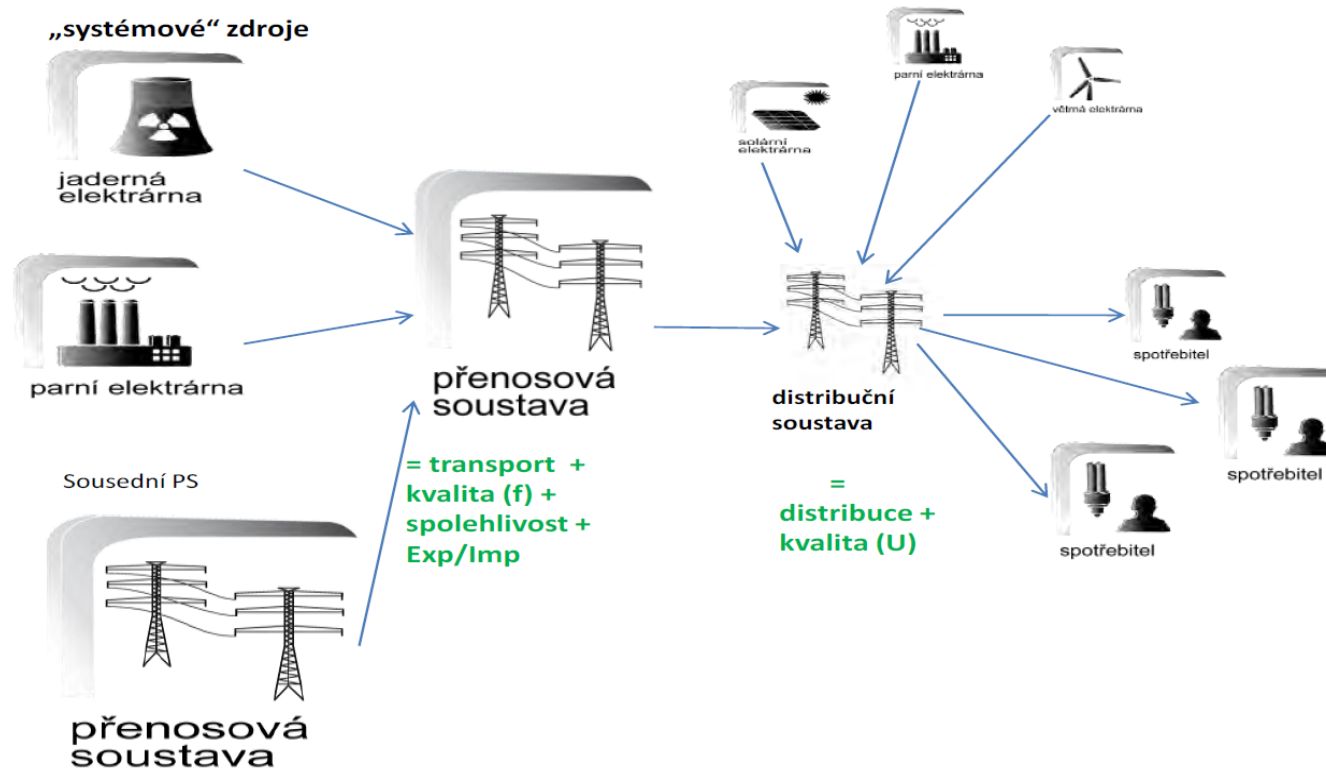


IEM: Electricity Market

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Structure of the electricity sector



Structure of the sector is changing with new national and supranational actors emerging.

Independent regulators

- Independent both from industry and government's interests. Own 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 gas pipelines and electricity networks.
- 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.

ENTSO-E + ENTSO-G

- Developing of standards and draft network codes to help harmonise the flow of electricity and gas across different transmission systems.
- Coordinating of 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.

TSO

- Transporting energy (electricity, natural gas) via fixed infrastructure.
- 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.

