

04 Building the IEM in electricity

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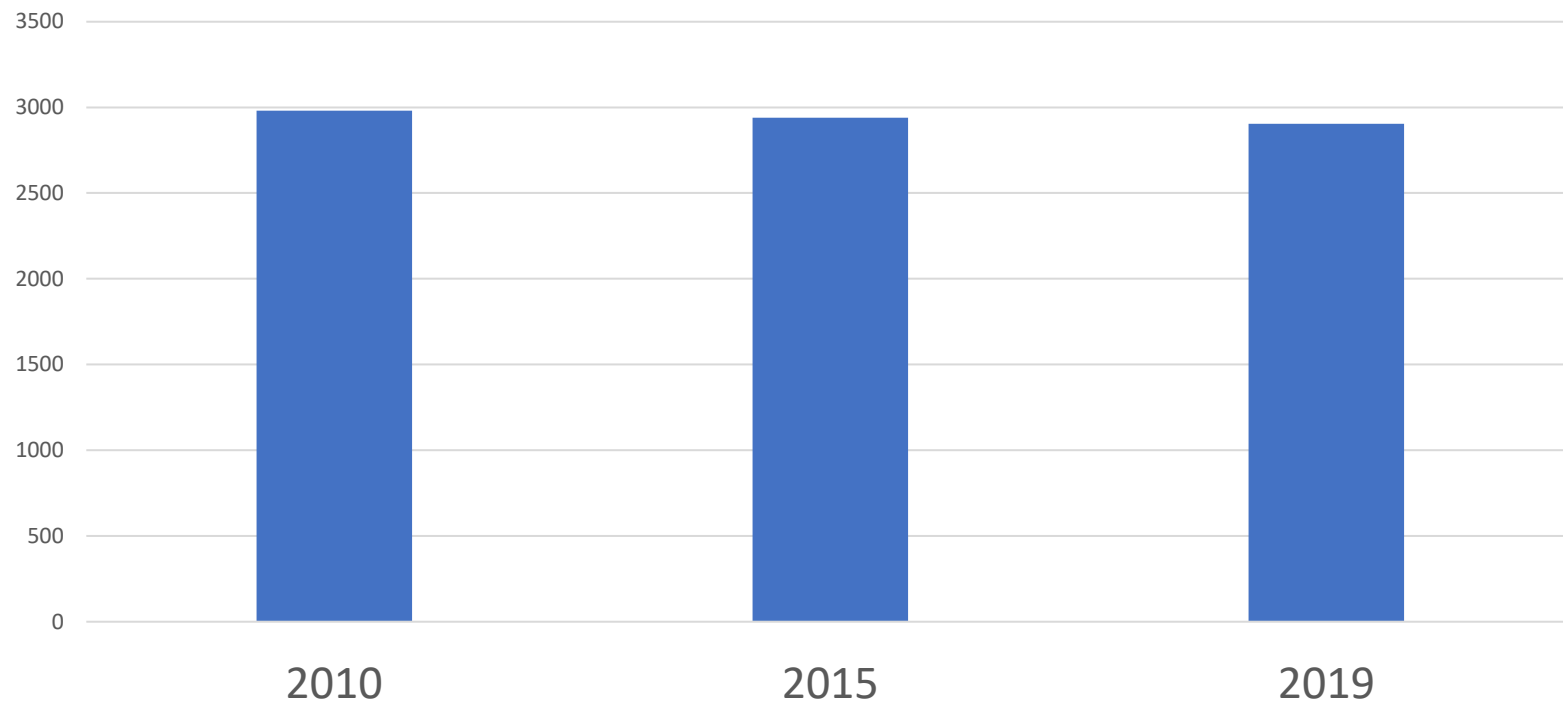
Rapid decarbonization of the power sector

- New sources (RES) integrate into the established electricity system.
- Predictable and dispatchable sources are replaced by less predictable and non-dispatchable technologies.
- The existing system is under threat, but we don't have a new one and we don't know what it will look like.

