03 Building the IEM in electricity

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Building of the IEM

Aim: to integrate national markets to single (internal) electricity market.

- Liberalization and competition – reducing state involvement in the energy sector and removing barriers to free market entry.
- Regulation (sic) – limiting the power of natural monopolies and transitioning from pre-liberalization regulation to a competitive framework.
- Common trading regime.
- Cross-border trading infrastructure - interconnectors.

Structure of the power market

- EU liberalization and market unification introduce new participants.
- System growth and national differences increase coordination demands, as the power sector operates as an integrated system with limited storage capacity and high costs associated with outages.

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Structure of the power market

- Liberalized vs. regulated segments.
- Wholesale vs. retail markets.
- Trading timelines: Balancing; Intra-day; Day-ahead; Future.

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Infrastructure and physical assets

Component	Description
Generation facilities	Power plants utilizing coal, nuclear, gas, hydro, solar, wind, and other resources.
Transmission networks	High-voltage systems for transporting electricity over long distances.
Distribution networks	Lower voltage systems distributing electricity to consumers locally.
Storage systems	Battery storage, pumped hydro storage, and others for balancing supply and demand.
Interconnectors	Infrastructure facilitating cross-border/regional electricity transfer.

Market participants

Participant	Description
Wholesalers	Buy large quantities of electricity and sell to retailers or large industrial consumers.
Traders	Engage in speculative buying/selling of electricity contracts and derivatives.
Retailers/Suppliers	Purchase electricity wholesale and sell it to end-users.
Consumers	Residential, commercial, and industrial end-users of electricity.
Power exchanges	Power exchanges enable efficient electricity trading and market pricing.

Market participants

Entity	Description
Generation companies	Entities operating power generation facilities.
Transmission System Operators (TSOs)	Entities responsible for transmission network operations and stability.
Distribution System Operators (DSOs)	Entities handling distribution networks and connections to consumers.
Market operators	Entities like NEMOs overseeing electricity trading platforms.

Regulatory and coordinating bodies

Body	Description
National Regulatory Authorities (NRAs)	Oversee market operations, tariff setting, and compliance at a national level.
Regional and supranational entities	Bodies like ACER and ENTSO-E working across countries for harmonization and integration.
Industry associations	Groups like Eurelectric representing industry interests and promoting best practices.
Standard-setting bodies	Entities defining technical, safety, and operational standards for the industry.

Building of the IEM

Aim: to integrate national markets to single (internal) electricity market.

- Liberalization and competition – withdrawal of the state from the energy sector, removing the barriers for the free entry to the sector.
- But also regulation – to limit the power of (natural) monopolies and to remove the legacy of pre-liberal paradigm – regulation to competition.
- Common trading regime.
- Cross-border trading infrastructure - interconnectors.

Architecture of both electricity and gas markets builds on two principles:

- Energy only regional markets (generator´s revenues depend on the price for each marginal unit of energy).
- Market coupling (to achieve convergent prices across the EU).

Harmonization of the regulation

- Harmonization of rules for wholesale markets (detection of market abuse, prohibition of insider information and trading, use or dissemination of false information).
  - Regulation No 1227/2011 on Wholesale energy market integrity and transparenci (REMIT).
- Regulation of entities eligible to use cross-border infrastructure.
- Access to infrastructure (exemptions from TPA to facilitate high-risk investments otherwise unfeasible).
- Guidelines on government intervention (state aid for RES, backup capacity, etc.).
- Consumer rights and protection.

Regulatory structure - NRAs

- Independent of both industry and government interests. Distinct legal entities with their own budgets.
- Can issue binding decisions on companies and impose penalties on non-compliant entities.
- Generators, network operators, and suppliers must provide accurate data to them.
- Required to collaborate with each other (ACER).

Regulatory structure - ACER

- Drafts guidelines for the operation of cross-border electricity networks and gas pipelines.
- Reviews 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.

Regulatory structure – ENTSO-E + ENTSO-G

- They develop standards and draft Network Codes to harmonize the flow of electricity and gas across various transmission systems.
- They oversee the planning of new network investments and track the progress of new transmission capabilities. A Europe-wide 10-year investment plan (TYNDP) is established to identify gaps biennially.

