IEM: Electricity Market II.

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Electricity market – current situation

- Tension between the aim of a) freely operating single market and b) secure low-carbon energy system.

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Renewables

- 14,1% in total final energy consumption. 24,1% of electricity generation.
- Aim of having 27% of RES energy in the EU in 2030.
- Main drivers of development are a) goals of the EU b) that lead to national subsidy schemes c) plus increasing competitiveness of technology.

- RES significantly changes the way the electricity is produced and traded.

Problem No. 1 – Oversurplus of generating capacity

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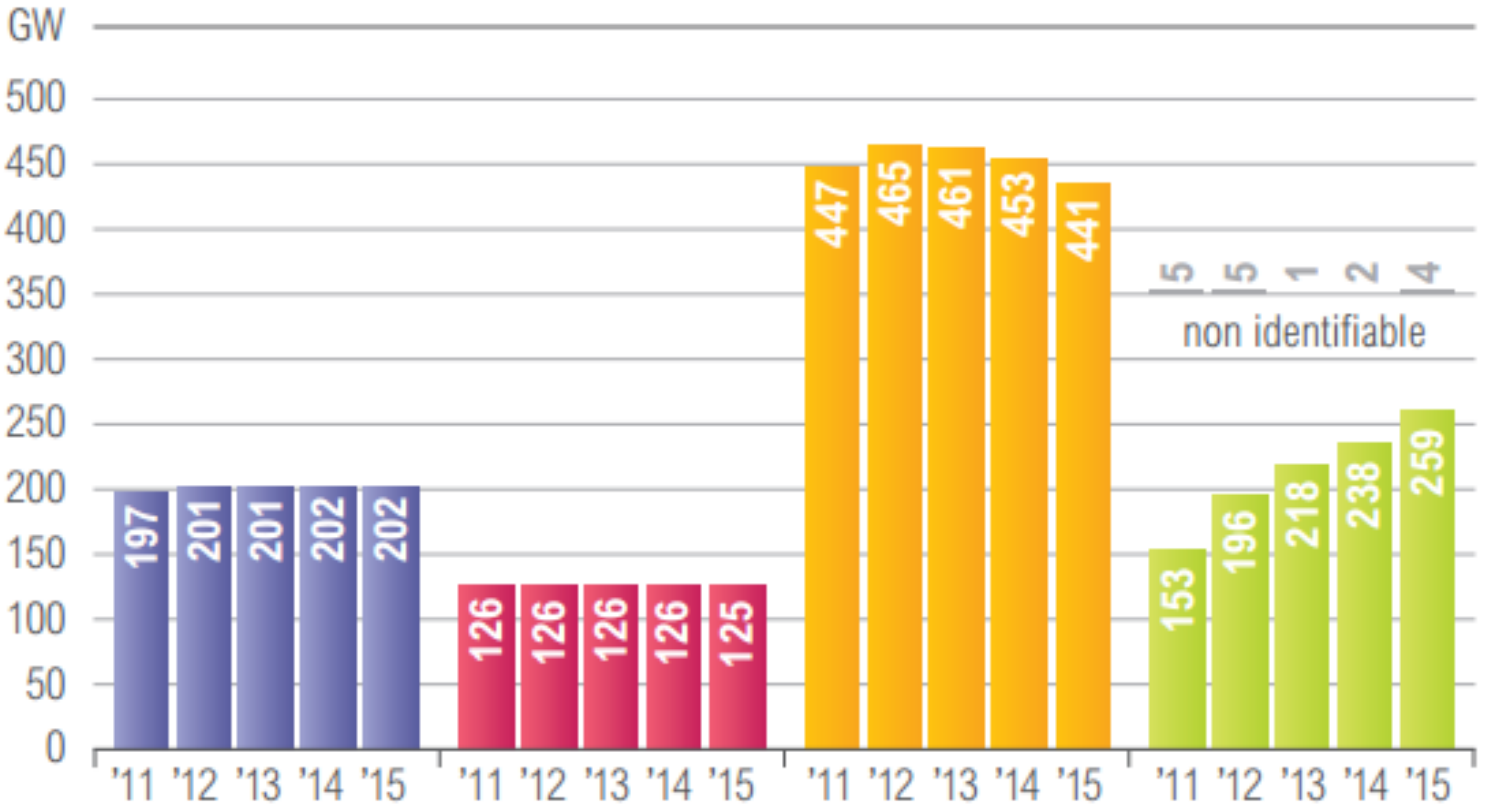
Net generating capacity, 2011-2015, GW