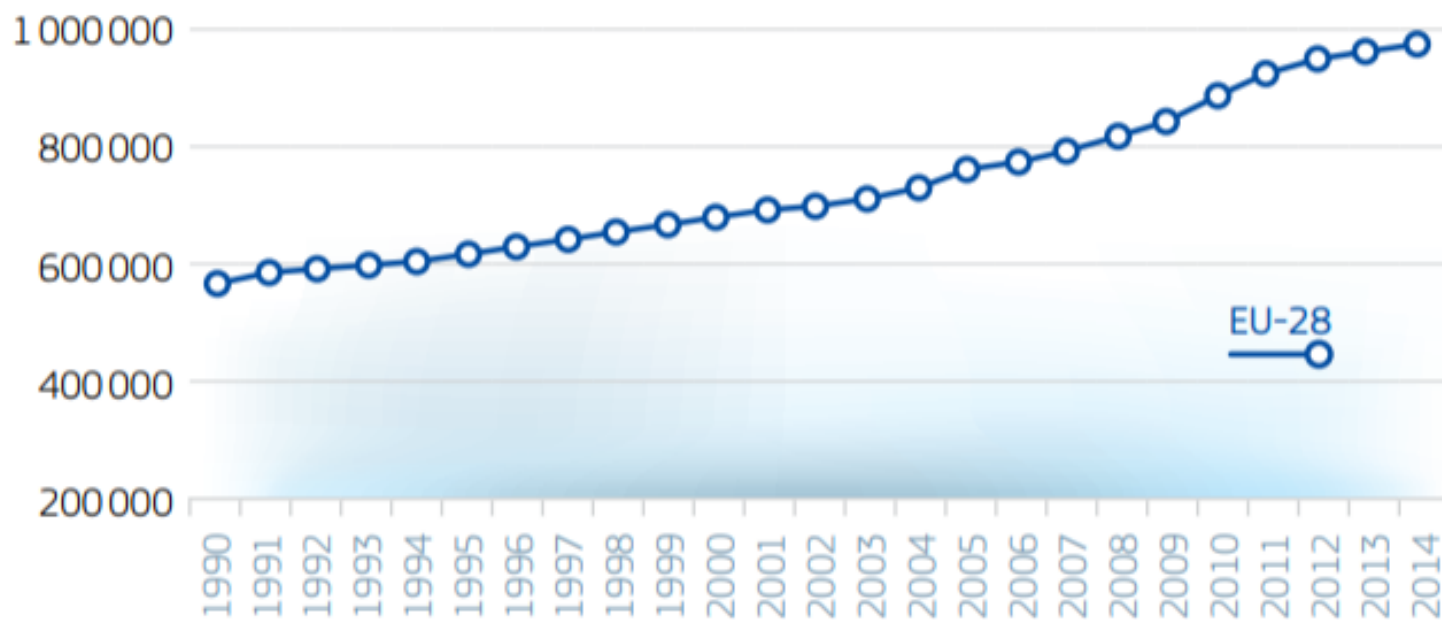
And others

- DSO
- Power Exchange
- Market operator
- ...

Key data on EU electricity sector

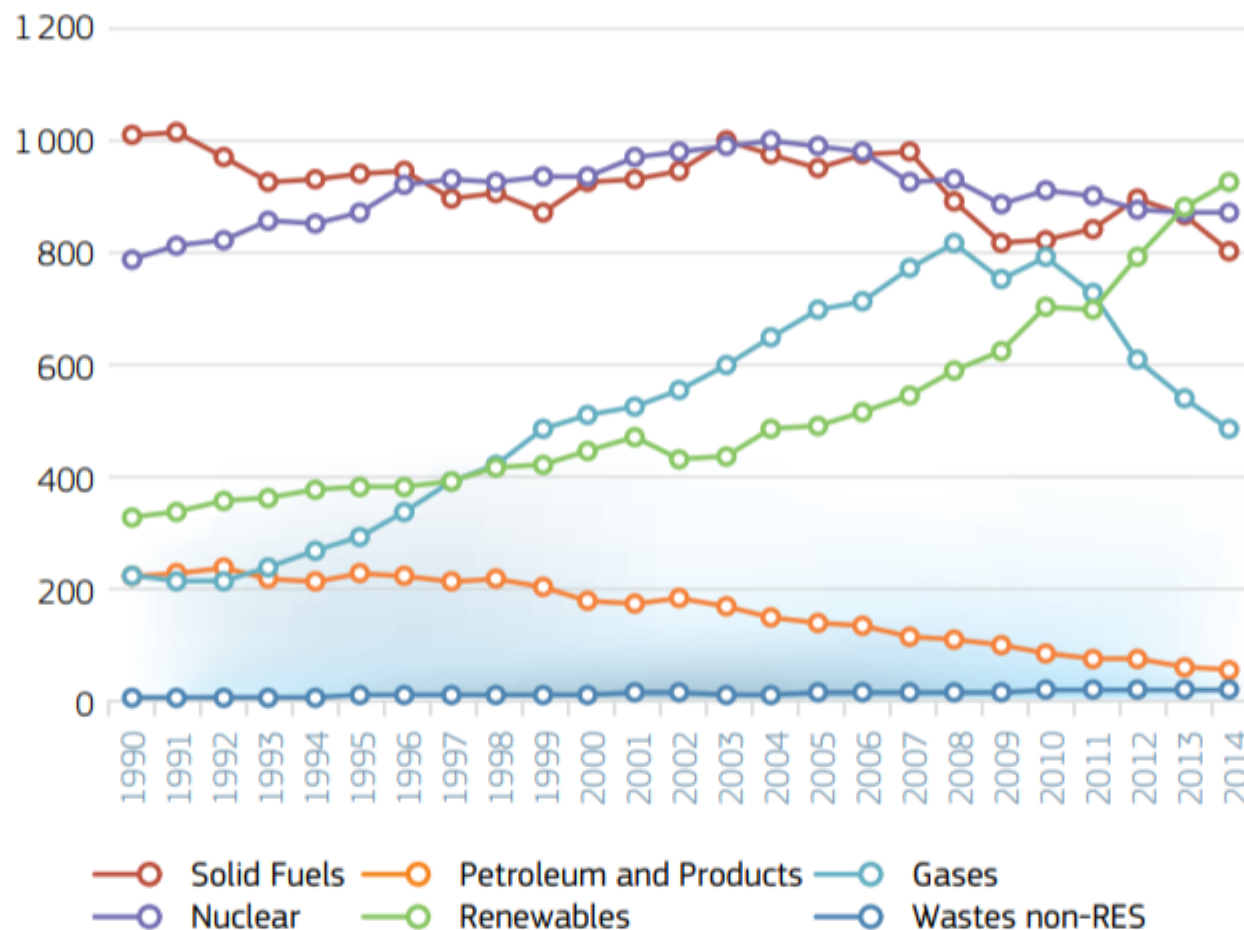
- Installed capacity – 978 GW in 2014, 884 GW in 2010, 681 GW in 2000.
- Electricity generation mix (2014): combustible fuel 49,3%, hydro 15,4%, nuclear 12,6%, wind 13,2%, solar PV 8,9%, other sources 0,6%.