Renewable electricity

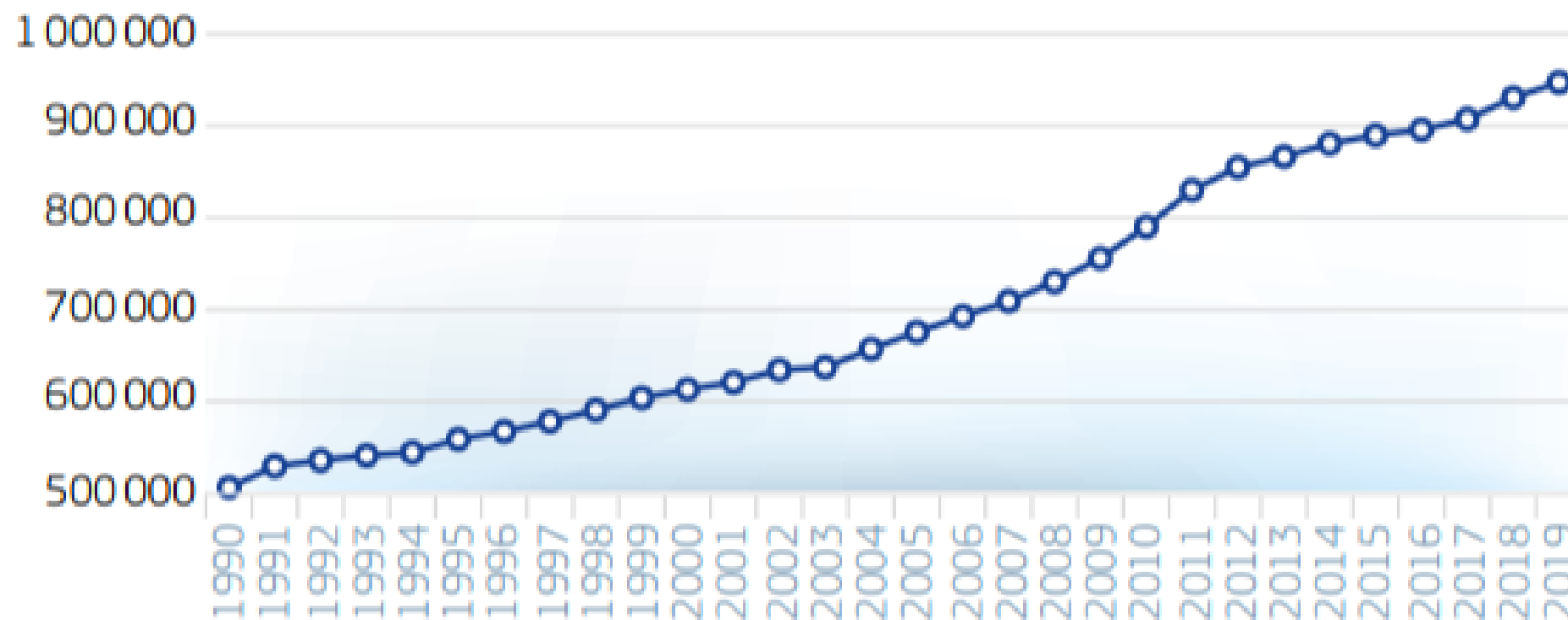
- In 2022, renewables main source of electricity (39.4% vs fossil fuels with 38.7%).
- Aim of having 42.5% of RES energy (!) in the EU in 2030.
- Development is primarily driven by a) EU objectives, b) resulting national subsidies and regulations, and c) rising technological competitiveness.

