Bidding zone configurations in the German power market

What are the impacts on the current system?

Thorsten Lenck

Energy Innovation Summit, Berlin, June 24, 2025

Agora Energiewende

About us

Who we are:
Agora Energiewende is a think tank, policy lab, and part of the **Agora Think Tanks**

What we do:
We develop scientifically sound and **politically feasible strategies** for a successful pathway to **climate neutrality** in the power and buildings sector – in Germany, Europe and internationally

How we work:
We are independent and non-partisan, with a diverse financing structure – **our only commitment is to climate action**

Where we take action:
Agora Energiewende has offices in Berlin, Brussels, Beijing and Bangkok, and cooperates internationally with more than 20 partner organisations

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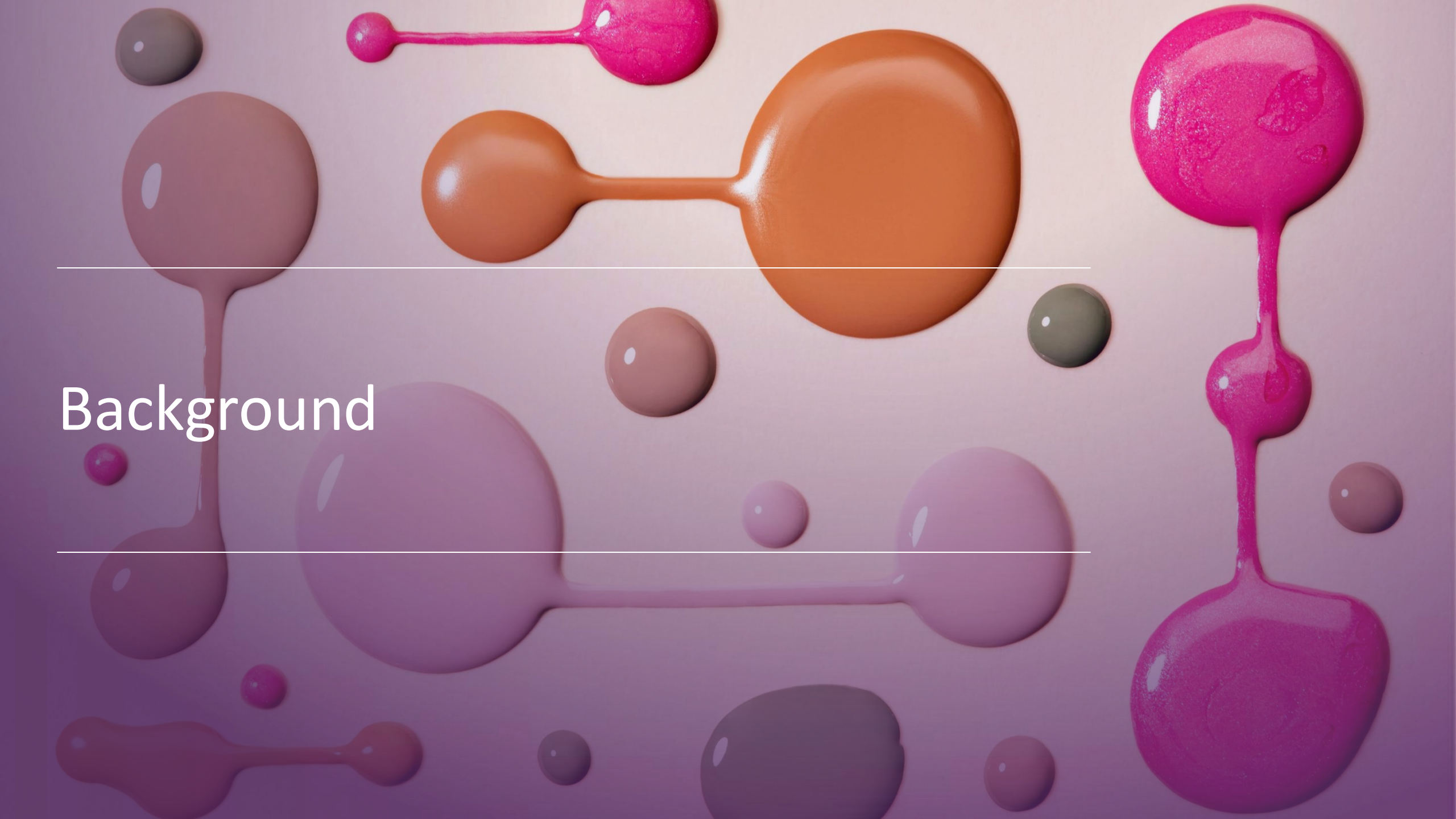
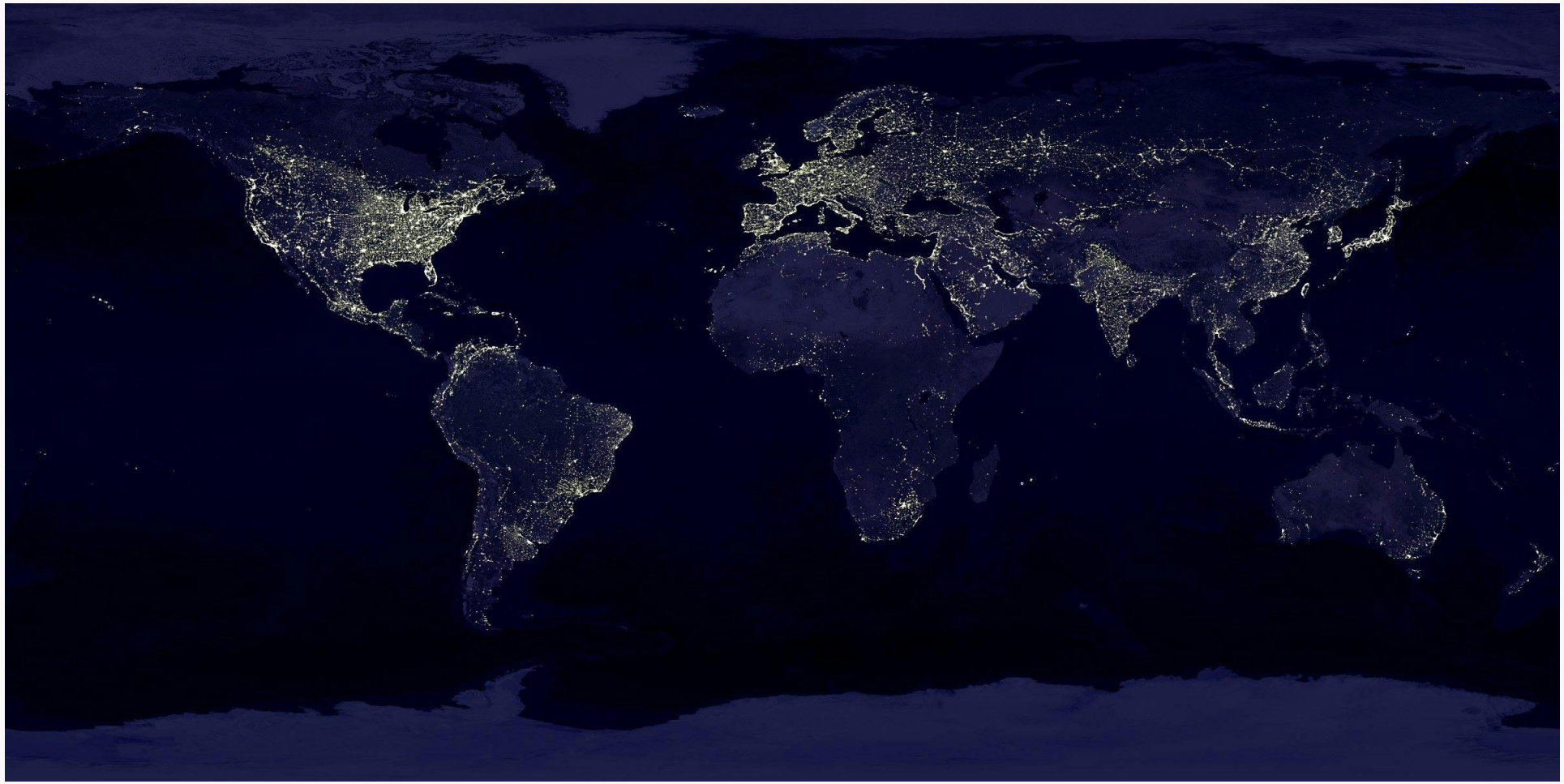