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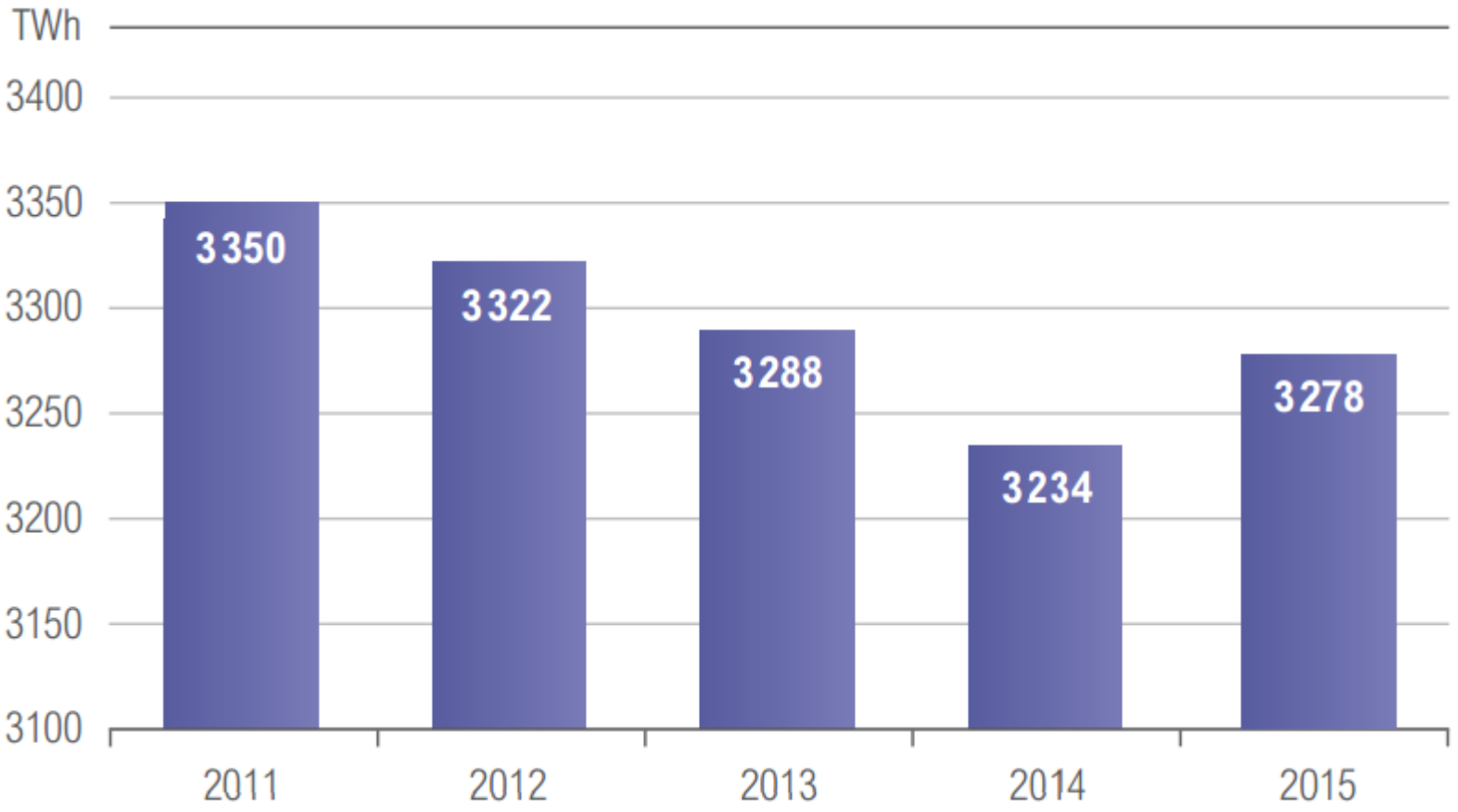
Yearly energy consumption, 2011 – 2015, TWh



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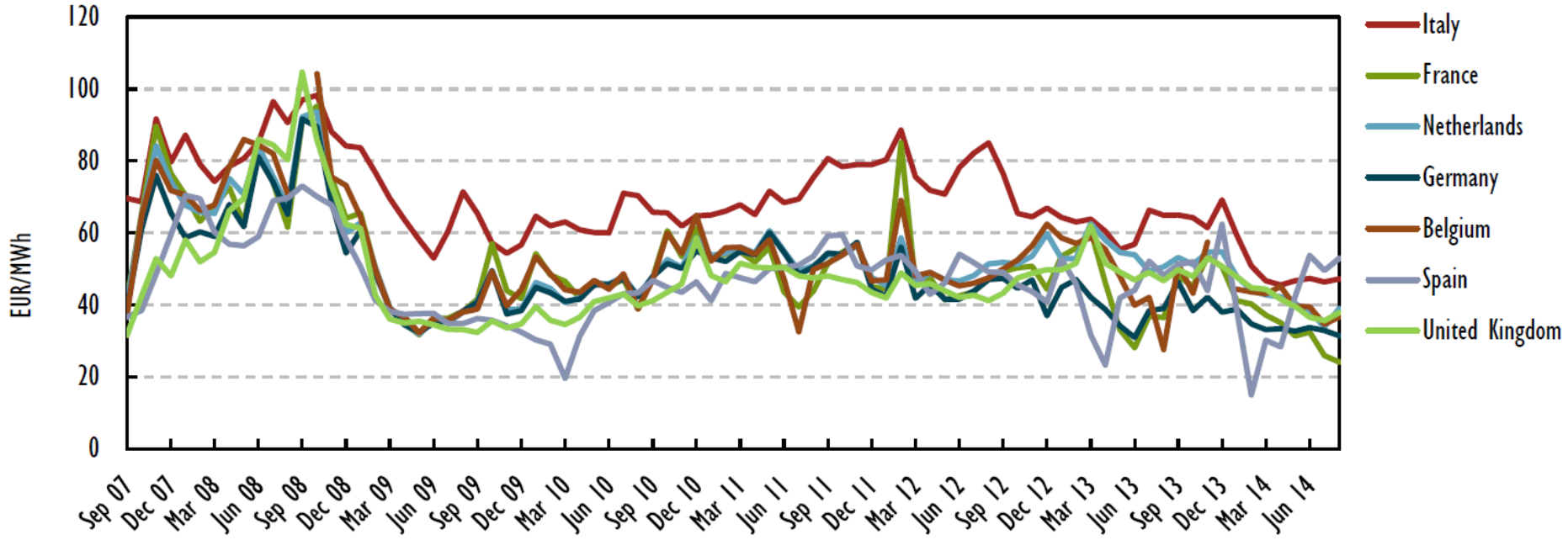
Central-West European spot power prices for base-load capacity