Installed electricity capacity, EU28, MW



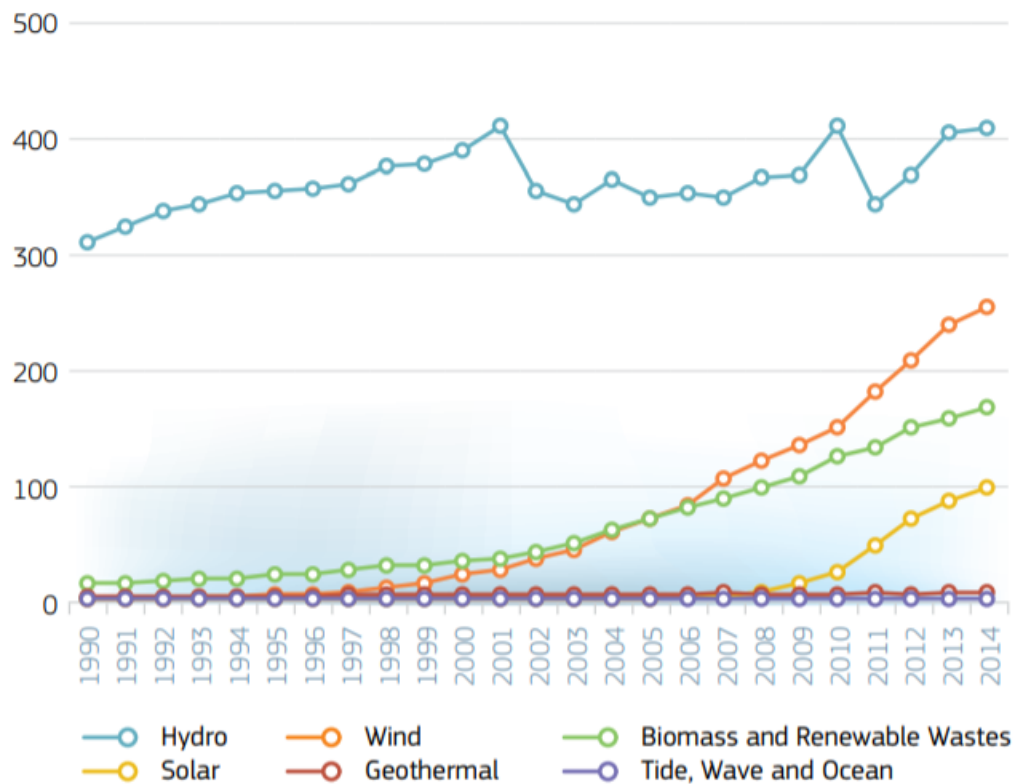
Note: No complete EU 28 data available for 1990-2000.