Background

Three major (physical) trends will continue to fundamentally reshape the power system – worldwide.



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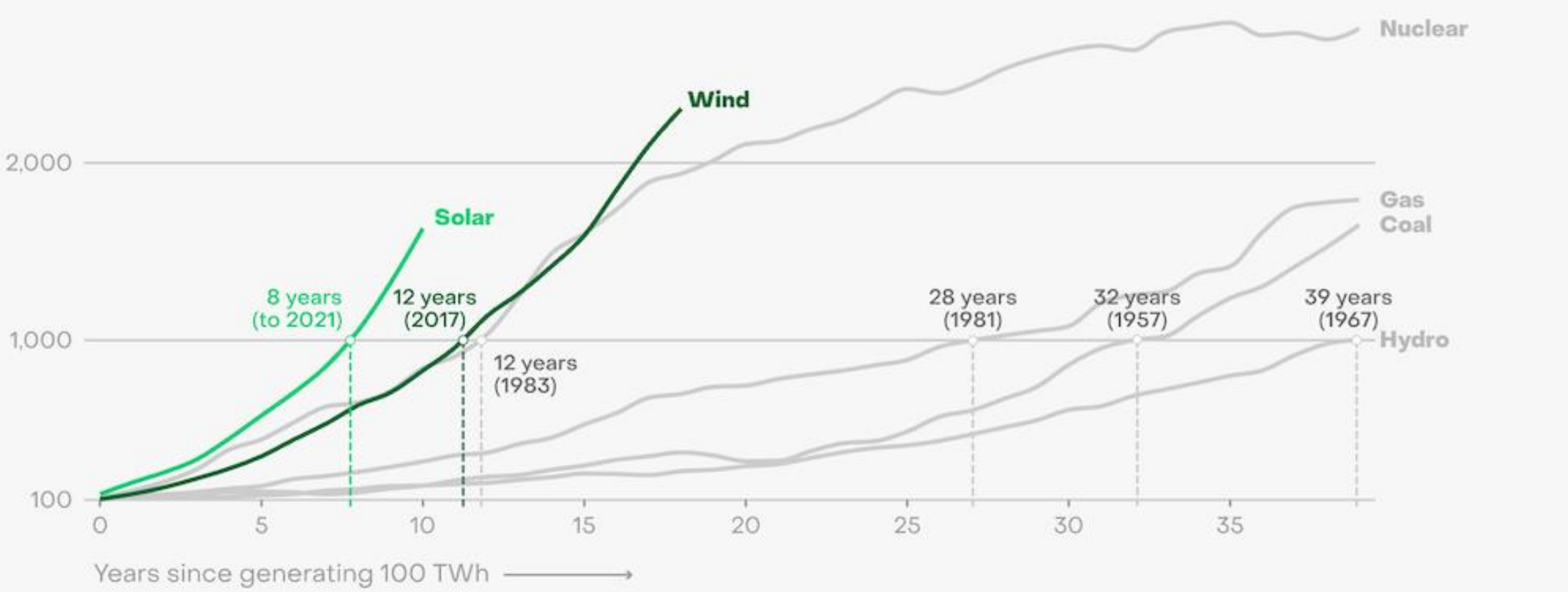
Trend #1: The strong and continuing growth of solar and wind.