Regulatory structure – NEMO

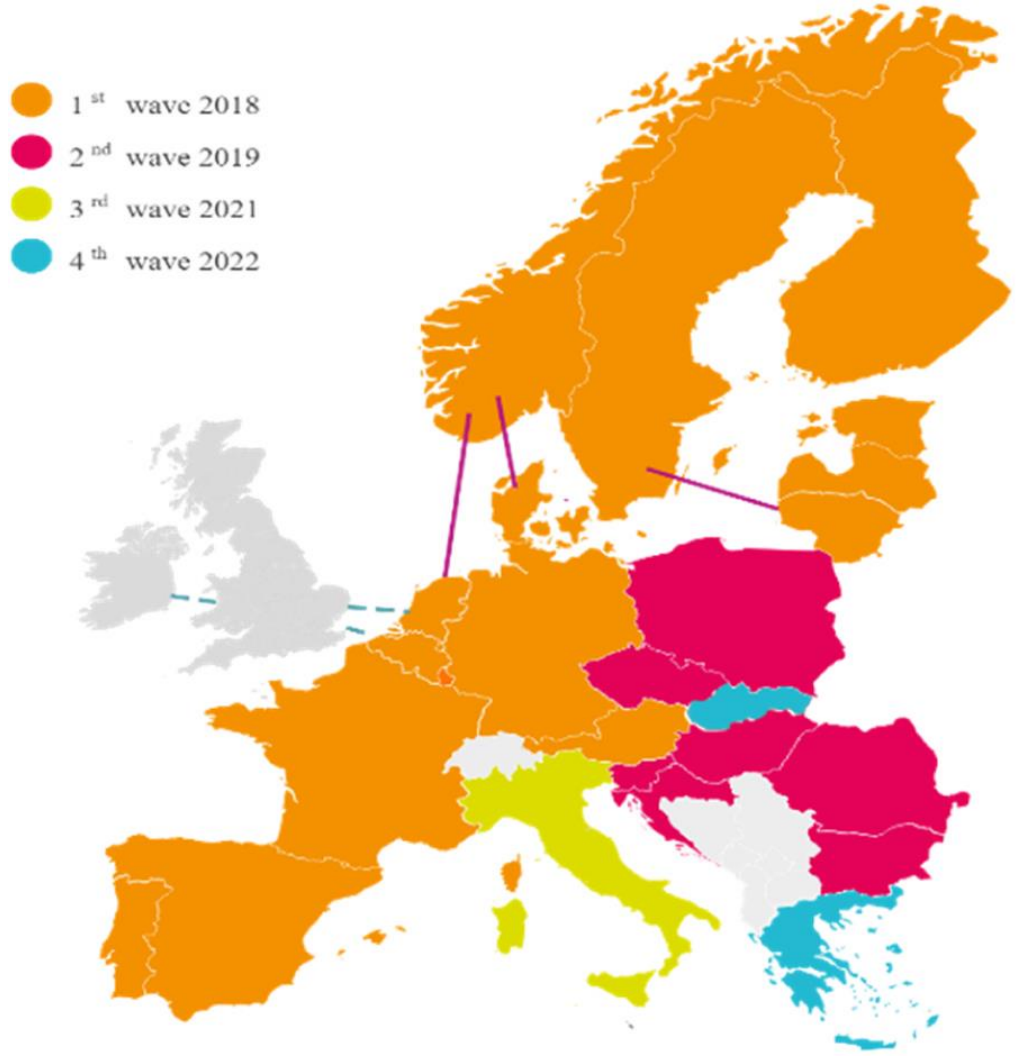
- Nominated Electricity Market Operator – operates the day-ahead and intraday trading services. Often power exchanges.
  - Receives orders from market participants.
  - Match and allocate orders.
  - Publish prices.
  - Act as a central counterparty for clearing and settlement of the exchange of energy.

Common trading regime – market coupling

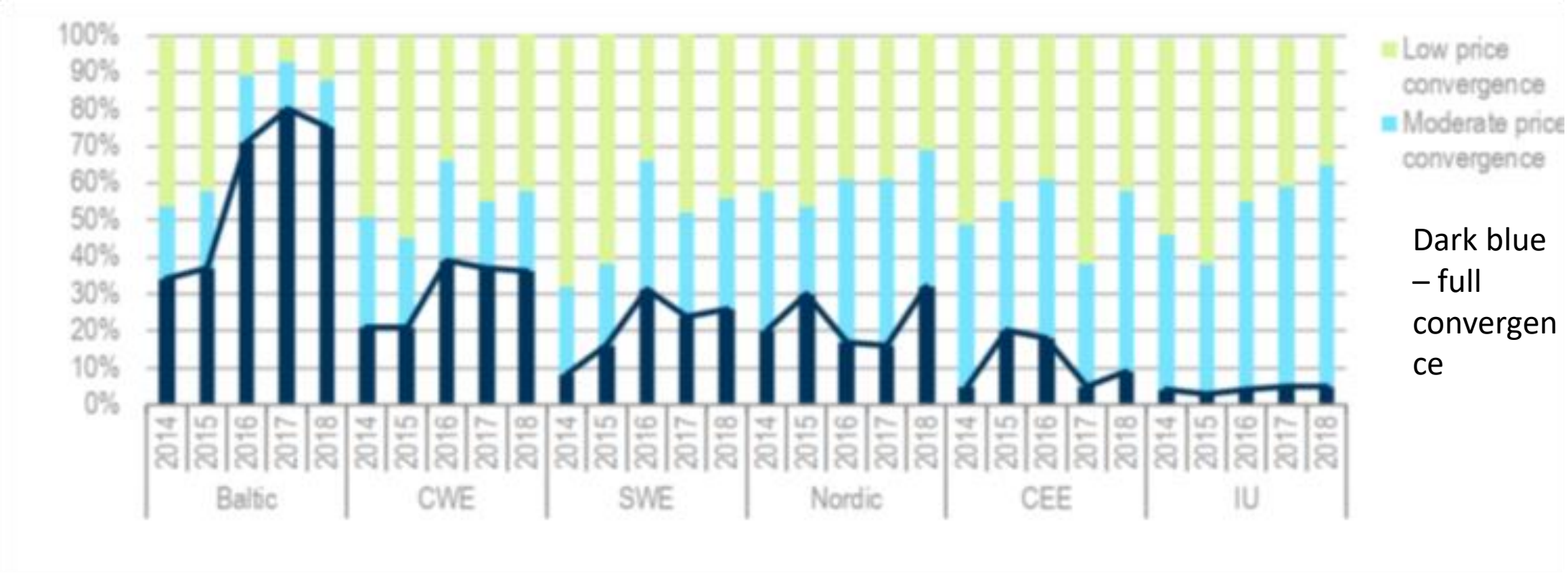
- Primarily day-head (DA) and intra-day (ID) markets. Balancing markets are still largely national or bilateral.
- DA market coupling through the coupling of cross-border electricity exchanges. Coupling of regional electricity markets – Nordic market, Central West, North West Europe… .
- (DA) market 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.
- Driven by Network Codes (Capacity Allocation and Congestion Management and others) and Framework Guidelines.