Source: Bloomberg, 2014.

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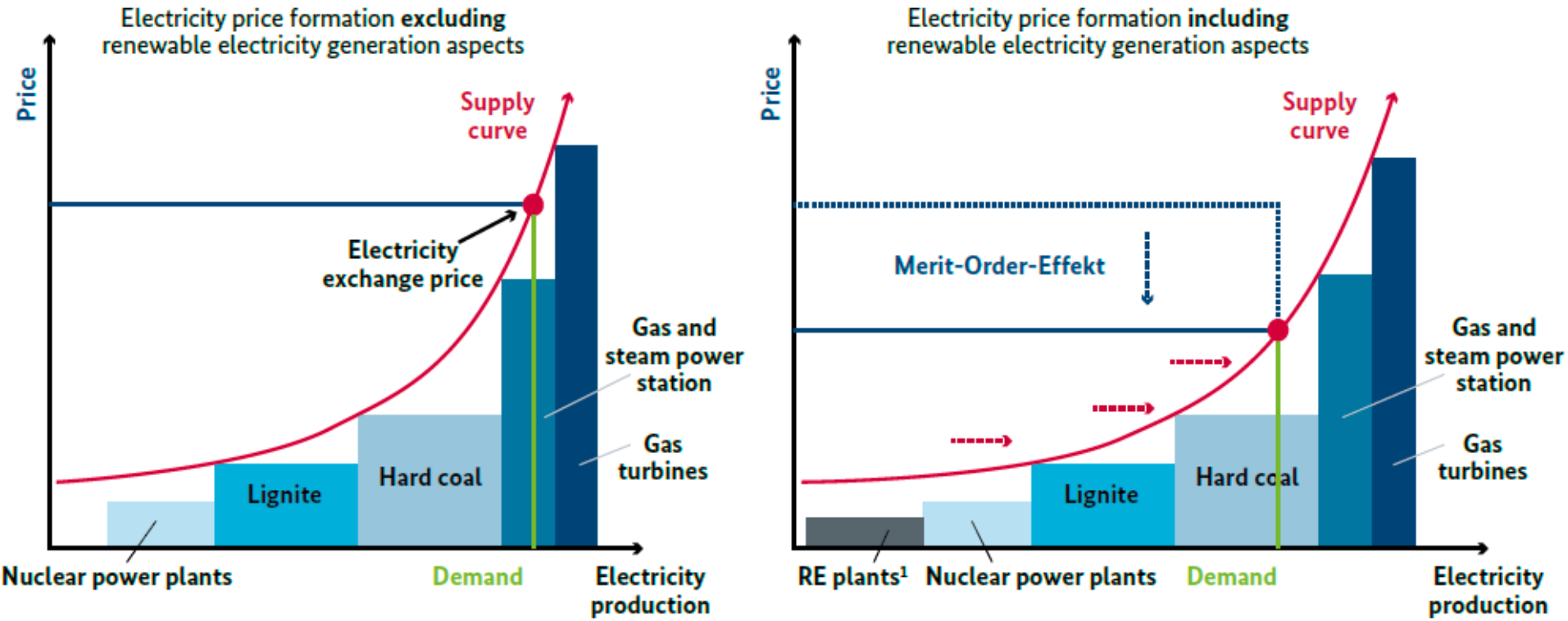
Merit-order effect