Gross Electricity Generation, EU28, TWh

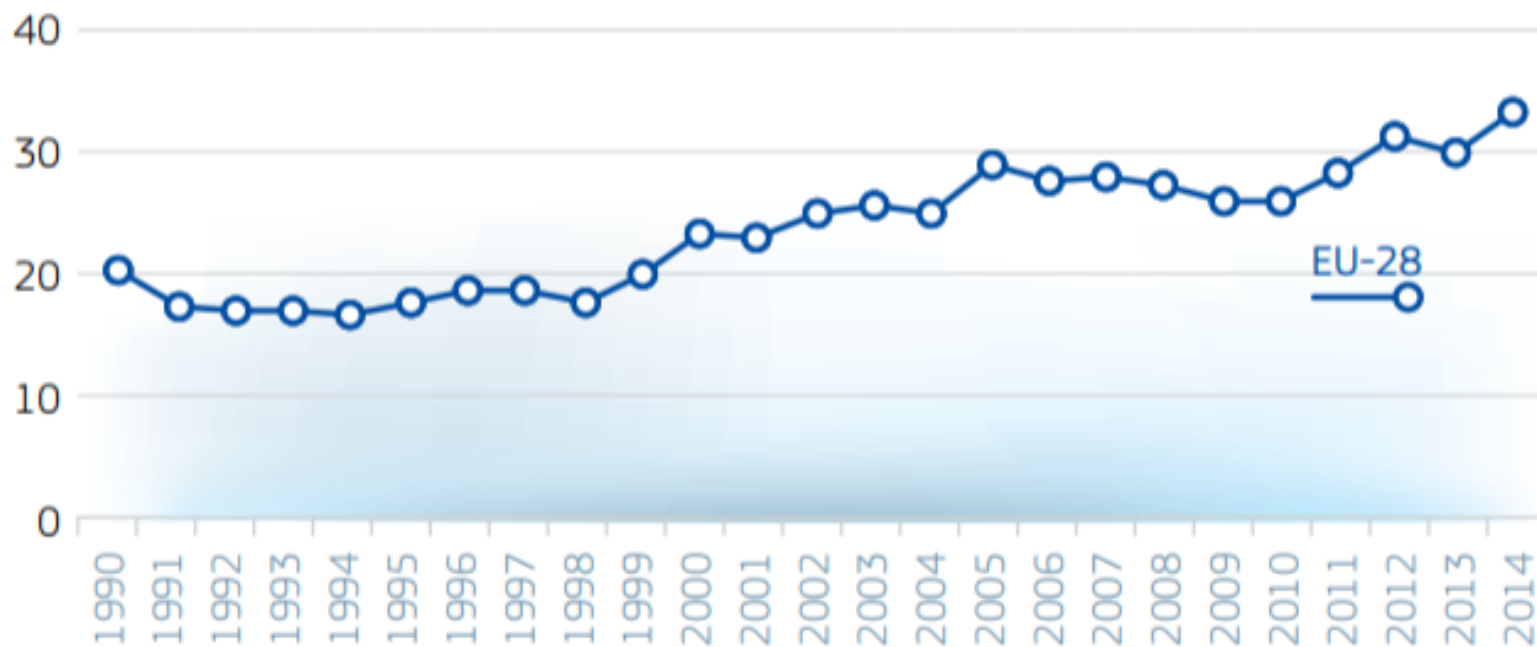


Gross Electricity Generation - Renewables, EU28, TWh

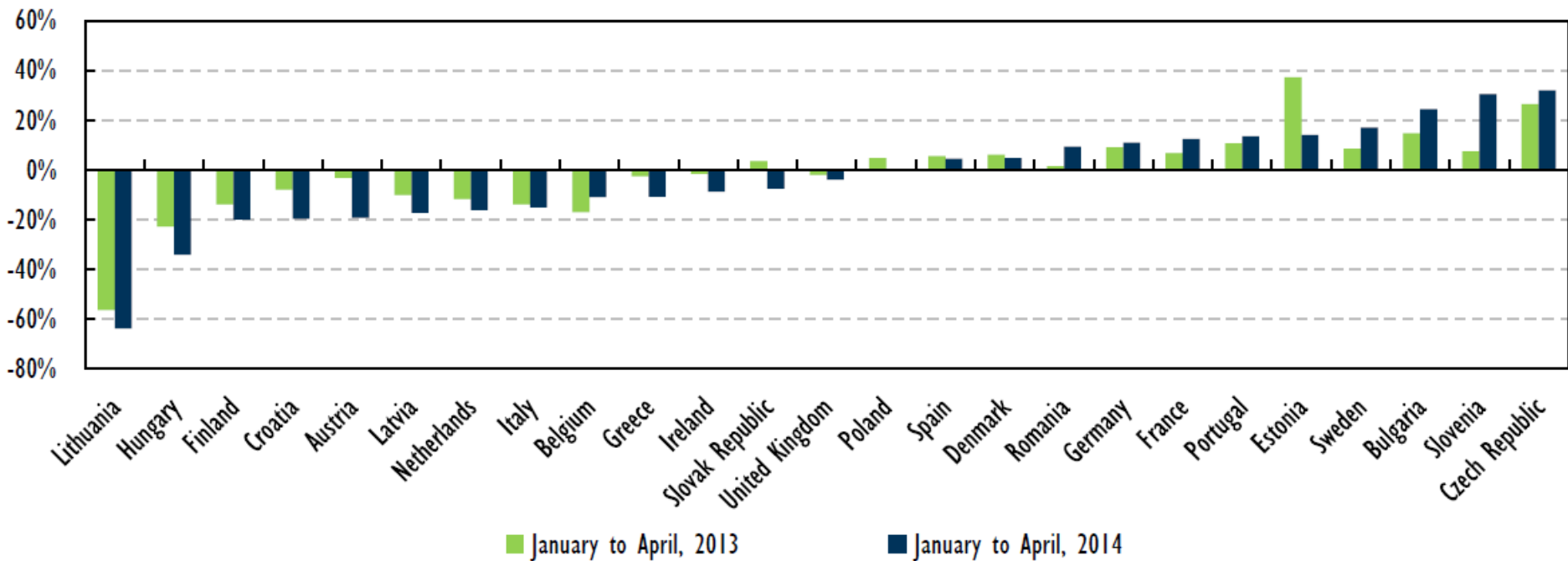
GROSS ELECTRICITY GENERATION - EU-28 - RENEWABLES - 1990-2014 (TWh)



Imports of electricity, EU 28, Mtoe



Intra-EU power import and export positions, 2013 and 2014



Notes: data represents the difference between power generation and consumption. Data for Cyprus, Malta and Luxembourg are not included.

Source: ENTSO-E, European Commission, 2014.

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.