Global electricity generation, by technology [TWh]



 Ember (2023) in https://www.carbonbrief.org/wind-and-solar-are-fastest-growing-electricity-sources-in-history/

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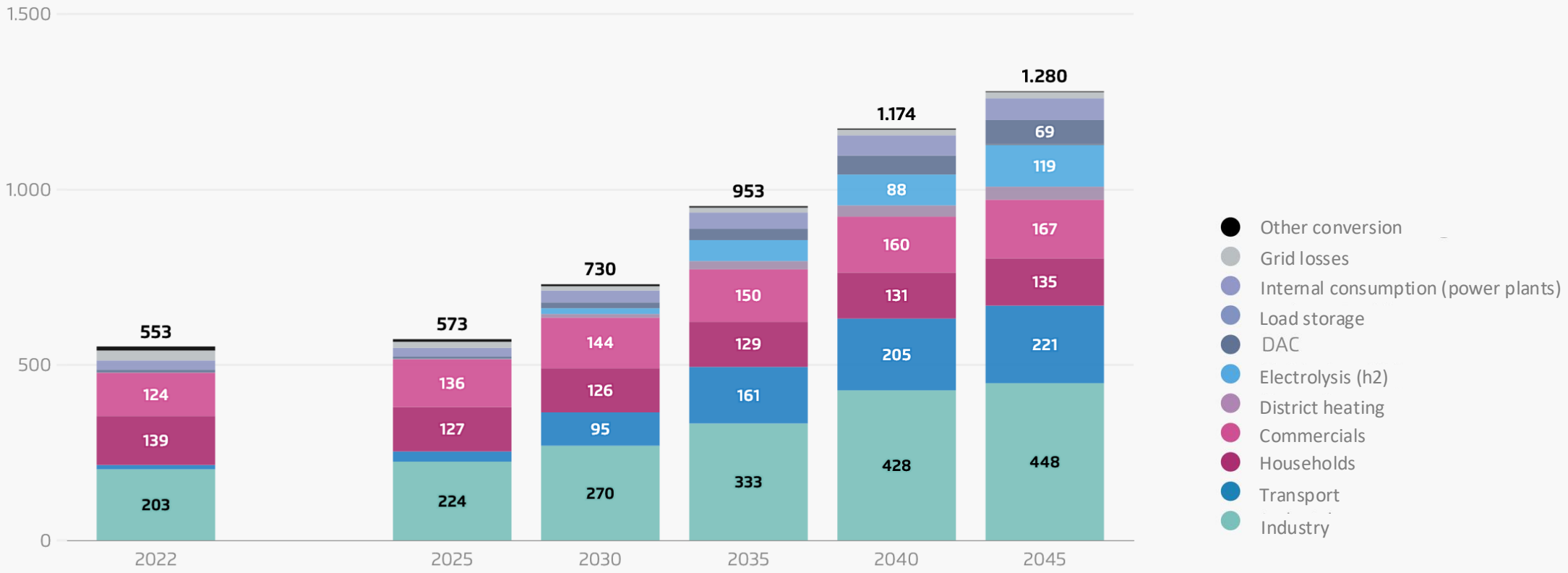
Trend #2: Increasing electrification as the cornerstone of decarbonization – across industry, transport and buildings.