Schematic description of the merit-order effect

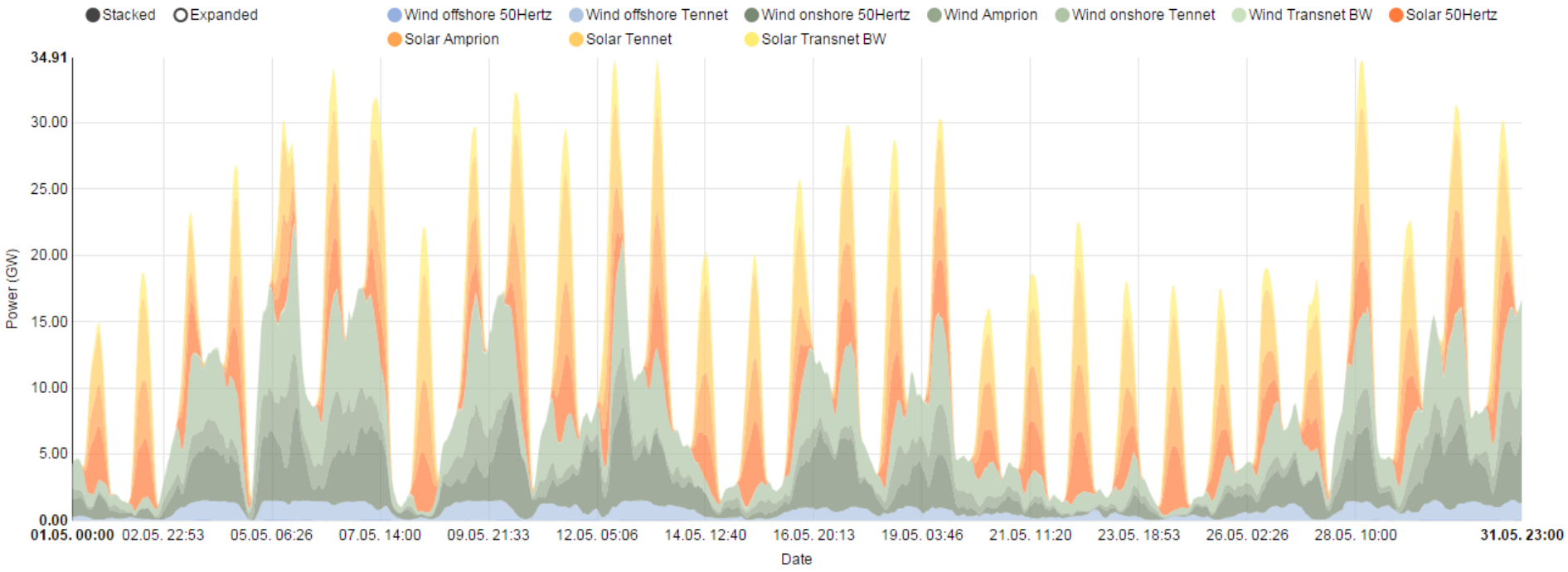


Note: The RE plants shift the supply curve in the right-hand diagram to the right. This lowers electricity prices at the exchange, assuming demand remains unchanged. The price difference is the merit-order effect.

1 electricity from fluctuating renewable energy sources (PV, wind): marginal costs = 0

Source: ZSW

Production from non-dispatchable RES, May 2015, Germany



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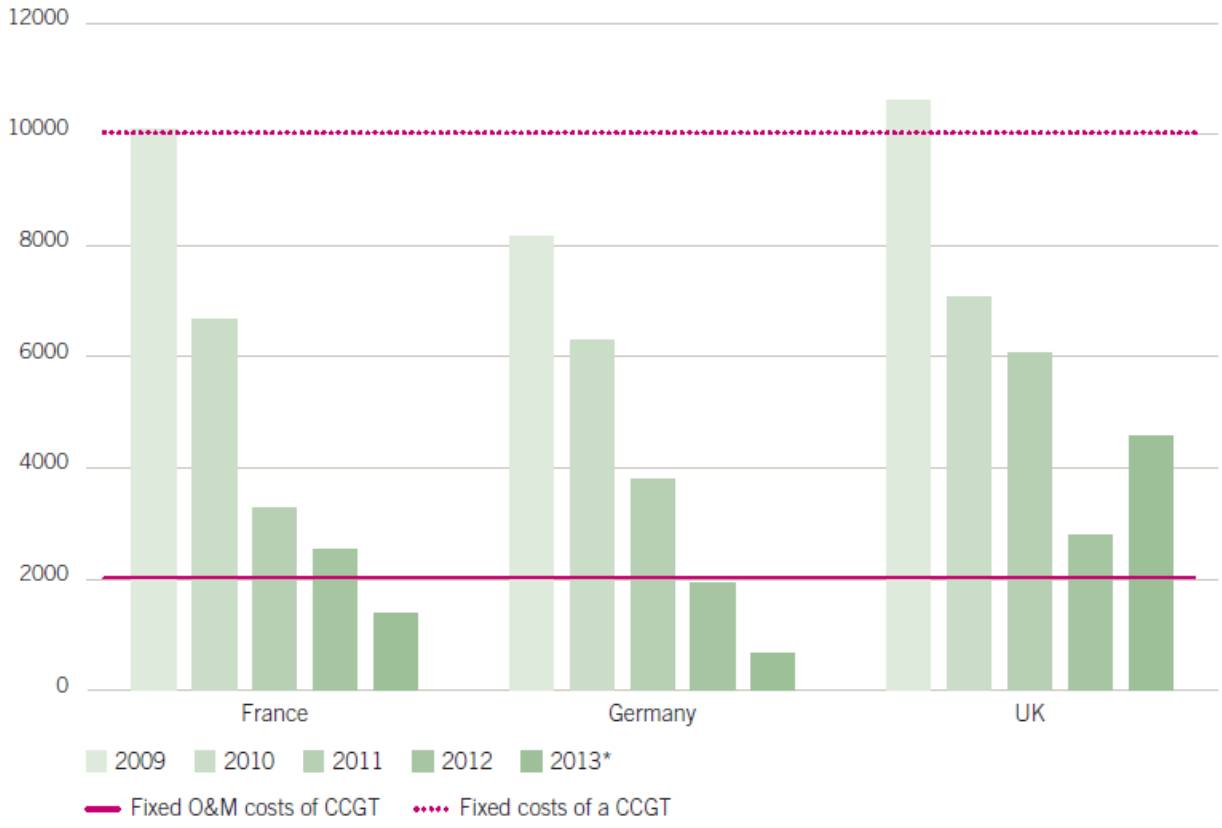
Decrease in revenue for CCGTs (€MW/month)