Gross electricity production in the EU, TWh



INSTALLED ELECTRICITY CAPACITY – TOTAL – 1990-2019 (MW)

EU27_2020

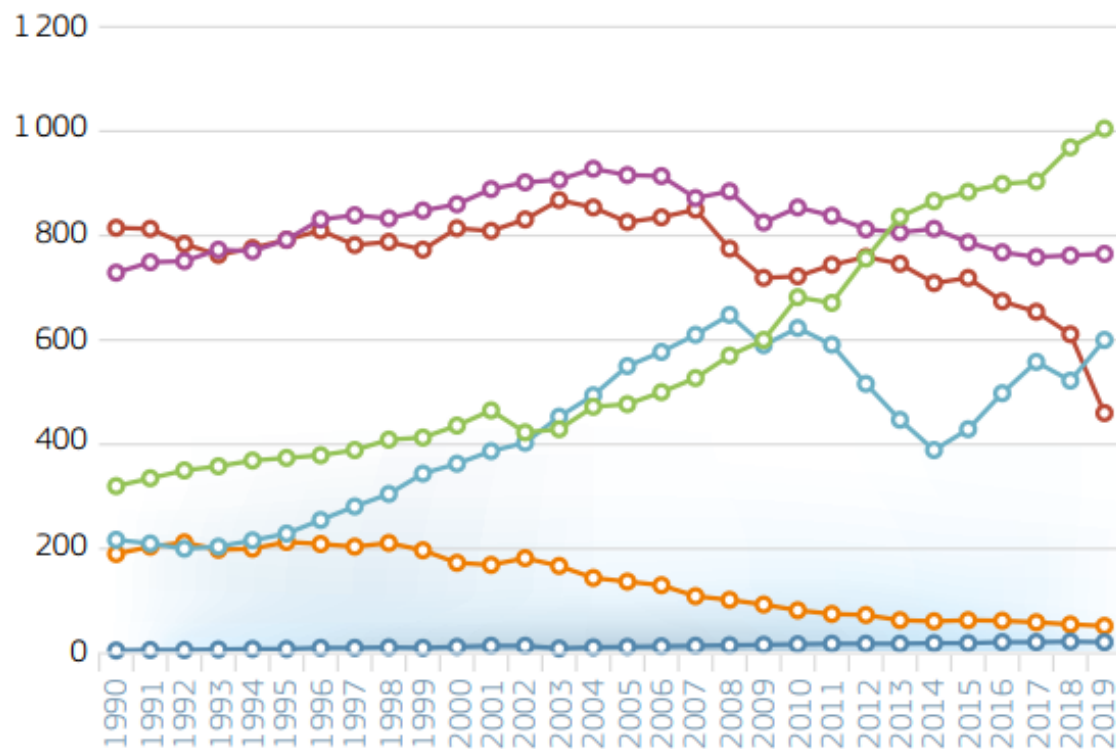


* No complete EU-27 data available for 1990-2004.

Source: Eurostat April 2021

2.6.2 Gross Electricity Generation

EU27_2020 – BY FUEL – ALL FUELS – 1990-2019 (TWh)