Case study: Climate-neutral Germany
Gross electricity consumption [TWh]

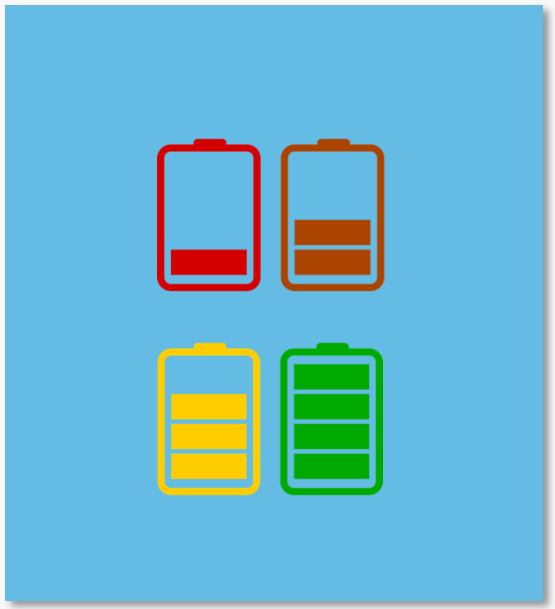


Trend #3: Decentralized flexibility is emerging as a major player in the electricity system.

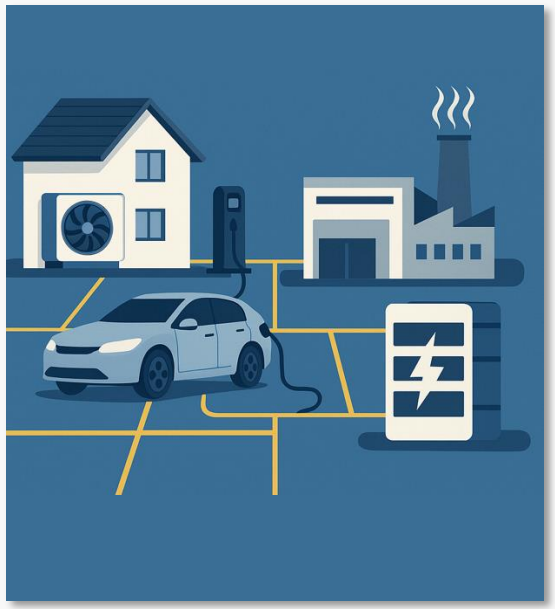
Examples for decentralized flexibility

Heating/cooling
+ thermal storage

Electric vehicles
(bi-directional)



Battery storage

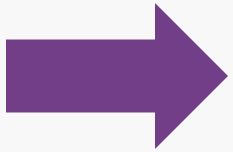


Demand response (in
new industry processes)

All three trends impact physically the temporal and spatial patterns of both, generation and consumption.

Trend

1. Solar and wind
2. Electrification
3. Decentralized flexibility



Impact on the electricity system

Shift in time and location

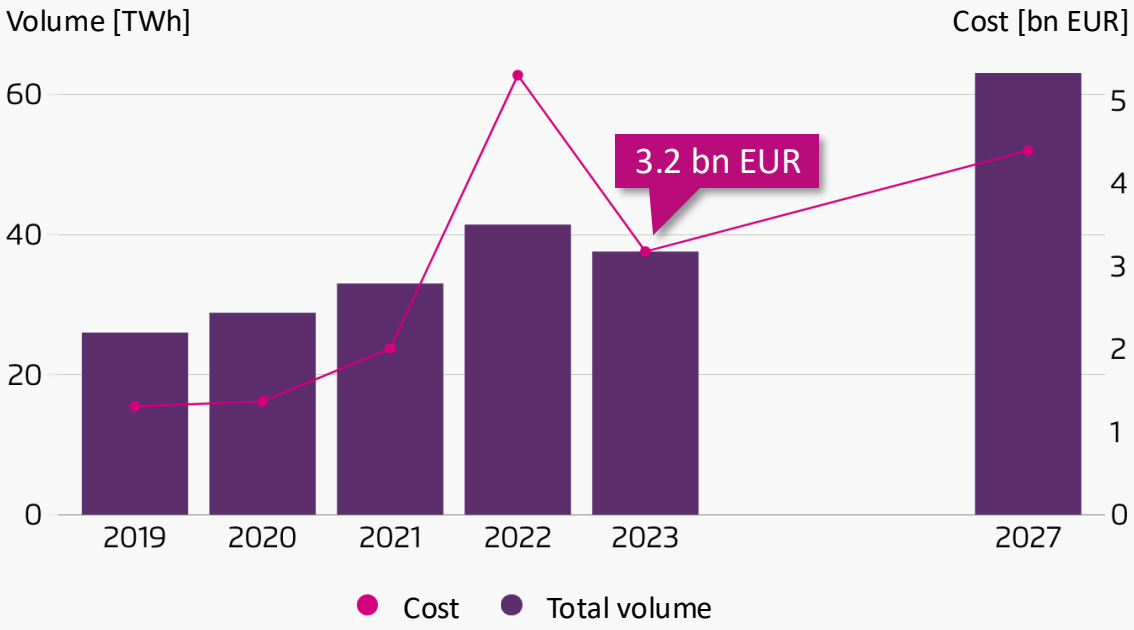
Therefore, physical developments lead to ongoing discussion of better market design options.

Bidding zones and locational prices: Impacts on the current system

Single bidding zone in Germany – the Debate

Why is it urgent?

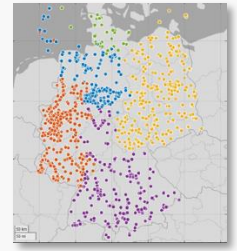
Historical volumes and costs of grid congestion management 2017 to 2023 and forecast 2027



Why is it discussed now?

