smaller RES are generally fed into the DSO

ENTSO-E + ENTSO-G

- They develop the standards and draft network codes to help harmonise the flow of electricity and gas across different transmission systems.
- They coordinate the planning of new network investments and monitor the development of new transmission capabilities. Europe-wide 10 year investment plan to help identify gaps every two years.

Independent regulators (NRAs)

- Independent both from industry and government's interests. Separate legal entities, have their own budget.
- Can issue binding decisions to companies and impose penalties on those that do not comply with their legal obligation.
- Generators, network operators and suppliers have to provide them with accurate data.
- Are required to cooperate with each other (ACER).

ACER

- Drafting guidelines for the operation of cross-border electricity networks and gas pipelines.
- Reviewing the implementation of EU-wide network development plans.
- Deciding on cross-border issues if NRAs cannot agree or if they ask it to intervene.
- Monitoring the functioning of the IEM including retail prices, network access for electricity produced from RES, and consumers rights.

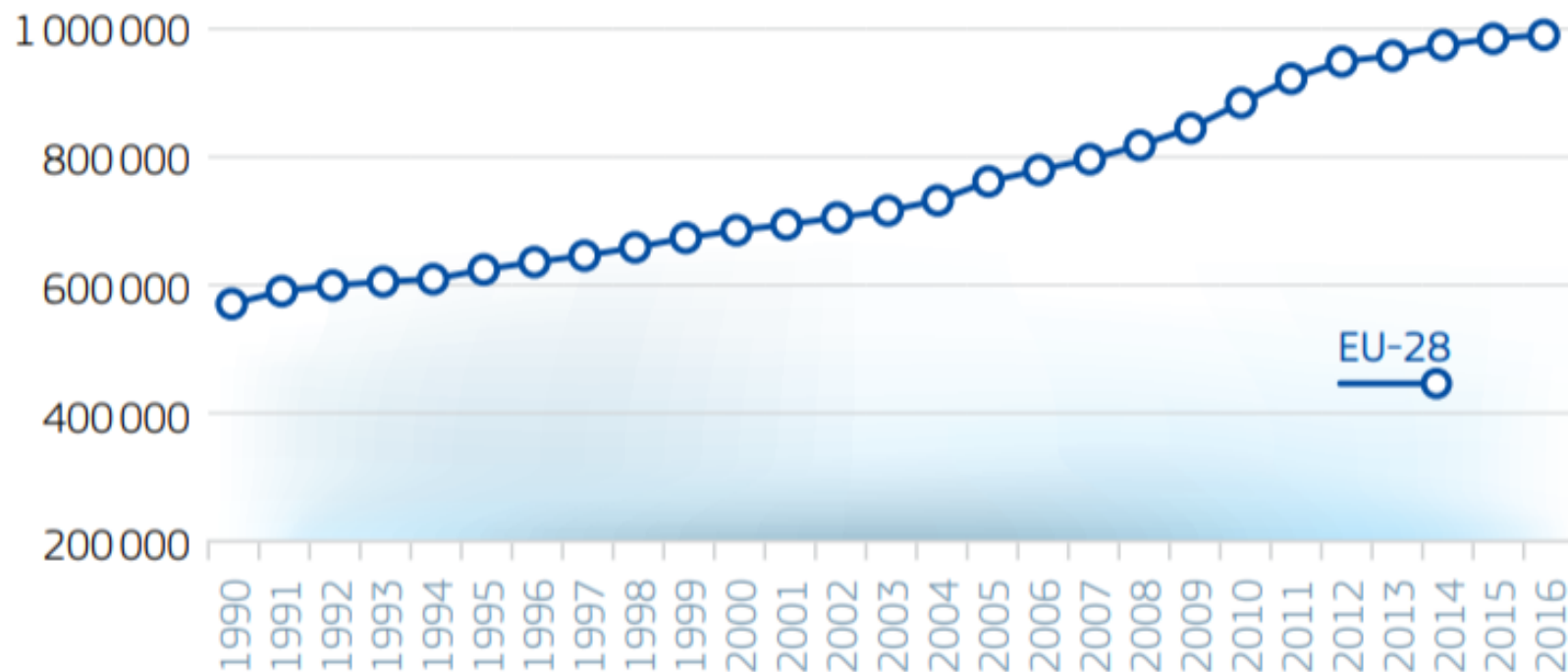
Power exchanges

- The trading platforms to exchange members submitting bids for buying and selling power.
- Optional, anonymous, accessible to all participants that satisfy admission requirements.
- They ensure a transparent wholesale price formation mechanism by matching supply and demand.
- They ensure that trades are delivered and paid.