Analysis: FTI-CL Energy – Revenues calculated from wholesale spot prices excluding estimated short-run marginal costs. Excludes combined heat and power revenues and revenues from ancillary services. Figures for Germany for 2013 are based on 11 months.

Sources: EPEX. APX. IHS CERA

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Solution 1: Energy-only market

- Generators paid solely on the basis of the volume of power that they produce.
- No remuneration for being available during peak hours when intermittent sources aren´t producing.
- Peak loading pricing theory = capacity adequacy is maintained because prices will rise if market players anticipate an impending shortage and invest accordingly.

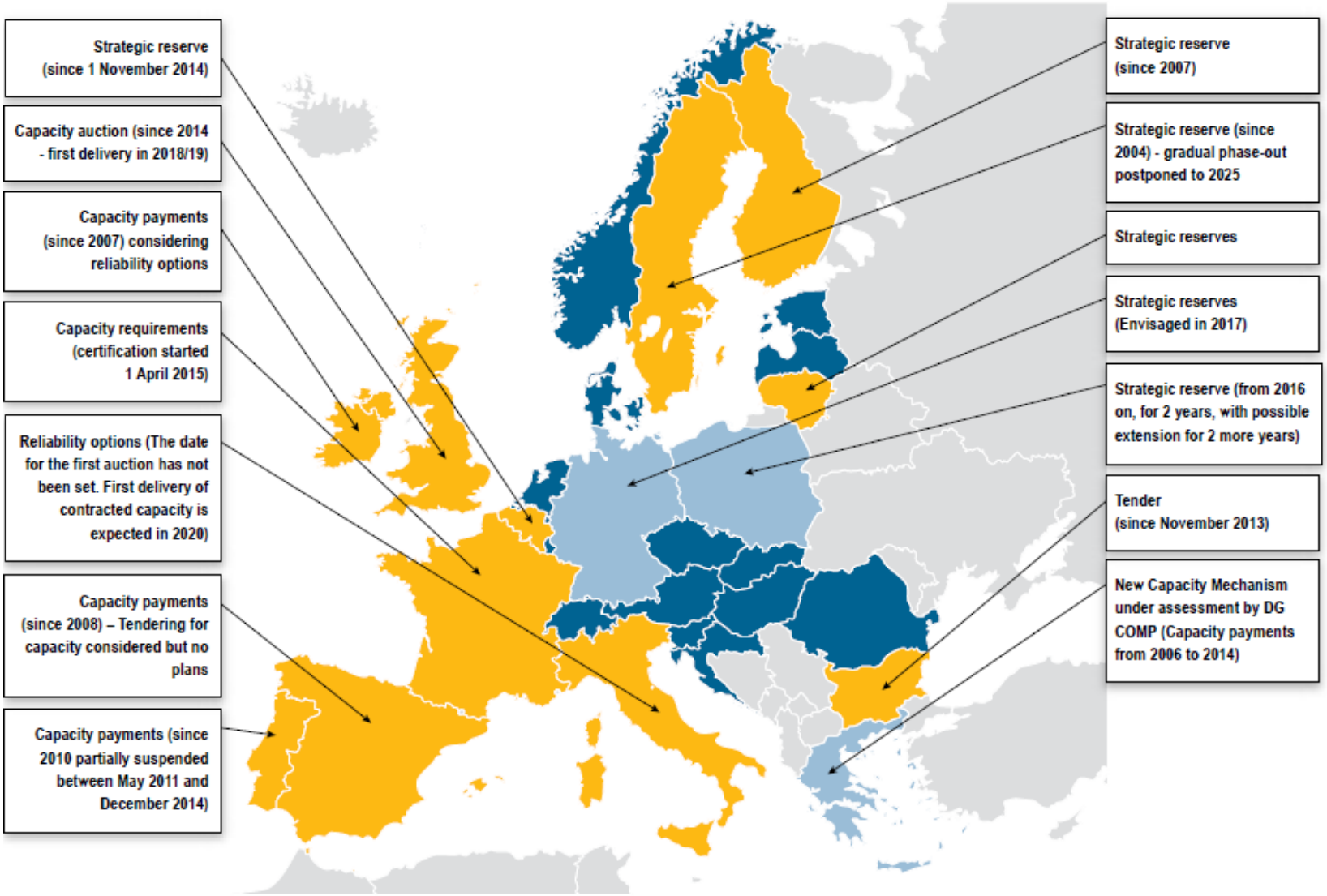
- Political constraints.
- Boom and bust cycle.
- Limited ability of the system to store electricity, supply and demand uncertainty, inelastic demand, steepness of the supply curve = high price volatility when reserve margins are low.