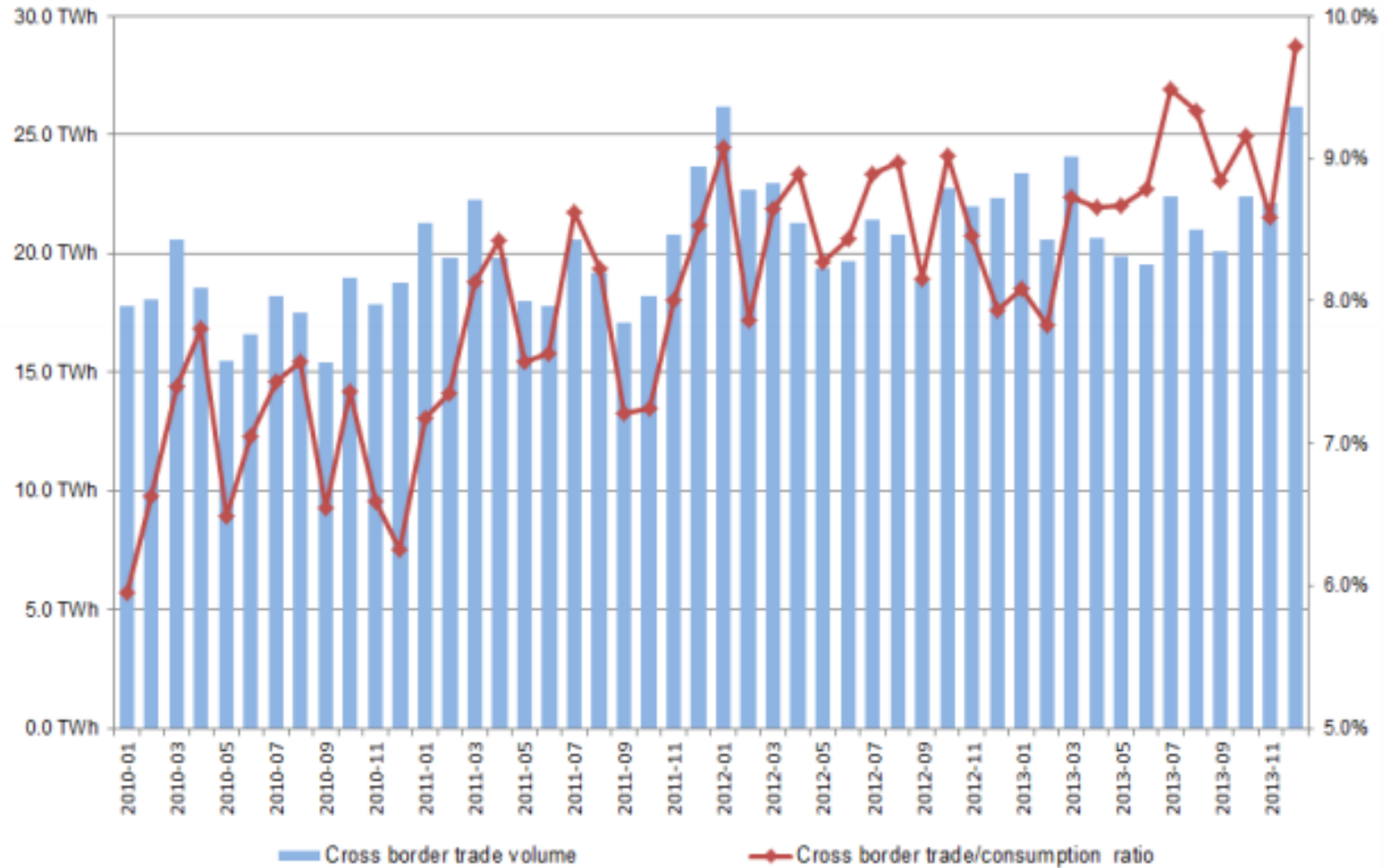
...and market unification.

- 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.