Solid Fossil Fuels, Peat, Oil Shale and Sands

Renewables and Biofuels

Nuclear

Natural and Manufactured Gases

Oil and Petroleum Products

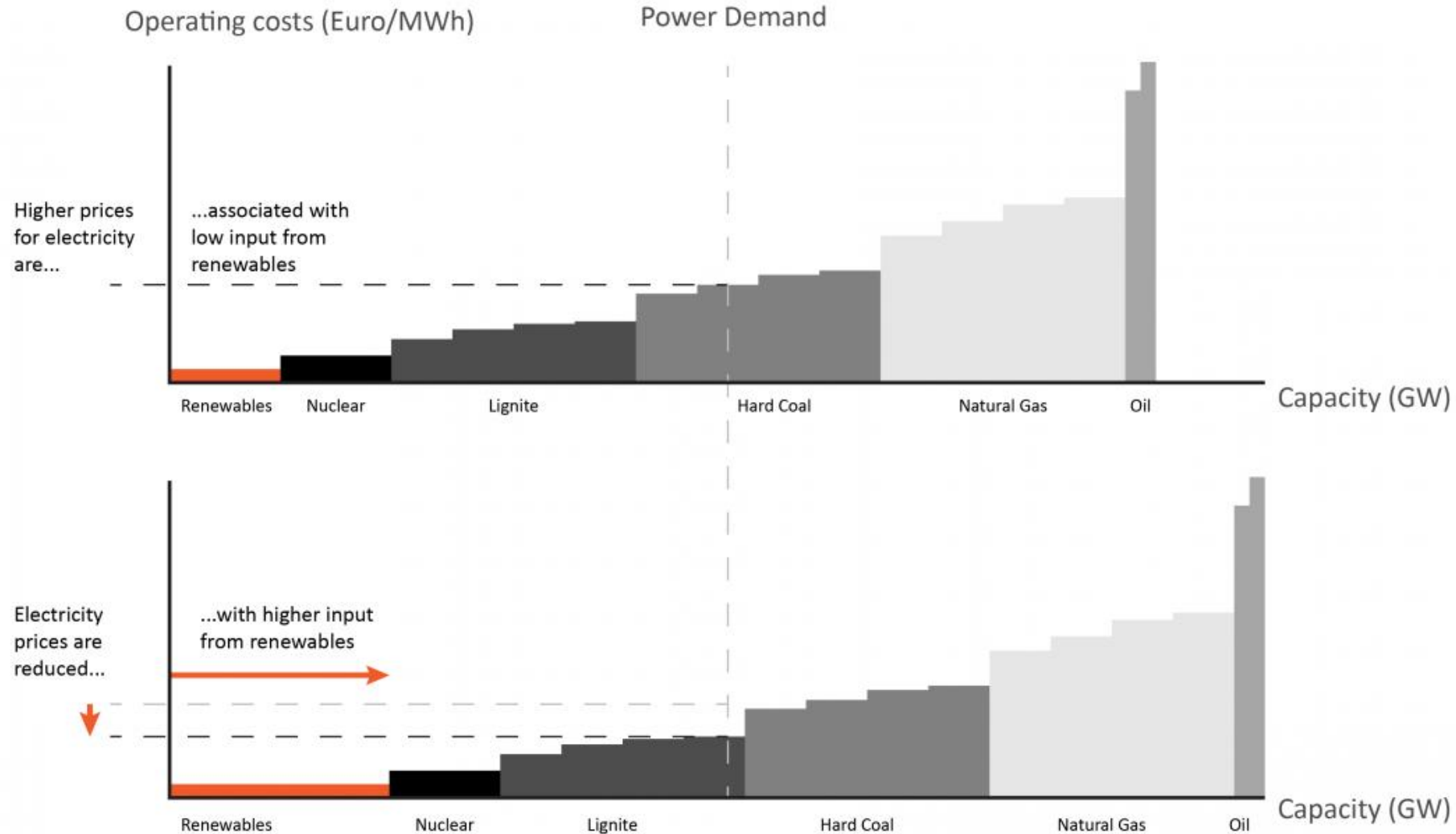
Wastes non-RES

RES impact on electricity price

Simple explanation: Subsidized RES electricity is pushing the price down.

Elaborated explanation: Merit order effect.