Capacity mechanisms

= capacity remuneration.

- To solve problem of weaken investment incentives.
- But they replace market-driven investment with central planning – considerable regulatory risk and cost for investors and consumers.

Solution 2: Capacity mechanisms/payments



Problem No. 2 – impact of volatile sources on electricity trade

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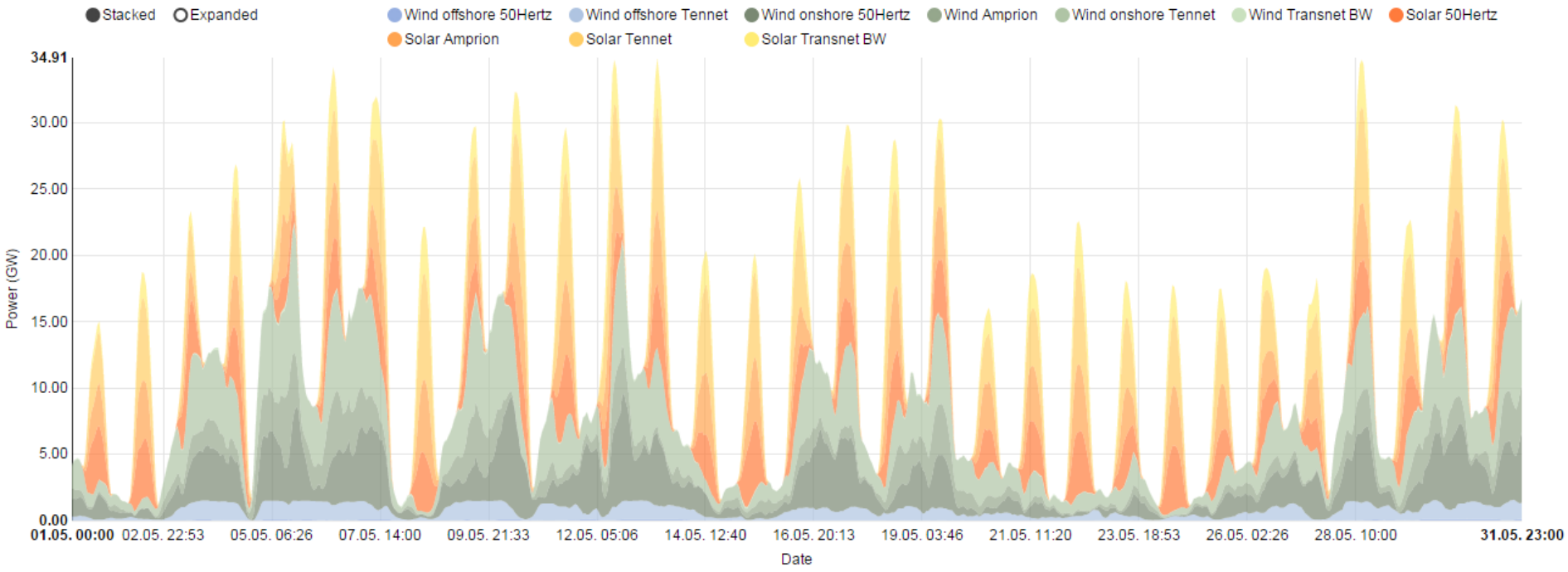
Production from non-dispatchable RES, May 2015, Germany



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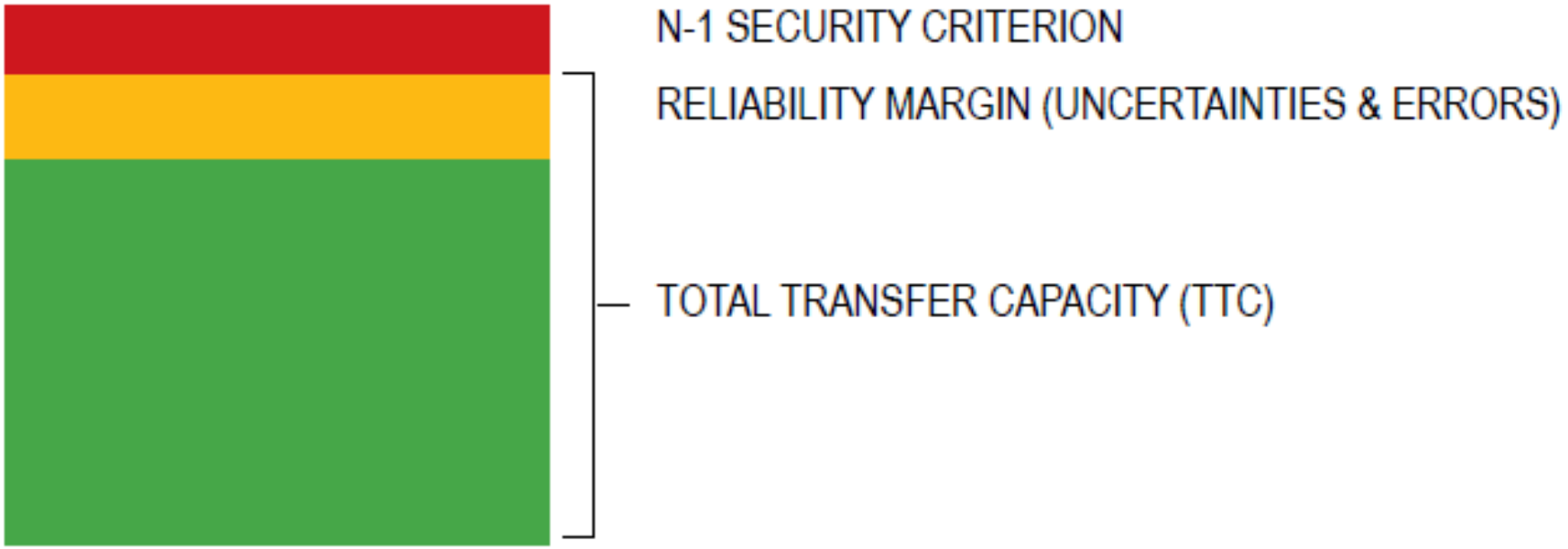
Cross-border electricity interconnection as ratio of total generating capacity, 2014			
MS above the 10 % treshold		MS below the 10 % treshold	
Austria	29%	Ireland	9%
Belgium	17%	Italy	7%
Bulgaria	11%	Romania	7%
Czech Republic	17%	Portugal	7%
Germany	10%	Estonia	4%
Denmark	44%	Lithuania	4%
Finland	30%	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%		