Market structure

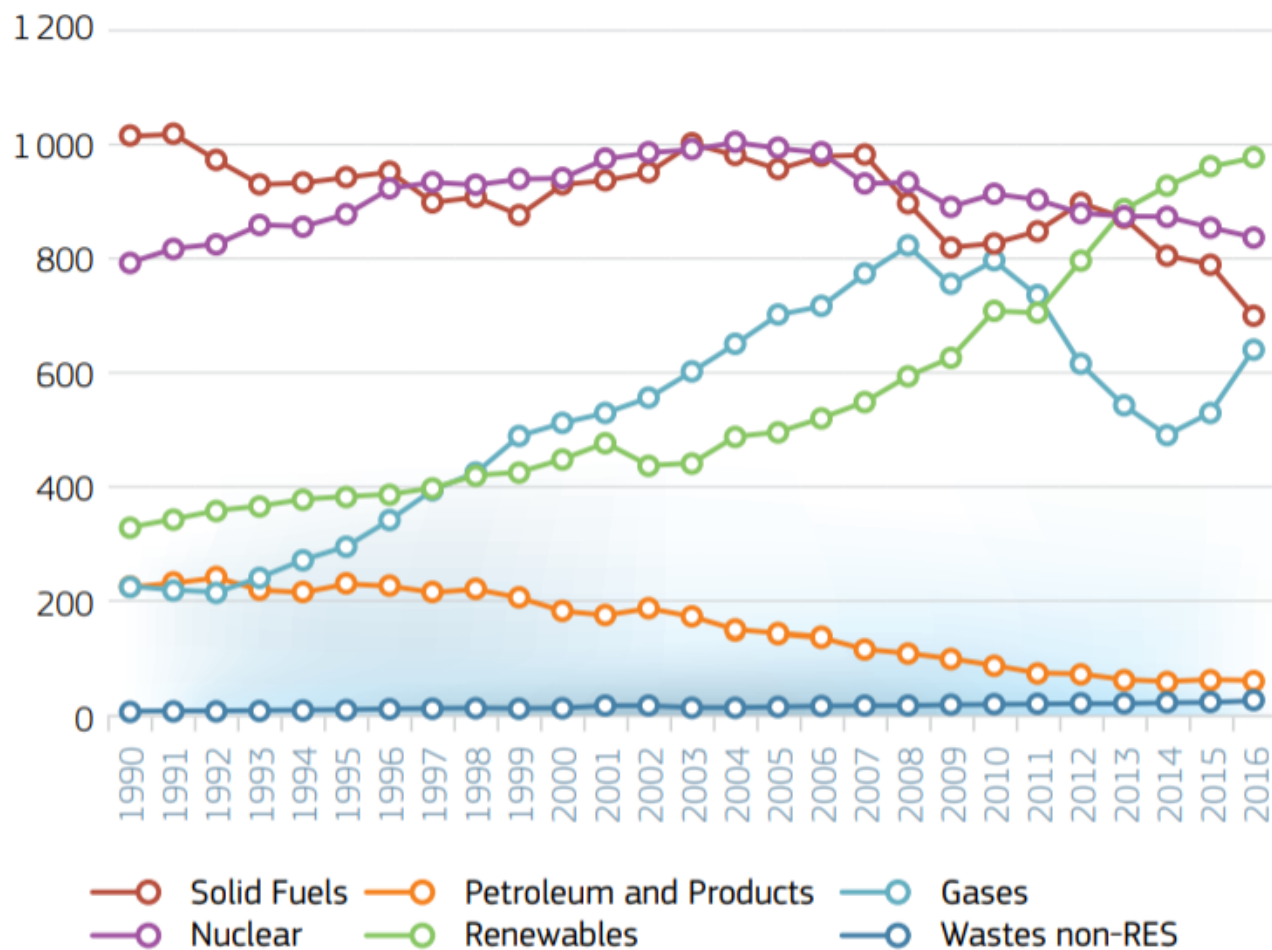
- Spot markets
 - Day-ahead = hourly products with next day delivery.
 - Intra-day = hourly products with delivery after 60 minutes and more.
- Futures
 - Future delivery, either physical or financial (financial clearing only for hedging and speculation purposes).
- Balancing market
 - To balance the grid, organized by TSOs.