Connection of the wholesale electricity market

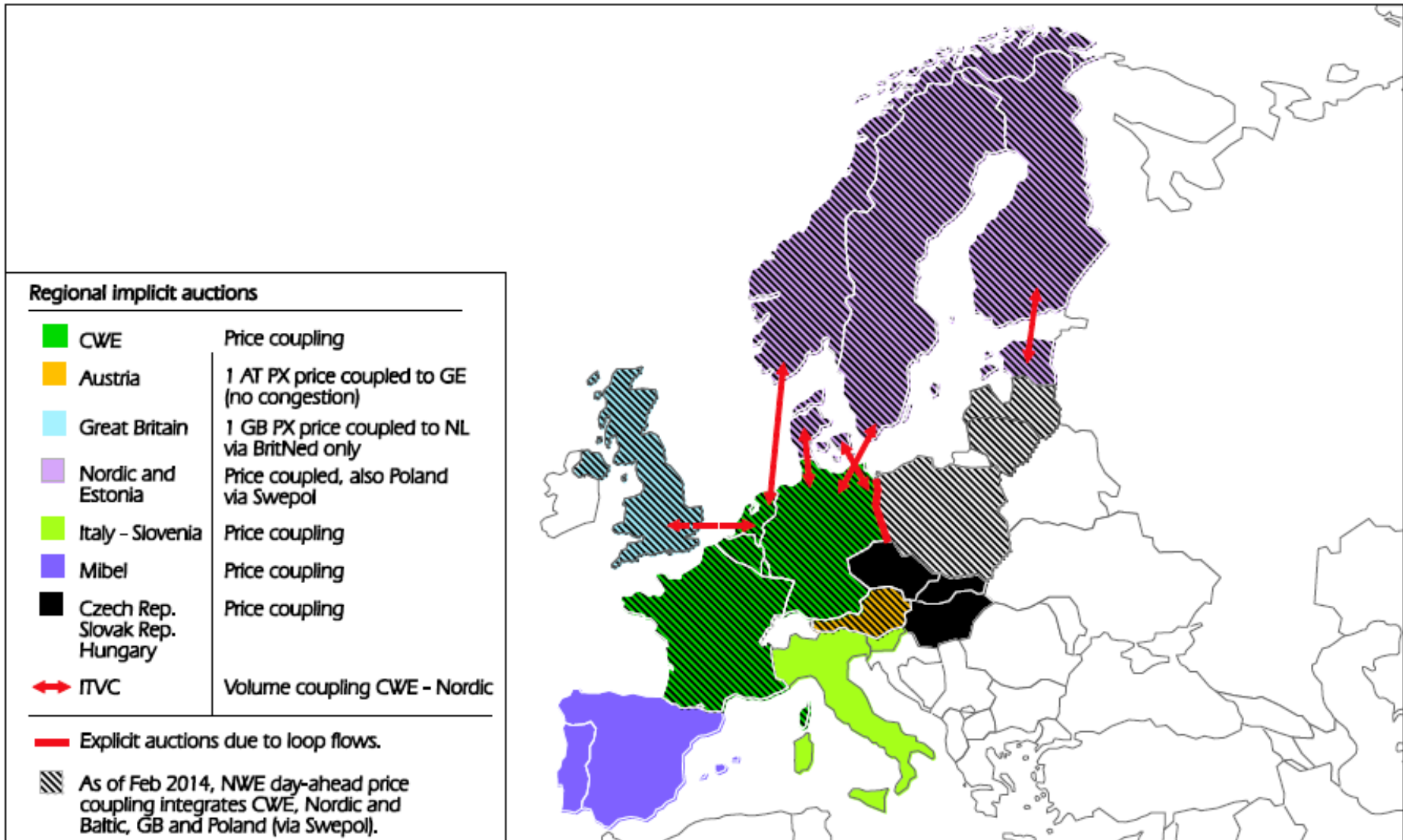
- Day-ahead market coupling through the coupling of cross-border electricity exchanges. Coupling of regional electricity markets – Nordic market, Central West, North West Europe...
- (Day-ahead) market coupling optimises interconnection capacity utilisation (calculation and allocation) and facilitates 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.

Monthly cross border electricity flows in the EU and the ratio of cross border flows compared to the gross inland electricity consumption



Source: ENTSO-E

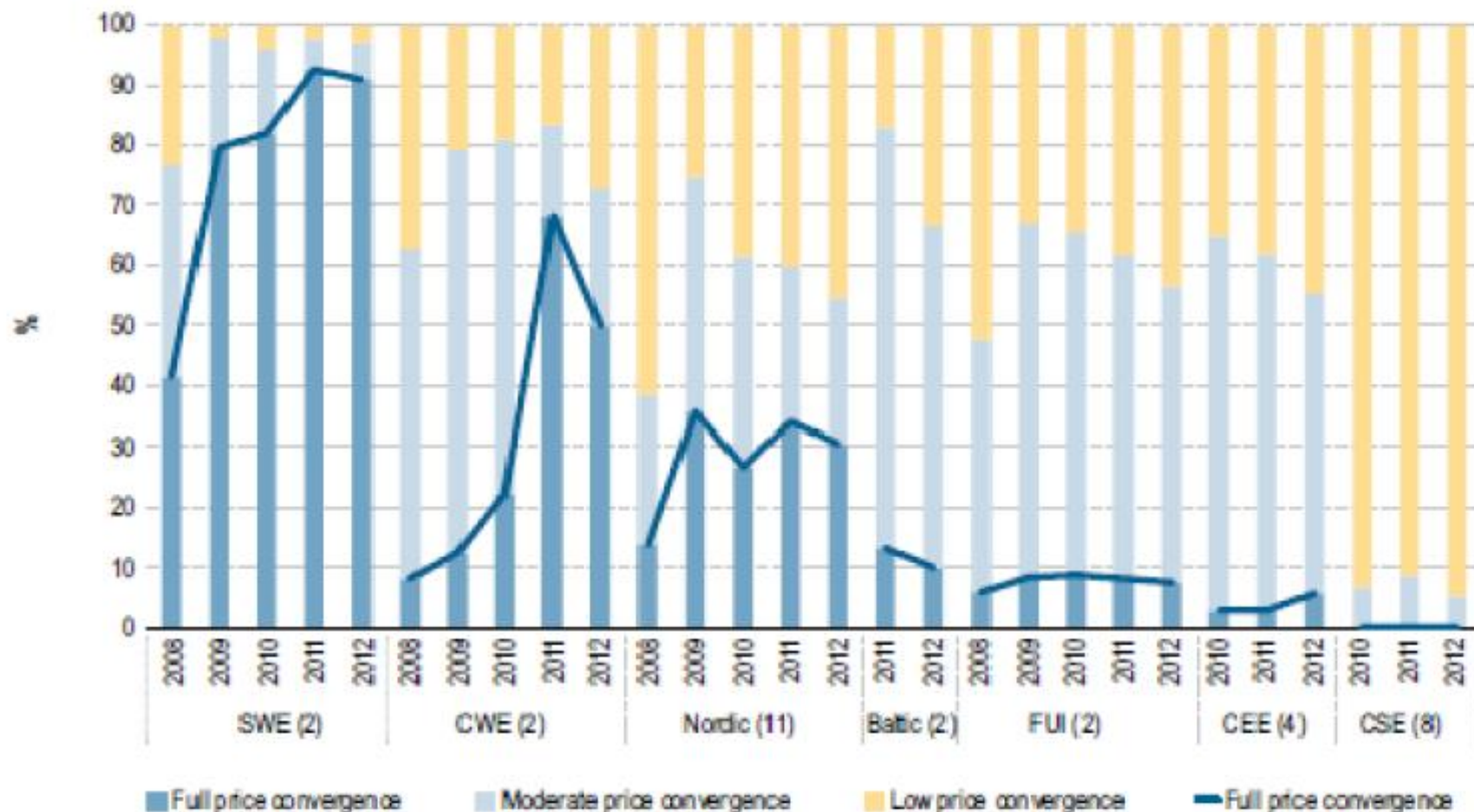
Overview of market coupling towards a European day-ahead market