→ Prominent economists published a plaidoyer for local pricing

→ ENTSO-E's Bidding zone review cautiously proposed conditional split into 5 zones



→ Coalition treaty positioned government against transforming the single bidding zone: *"We are sticking to a single electricity bidding zone."*

 Quelle links: Bundesnetzagentur (2024a), Bundesnetzagentur (2024b) • Gesamtvolumen umfasst konventionellen und erneuerbaren Redispatch, Countertradiung und Netzreserve.

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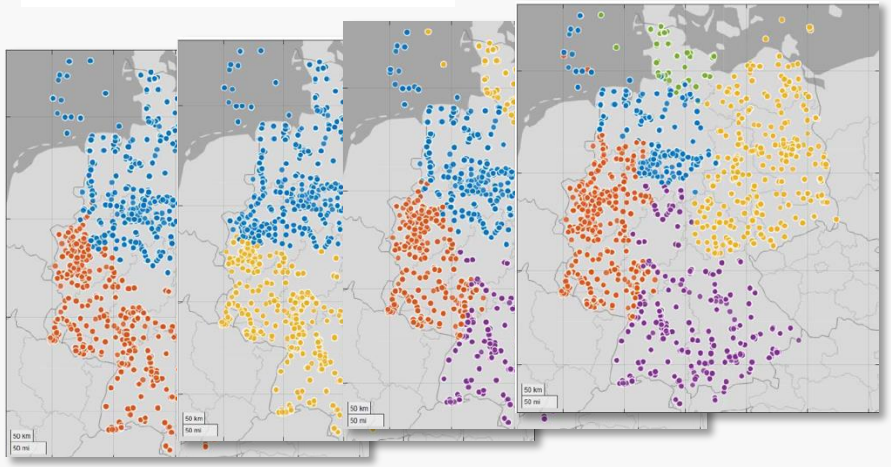
Review of the configuration of European bidding zones every 3 years; Agora study and tool provides new basis for analysis and discussion

Bidding Zone Review

Goal: Review configuration 2025

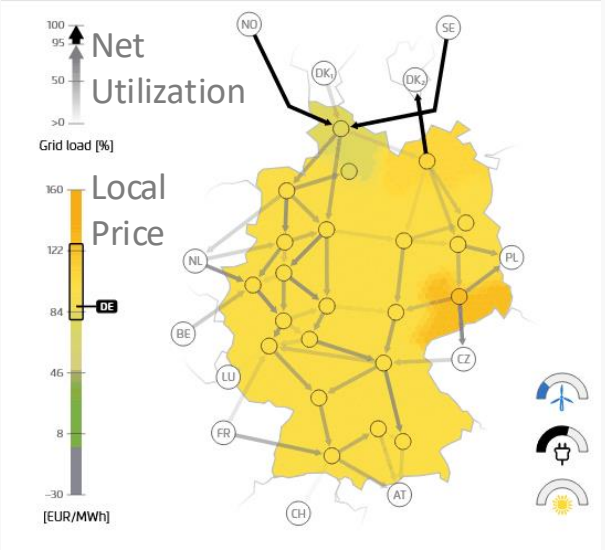
ACER
European Union Agency for the Cooperation of Energy Regulators

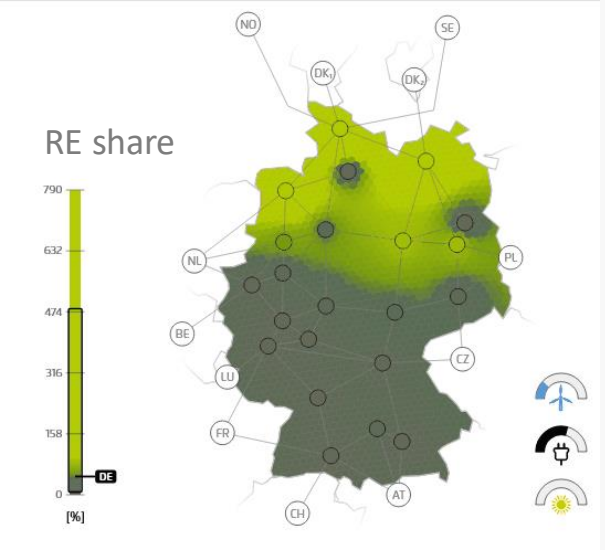
15 YEARS OF entsoe
ELECTRIFYING EUROPE



Local Agorameter tool + study

Basis for analysis and discussion: data for 22 hubs





Objective: Informed debate on the successful further development of the electricity market