Thermal capacity of interconnectors



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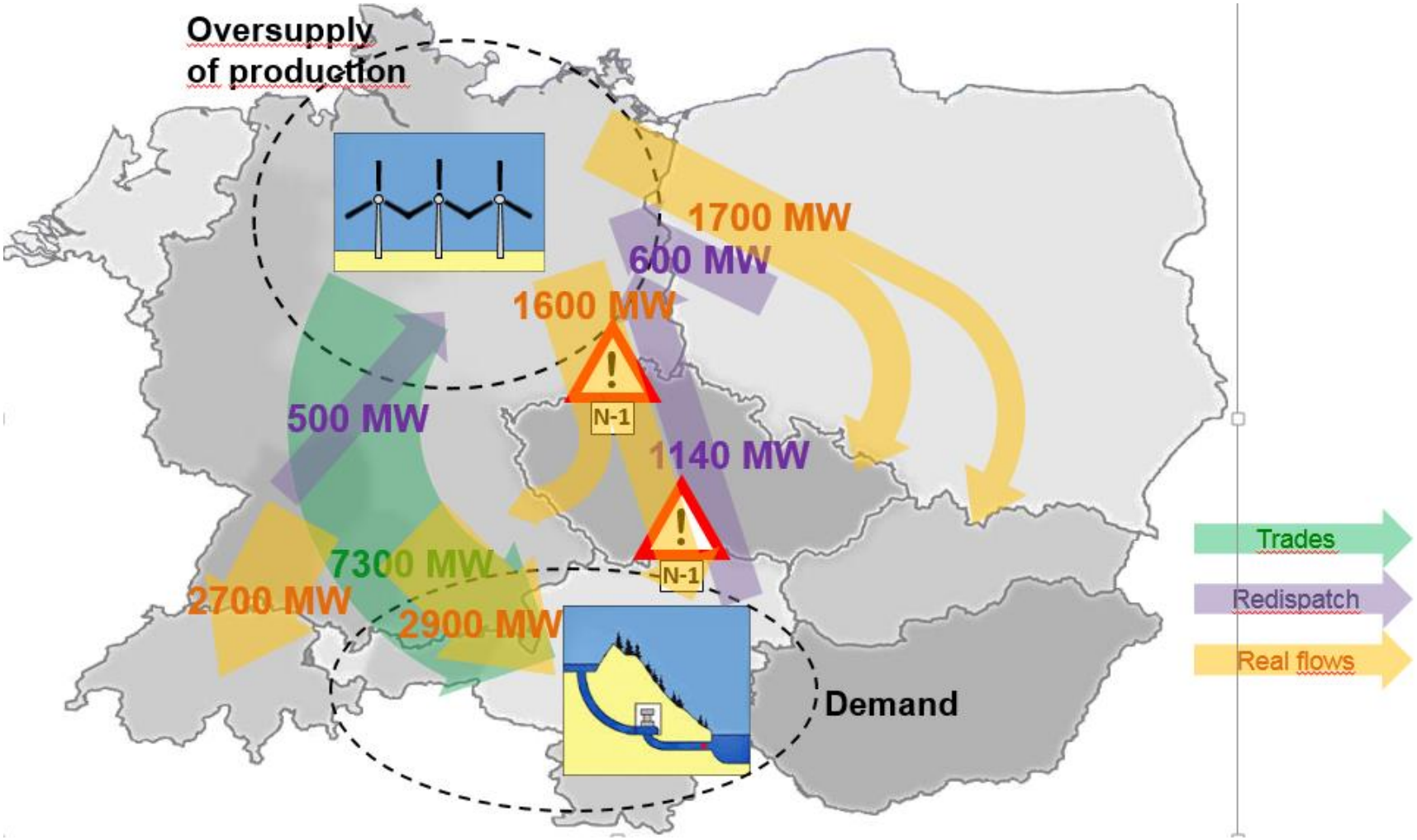
Trades and flow of electricity 2014/2015