Single Day Ahead Coupling (2021)

Single CrossBorder Intraday platform (2021)



Price convergence

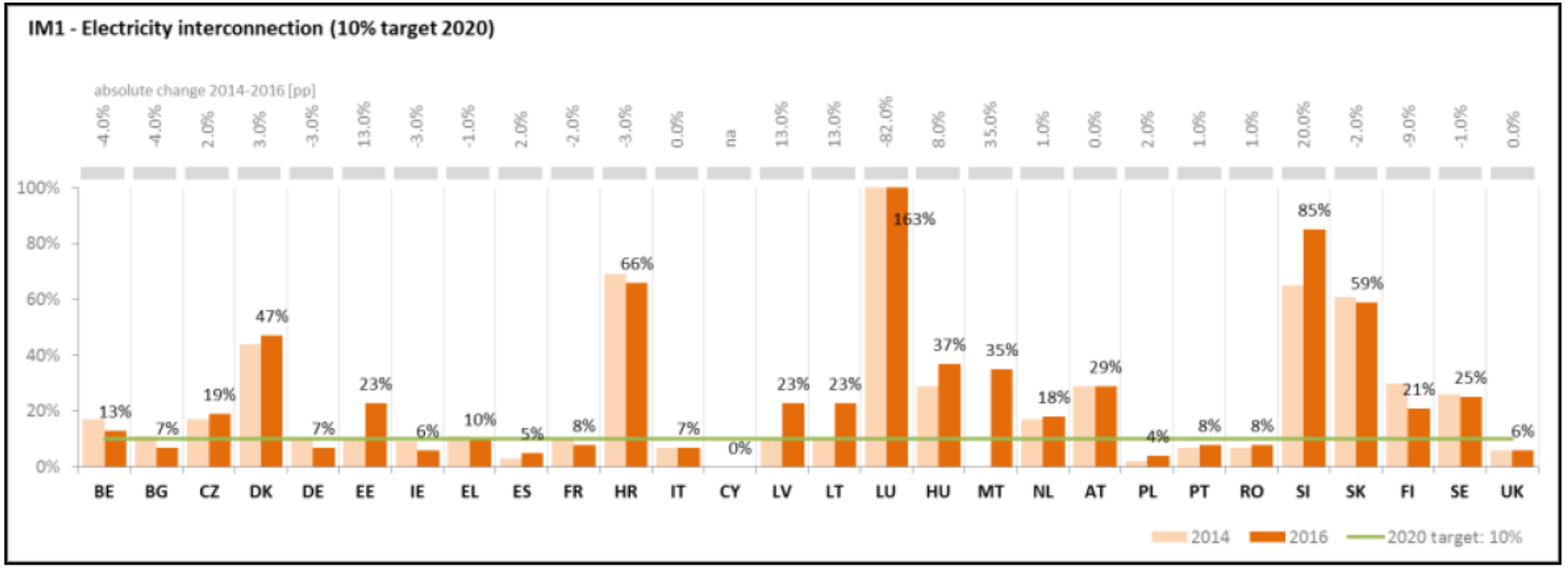


Dark blue – full convergence

Cross-border infrastructure

- Grids were originally designed to serve the needs of individual nation-states, not for cross-border trading.
- Interconnectors are costly and often face local opposition, disputes over cost allocation, and questions about benefit distribution; they also introduce competition.
- Every Member State (MS) should aim for an interconnection capacity of at least 15% by 2030.

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.

TYNDP and PCIs

- Every two years, ENTSO-E drafts a rolling TYNDP, providing scenarios for the EU's future power system and aiming for the best grid layout for the next decade.
- The TYNDP highlights key infrastructure projects, called PCI projects (involving two or more states), essential for the EU's climate goals.
- PCI projects, once identified, get benefits like faster planning, easier permitting, and EU fund access.
- Both TYNDP and PCI initiatives promote quicker construction, streamline processes, and pull in EU and national funds.

TYNDP and PCIs

https://ec.europa.eu/energy/infrastructure/transparency_platform/map-viewer/main.html