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Price convergence in Europe by region, 2008-2012 (%)

Price convergence in Europe by region (ranked) – 2008 to 2012 (%)



Source: Platts, PXs and data provided by NRAs through the Electricity Regional Initiatives (ERI) (2013) and ACER calculations

Note: The numbers in brackets, e.g. SWE(2), refer to the number of bidding zones per region included in the calculations.

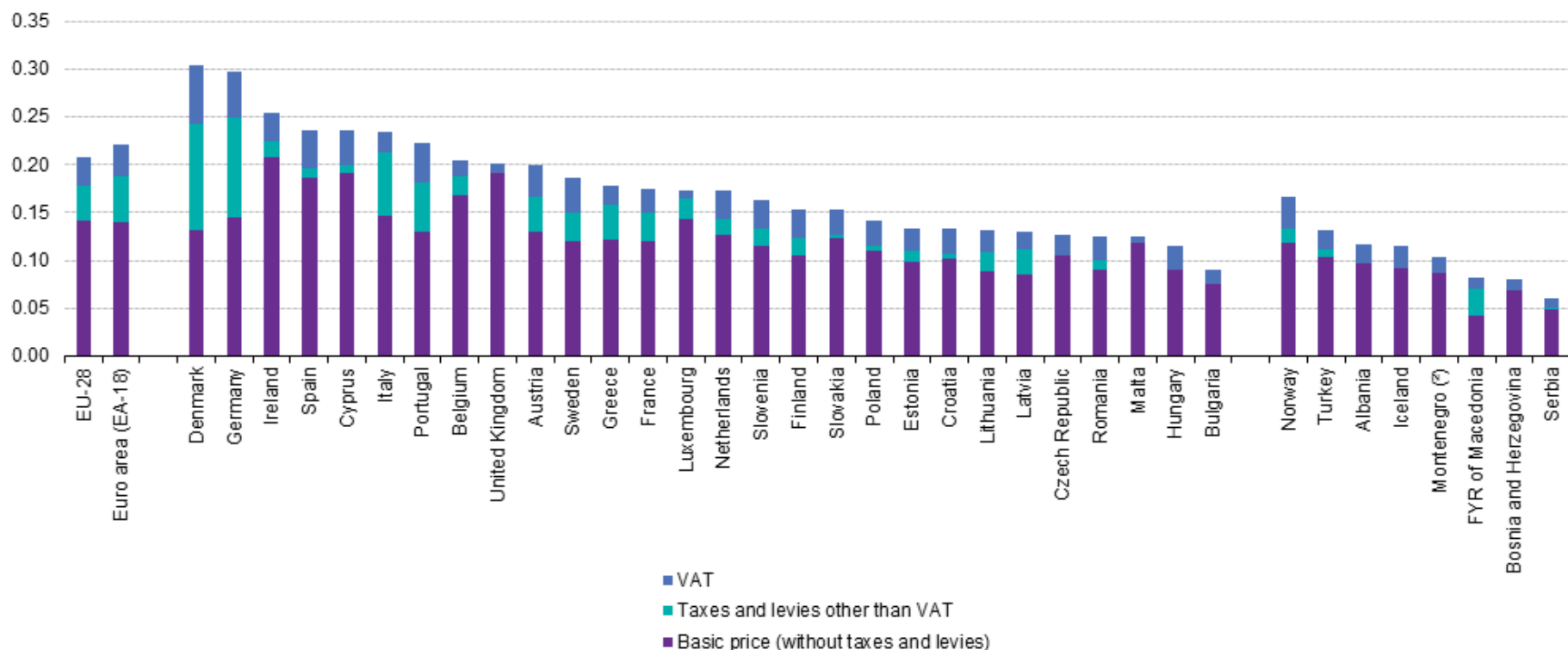
Retail markets

- Still fragmented, regulated, with low level of switching.
- Still high generation concentration. In 8 MS more than 70% of generation controlled by historic incumbent.

Prices

- Gap between household and industry prices – different levels of taxation and RES surcharges.
- Since 2008 the wholesale prices have been falling by 1/3, retail prices have increased by 4%/y.
 - Due to the persistence of regulated prices and market concentration, the higher level of levies, taxes and network cost and low responsiveness of consumers to switch suppliers to better offer.