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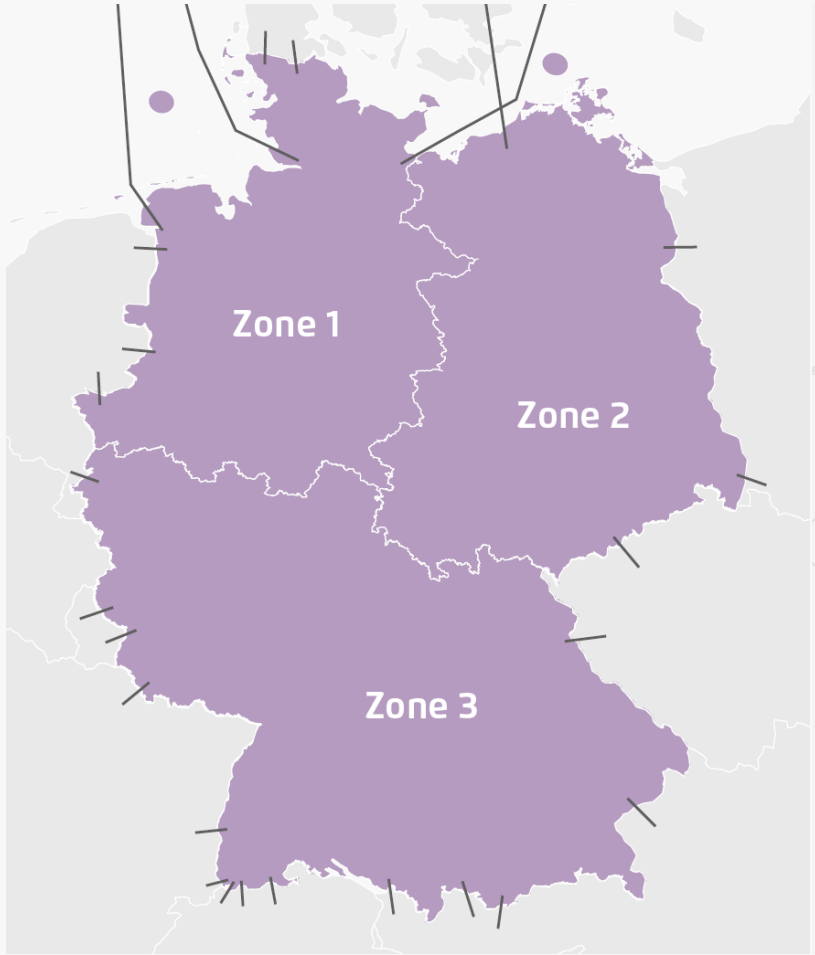
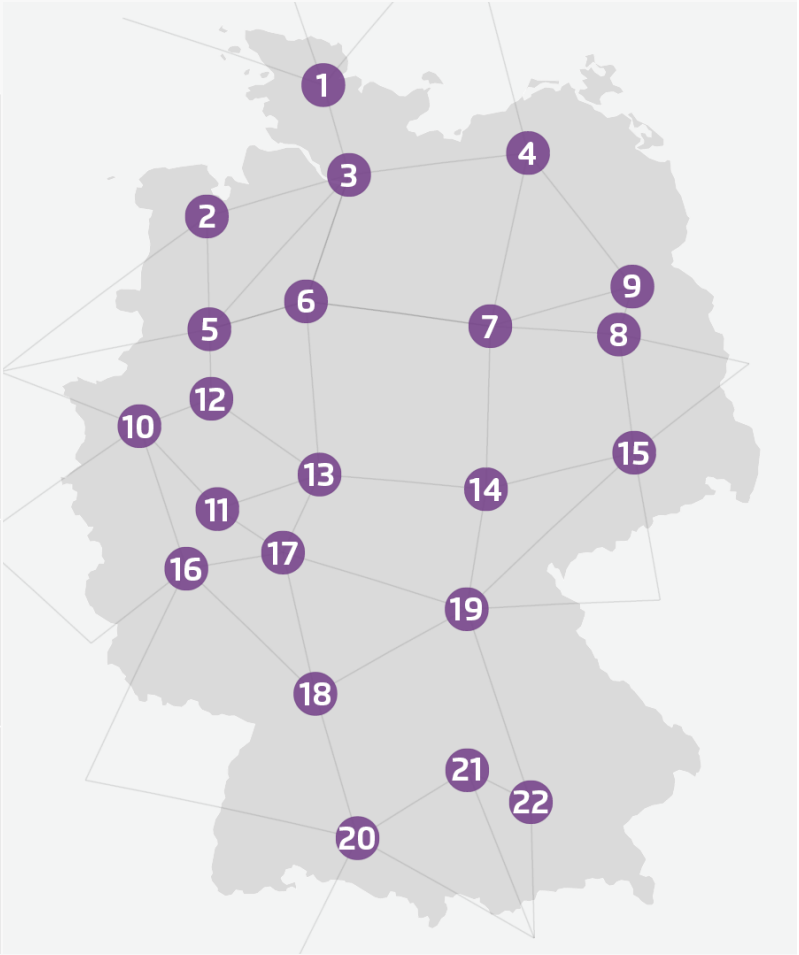
Agora study and live tool for a debate on a cost-efficient electricity market design. Variants examined.