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Remedial measures

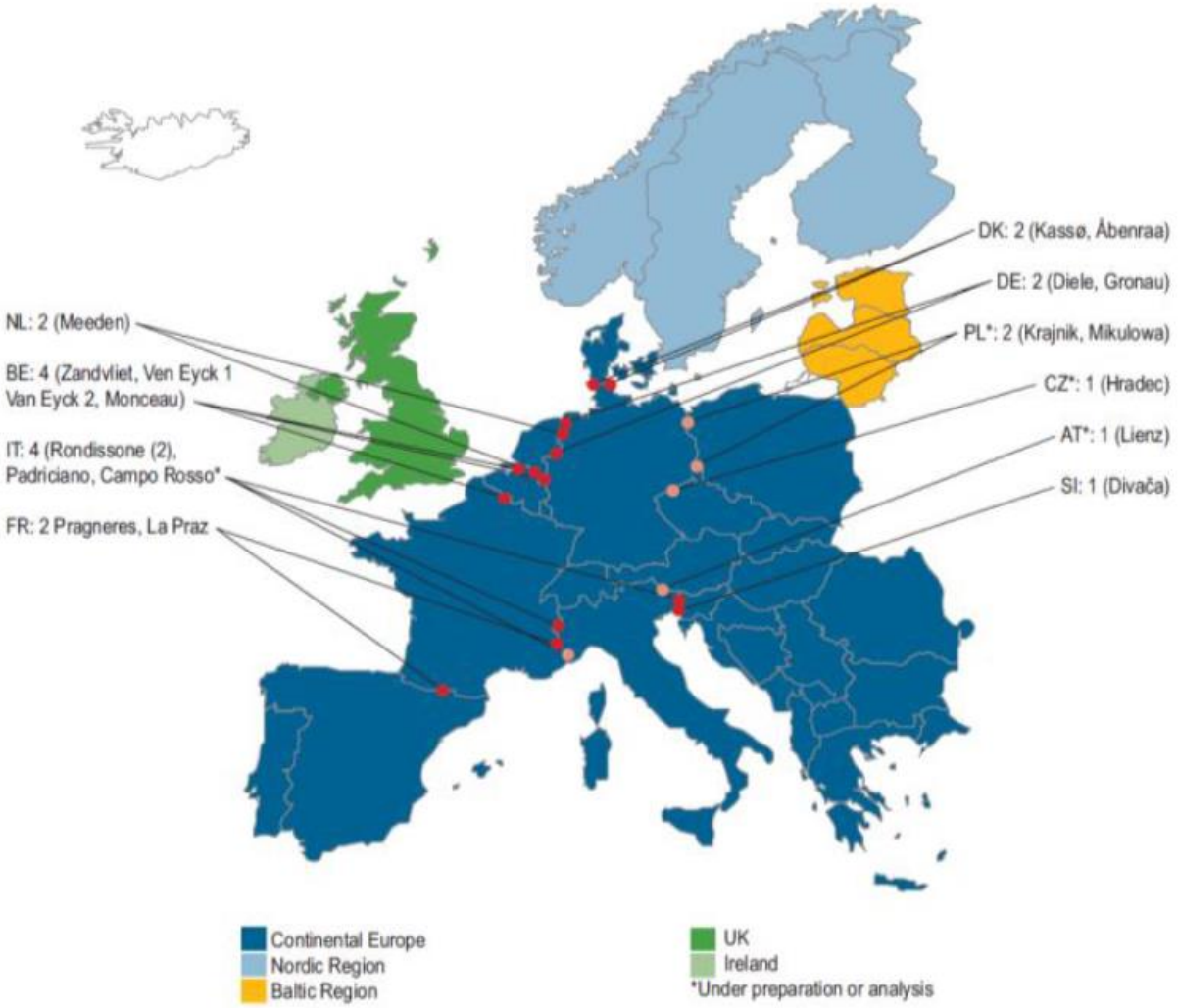
Unscheduled flows reduce the amount of tradable cross-zonal capacit and affect the social welfare distribution.

Structural solutions:

- Improvement the capacity calculation methodology.
- Improving bidding zone configuration.
- Investments in the transmission network.

Short term emergency sollutions:

- Changing the grid topology.
- Re-dispatching.
- Counter-trading.
- Curtailment of allocated capacities.
- Phase-shifters.



Source: ACER/CEER (2012).

Electricity market – current situation

= Electricity markets impacted by national energy and climate policy decisions (RES, capacity mechanisms, retail market regulation, carbon prices…). Necessary is:

- to improve functioning of national markets by limiting state intervention (RES, capacity mechanisms, regulated tarrifs).
- to improve cross-border capacity (infrastructure investment, balancing and intra-day markets).
- to optimise cross-border flows.

Sources

- IEA (2014): Energy Policies of IEA Countries – The European Union.
- ENTSO-E (2016): Electricity in Europe 2015 .
- ACER/CEER (2016): Annual Report on the Results of Monitoring the Internal Electricity Market in 2015.

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