Prices for household consumers, second half 2014 (eur/kWh)

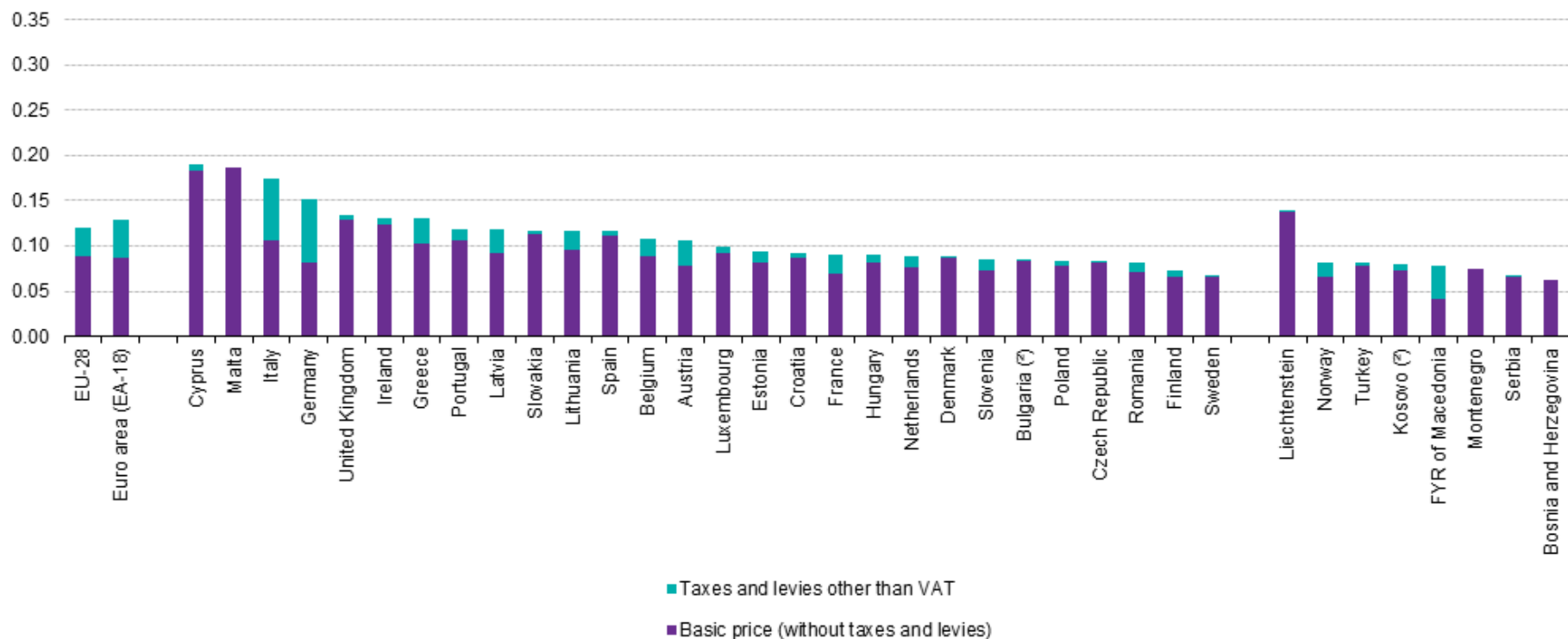


(*) Annual consumption: 2 500 kWh < consumption < 5 000 kWh.

(?) Taxes and levies other than VAT are slightly negative and therefore the overall price is marginally lower than that shown by the bar.

Source: Eurostat (online data code: nrg_pc_204)

Prices for industrial consumers, second half 2014 (eur/kWh)



(*) Annual consumption: 500 MWh < consumption < 2 000 MWh. Excluding VAT.

(*) Provisional.

Source: Eurostat (online data code: nrg_pc_205)

Connection of the intra-day 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.

Cross-border infrastructure development

- 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.
- 2002 – „every MS should have interconnection capacity equal to at least 10% of its total generatin capacity“. 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...

Cross-border electricity interconnection as ratio of total generating capacity, 2014

MS above the 10 % treshold		MS below the 10 % treshold	
Austria	29%	Ireland	9%
Belgium	17%	Italy	7%
Bulgaria	11%	Romania	7%
Czech Republic	17%	Portugal	7%
Germany	10%	Estonia	4%
Denmark	44%	Lithuania	4%
Finland	30%	Latvia	4%
France	10%	UK	6%
Greece	11%	Spain	3%
Croatia	69%	Poland	2%
Hungary	29%	Cyprus	0%
Luxembourg	245%	Malta	0%
Netherlands	17%		
Slovenia	65%		
Sweden	26%		
Slovakia	61%		



Impact of IEM on security of supply

= power system's capability to meet changes in requirements through investment, operational and end-use responses.

- EU market integration and electricity trade increases interdependency among jurisdiction. But lack of integrated policies regarding a fuel mix.
 - + diversification (more flexibility, lower the risk of shortages).
 - -/+ exposure to market, price and generation development in neighbouring countries.
- EU legislation, network codes (network security and reliability code, code for operational procedures in an emergency...).
- Cooperation of TSOs (Ten year network development plan, regional investment plans...).

Sources

- IEA (2014): Energy Policies of IEA Countries – The European Union.
- EC (2017): EU Energy in Figures.
- ACER (2016): Market Monitoring Report 2015 – Electricity and Gas