Study for 2019 to 2023

- → No future scenario for a single electricity price zone, three zones and 22 hubs (local electricity market design)
- → Tool for 2019 to live only for local electricity market design; forecasts for mapping the day-ahead market
- → Market & grid simulation, modelling of redispatch volumes and cost
- → Selection of 22 hubs with the goal of a congestion-free power grid 2019 - 2023

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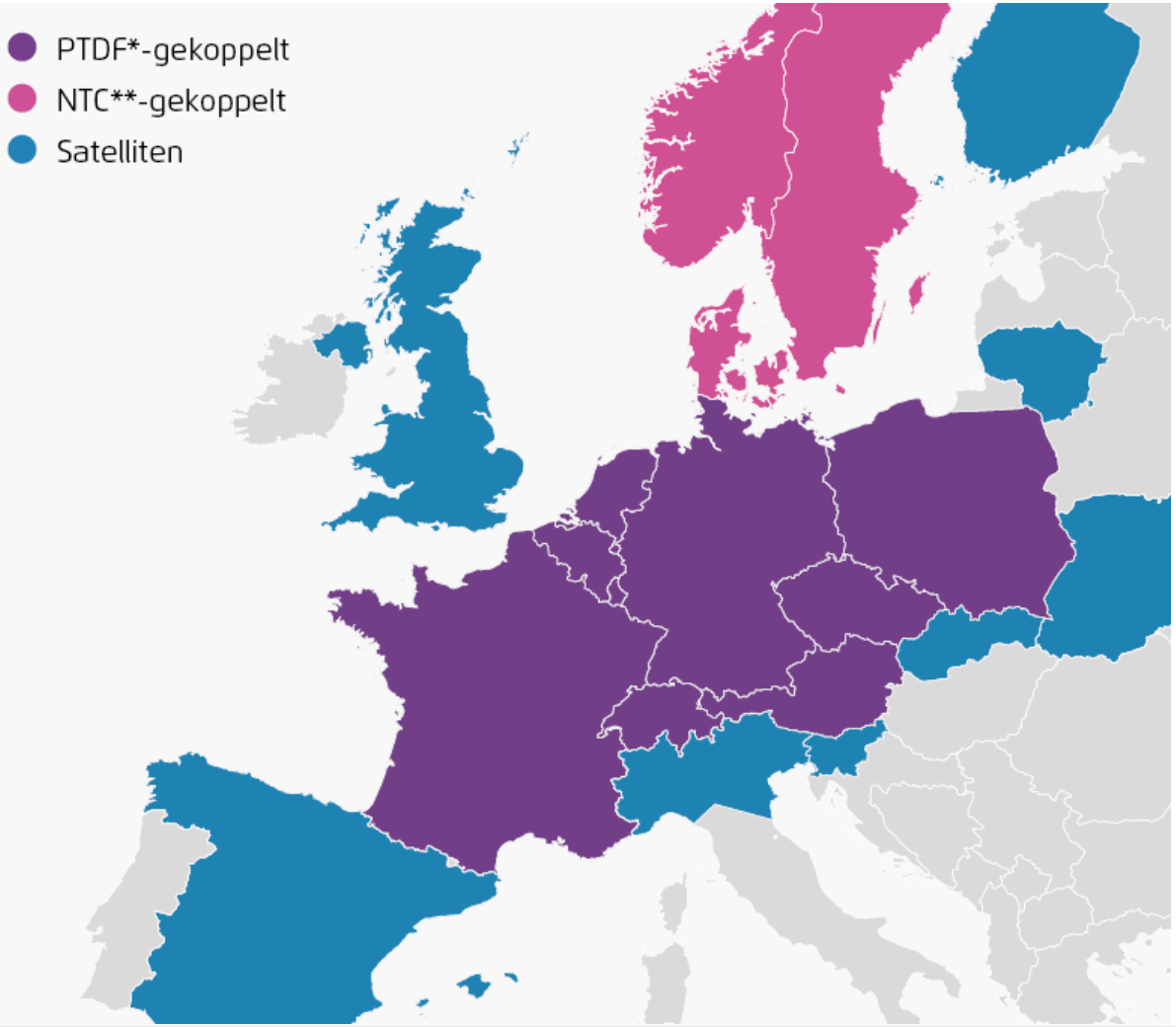
Modeling of the European electricity grid and market, Highest modeling accuracy in Germany



→ Electrical neighboring countries (PTDF and NTC):