Installed electricity capacity, MW



* No complete EU-28 data available for 1990-2004.

Gross Electricity Generation, TWh



Latest development: from liberalization to harmonization of the regulation...

- Harmonisation of the rules on wholesale markets (detecting of market abuse, prohibiting of using of insider information or the spreading of incorrect information).
- Regulation of who can use cross-border infrastructure and under what conditions.
- Access to infrastructure (exemptions from TPA to implement risky investments which cannot be made otherwise).
- Rules on government intervention (state aid for RES, backup capacity...).
- Consumer rights and protection.

...and market unification.

- Target model – agreed blueprint for the architecture of both electricity and gas market. To harmonize cross-border trading arrangements and link national markets through efficient use of infrastructure carrying electricity.
 - Network Codes (Capacity Allocation and Congestion Management and others) and Framework Guidelines.
- = to encourage cross-border trade to decrease the prices.

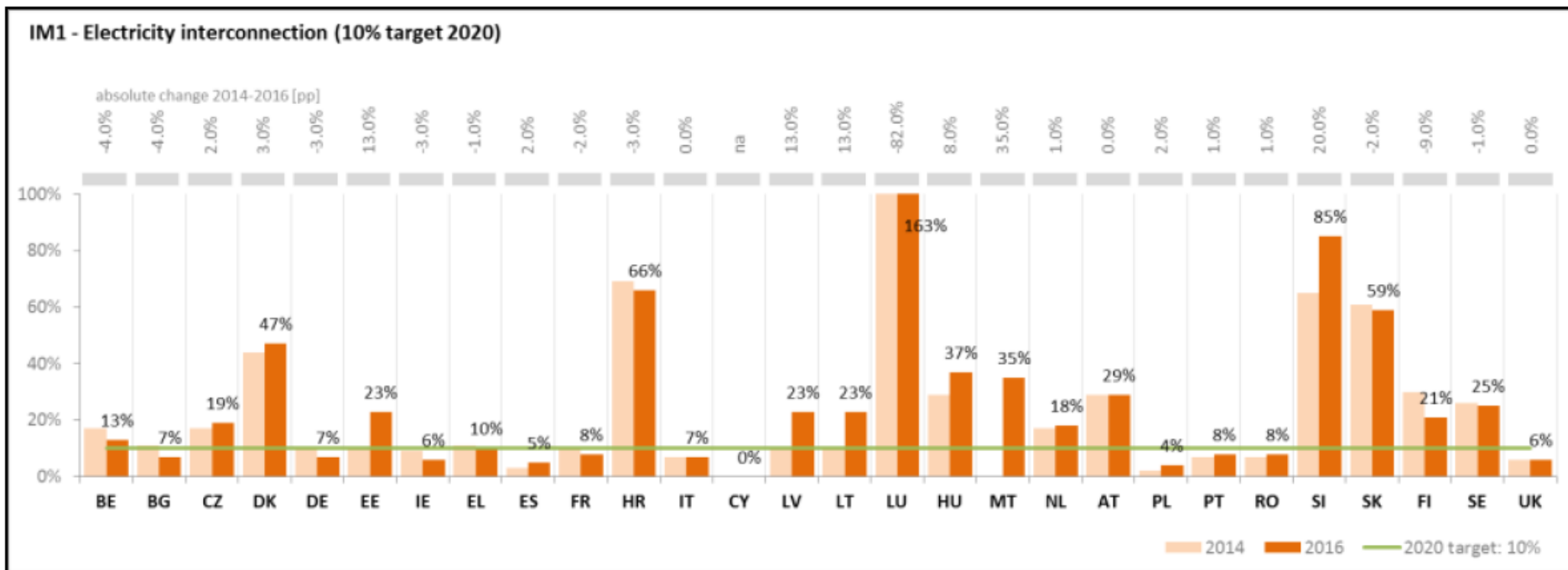
Issue 1: From liberalizing the sectors to integrate them into the IEM