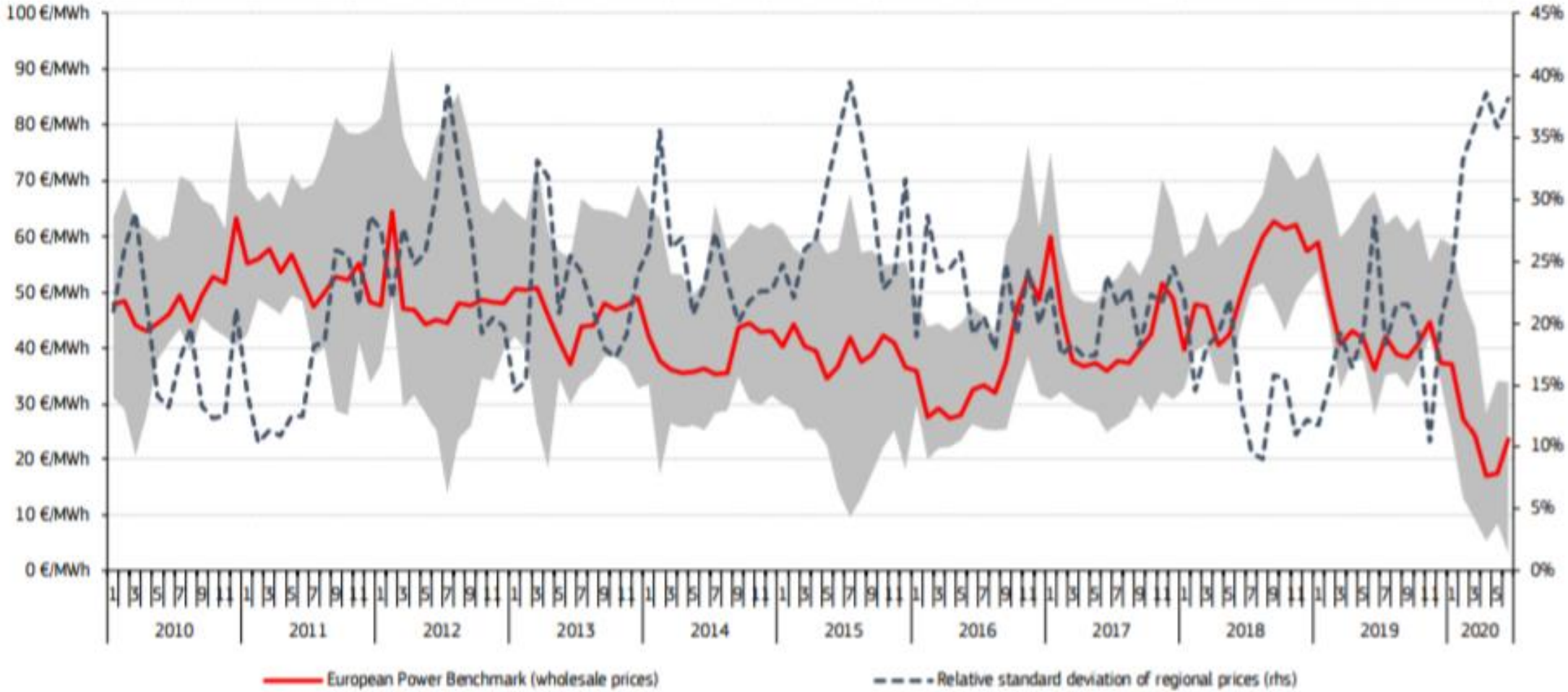
Illustrating electricity price fluctuations due to the Merit Order Effect