- By building the cross-border infrastructure
- By integrating the national trading mechanisms

Cross-border infrastructure

- Grids designed to serve to the national states, not for cross-border trading.
- Interconnectors are expensive, attract local opposition and disputes about the costs and benefit distribution, they invite competition.
- Every MS should have interconnection capacity equal to at least 10% of its total generating capacity by 2020 (15% by 2030). Still missing in 12 countries.
- Supported by European Energy Programme for Recovery, by Projects of Common Interests (EU budget + European Fund for Structural Investments), TEN-E...

Electricity interconnection (2014-2016)

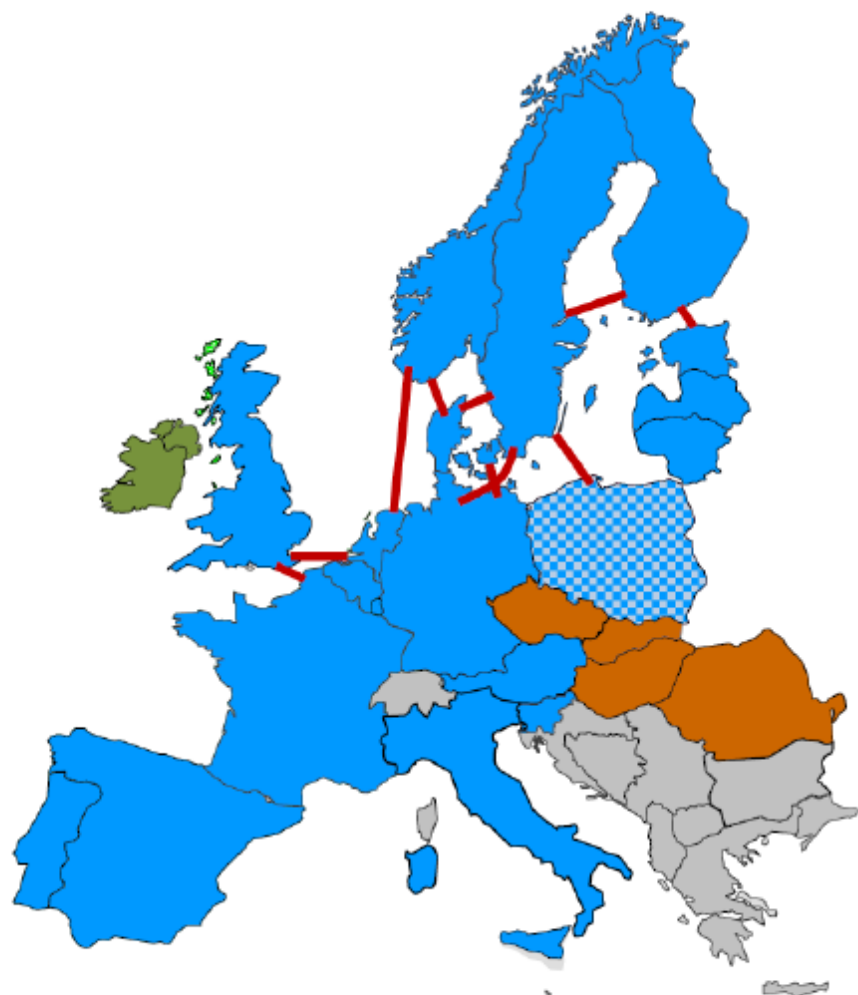



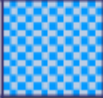


Note: The three Baltic states (Estonia, Latvia and Lithuania) are not yet synchronised with the European grid and are therefore treated as one entity. The value of 23 % for the three Baltic States refers to the interconnectivity of the entire Baltic zone with the European electricity market; the interconnectivity between the individual countries is higher.

Integration of the wholesale electricity markets

- Primarily focused on day-head markets.
- DA market coupling through the coupling of cross-border electricity exchanges. Coupling of regional electricity markets – Nordic market, Central West, North West Europe...
- (DA) market coupling optimises interconnection capacity utilisation (calculation and allocation) and facilitates linking of buyers and sellers on either side of a border.
- Cross-border capacity allocation is carried out together with the financial energy settlement in one single operation at the exchange (no need for prior reservation of capacity) = implicit auctioning.