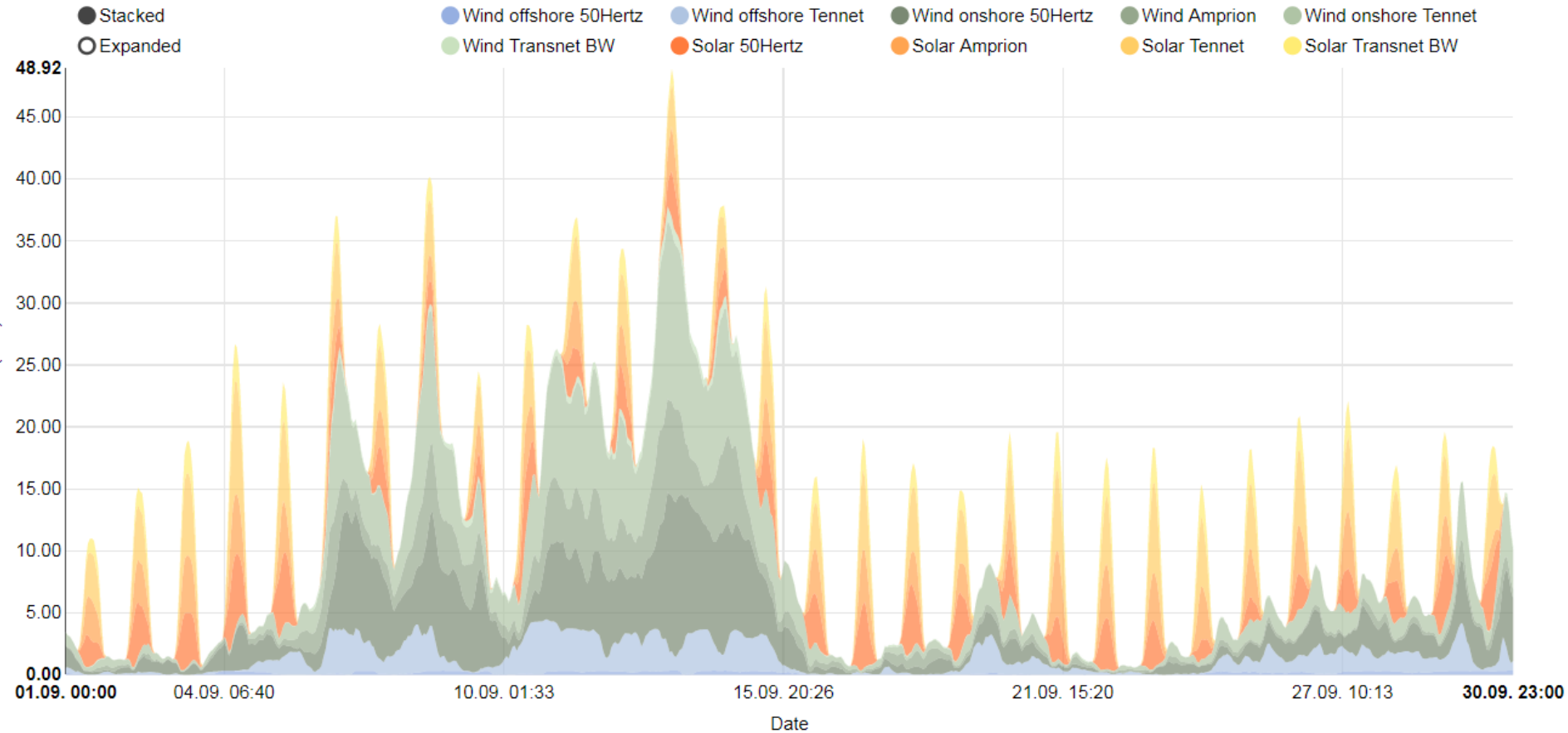
RES impact profitability of traditional sources

- = They drive the prices down.
- = They limit the time when other generators can make money.
- = They force the traditional sources to retire.
- = They prevent new (dispatchable) sources to be built.

EU wholesale electricity prices

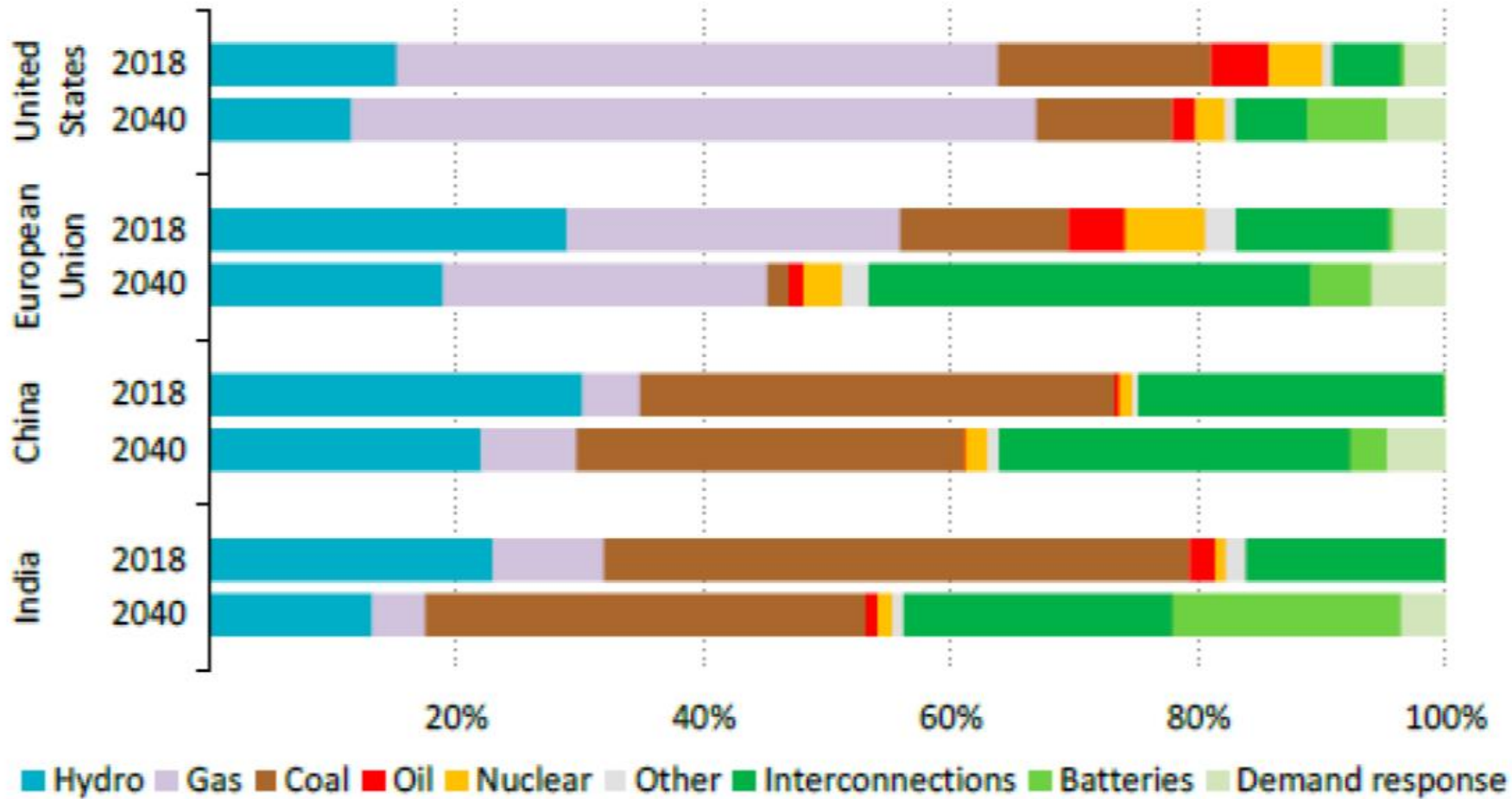


Production from non-dispatchable RES, Sept 2017, Germany



Datasource: 50 Hertz, Amprion, Tennet, TransnetBW, Netztransparenz.de
Last update: 25 Oct 2017 09:08

Sources of flexibility in the EU and other regions



Solution 1. Energy-only market

- Generators paid solely on the basis of the volume of power they produce.
- Peak loading pricing theory = capacity adequacy is maintained because prices will rise if market players anticipate an impending shortage and invest accordingly.
- New concept, little experience if any.
- 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.

Solution 2. Capacity mechanisms

= capacity remuneration.

- To solve the problem of weak investment incentives.
- They replace market-driven investment with „central planning“ – considerable regulatory risk and cost for investors and consumers.
- Usually not open for the cross-border participation.
- Strategic reserves – not participating on the market, only in case of emergency.