Market coupling - Status

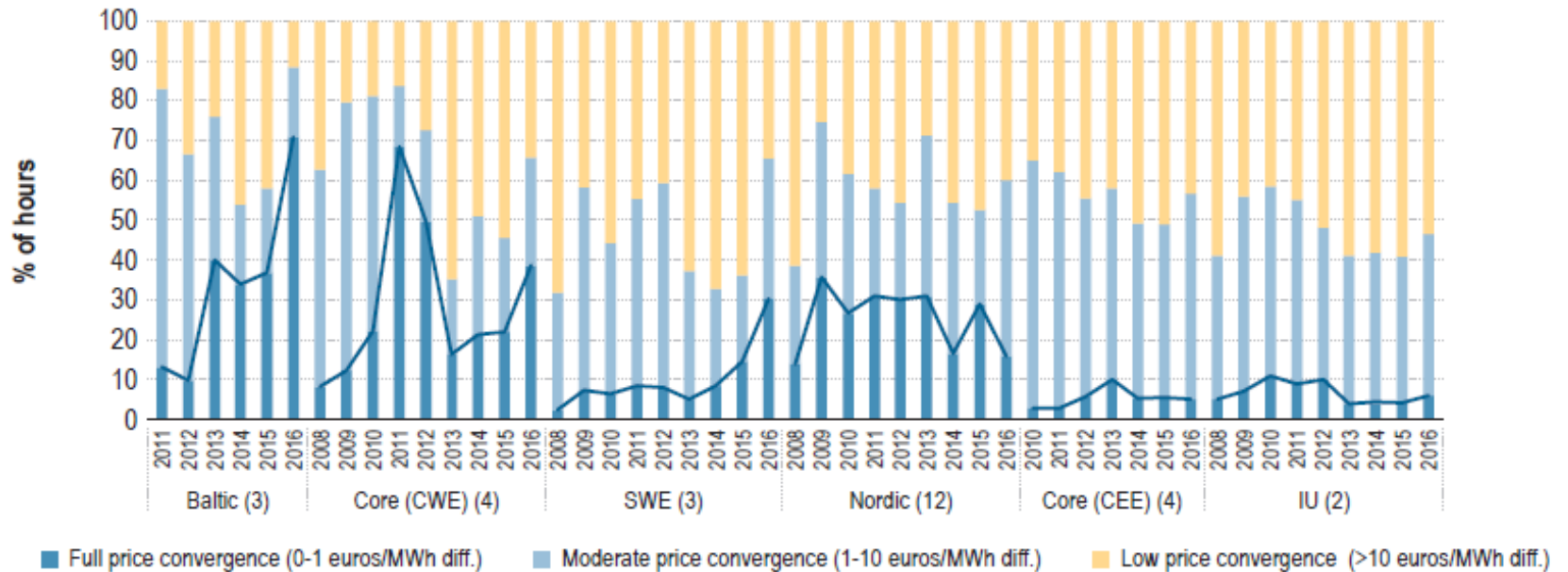


REGIONAL DAY AHEAD IMPLICIT AUCTIONS		
	North West Europe (NWE)	Price coupling
	Poland	Poland price coupled within NWE through SwePol-link
	Ireland and Northern Ireland	All Island market, single price zone
	Czech – Slovak – Hungary-Romania	Price coupling

Western Europe: Flow-based market coupling. Central and Eastern European countries (Poland, the Czech Republic, Slovakia, Austria, Hungary and Slovenia) will join in Q3 2018.

Source: APX /DG ENER

Figure 5: DA price convergence in Europe by region (ranked) – 2008–2016 (% of hours)



Source: ENTSO-E, Platts (2017) and ACER calculations.

Note: The numbers in brackets refer to the number of bidding zones included in the calculations per region.

Connection of the intra-day and balancing markets

- In comparison with DA markets intra-day and balancing markets are largely national or bilateral.
 - Dutch-German border.
 - Dutch-Belgium border.
 - Nordpool Elbas platform.
 - Dutch-Norwegian NorNed interconnector.
 - Great Britain on BritNed.

Sources

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- EC (2017): EU Energy in Figures.
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