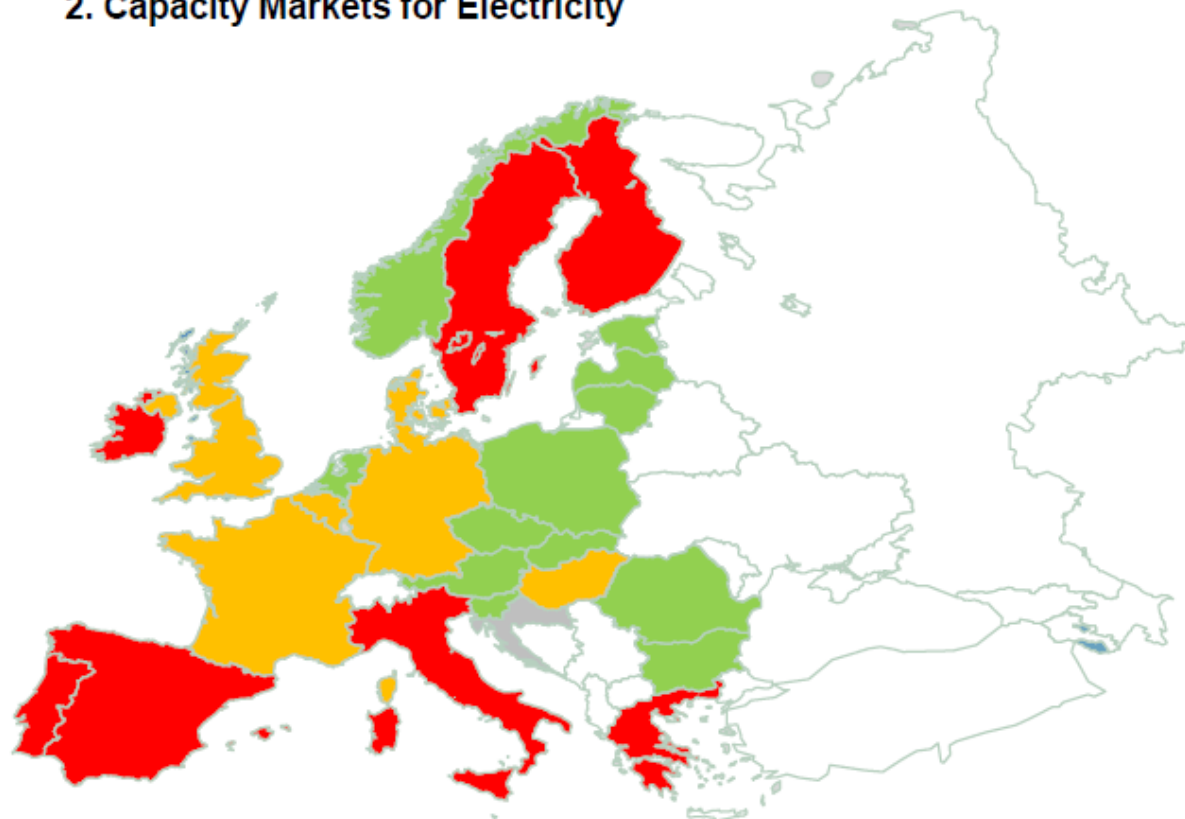
Capacity mechanism/payments

2. Capacity Markets for Electricity

Energy Only
Market

Capacity Market
under
construction

Capacity Market
operational



Clean energy for all citizens, 2019 (electricity market desing part)

- 30.11.2016, about 3500 pages. Significant reconstruction of the EU power market. The implementation started in 2020.
- To facilitate clean energy transition, cut CO₂ emission by at least 40% by 2030, incentivize cross-border trade, to increase the efficiency target from indicative 27% to mandatory 30%.
- To remove price caps and price regulations; harmonization of network tariffs setting rules, removing priority dispatch for bigger RES capacities (over 0,5 MW).
- Reinvesting congestion rents to network investments.

Clean energy for all citizens, 2019 (electricity market design part)

- Regional operational centers (regionally integrated TSOs) to coordinate capacity calculations, regional sizing of reserve capacities, facilitate regional procurement of balancing, outage planning...
 - Capacity mechanisms acknowledged but restricted – non-discriminatory, consulted with neighbours, open to non-domestic capacities, no fossil plants with emission over 550 gCO₂/kWh (no coal without CCS).
 - Powers to the consumers on retail markets.
 - New powers to ENTSO-E, ACER, regional centers, DSOs...
- = RES are assumed to be fully competitive, unsubsidized sources of electricity with standard rights and obligations on the power market.

Renewable electricity and existing system

Tension between the EU aim of a) freely operating single market and b) ambition to secure (by regulatory means) low-carbon energy system.

Sources

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