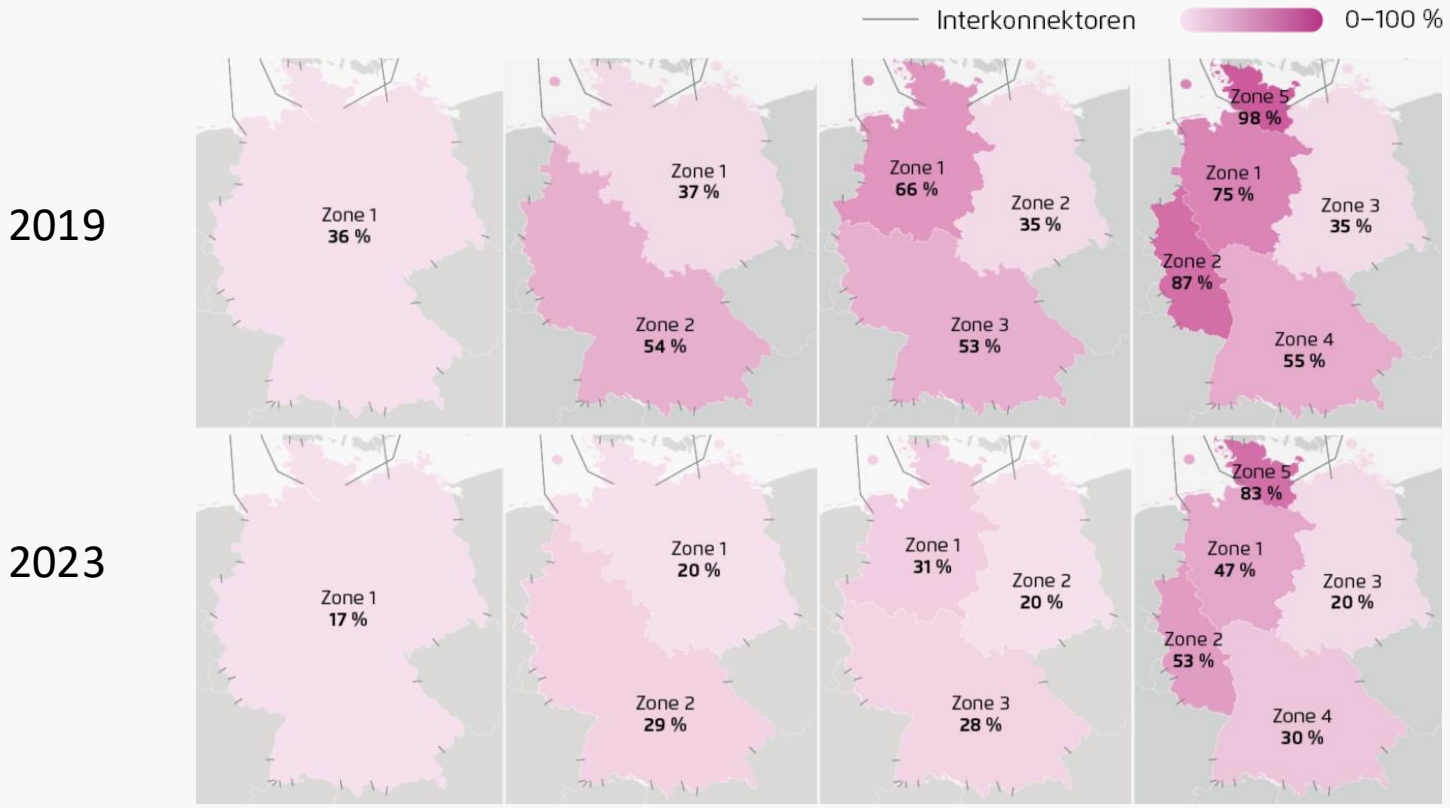
- Market simulation of today's zones, power plant deployment RE generation and electricity consumption
- Simplified grid simulation, focus on cross-border lines

→ Satellites: Consideration of the published export/import flows

→ A total of 30,000 time series as input data

Result 1: The smaller the bidding zones, the more targeted the redispatch can be avoided: three zones are not sufficient in the long term

Electricity price convergence: Proportion of hours per year in which the prices of the modeled hubs within a zone match to within +/-1 EUR per MWh



- The division into three zones would not have resulted in a substantially lower redispatch requirement between 2019 and 2023 and therefore does not reliably lead to a reduction in grid congestion in the current system either.*
- In alternative configurations of two to five price zones, the more local hub prices within the respective zone converge more strongly the smaller the zones become.

*This does not apply even if this would politically weaken the European obligation to provide cross-border line capacity for European electricity trading.

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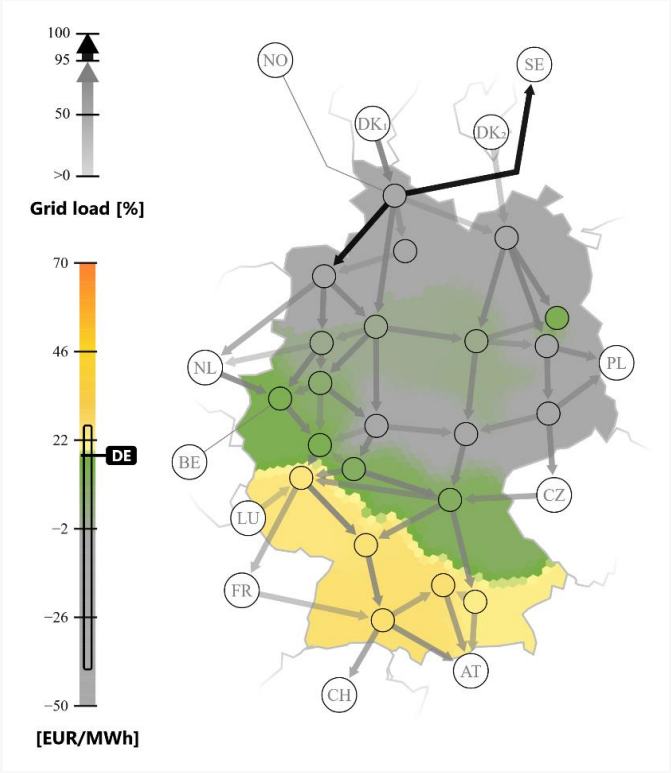
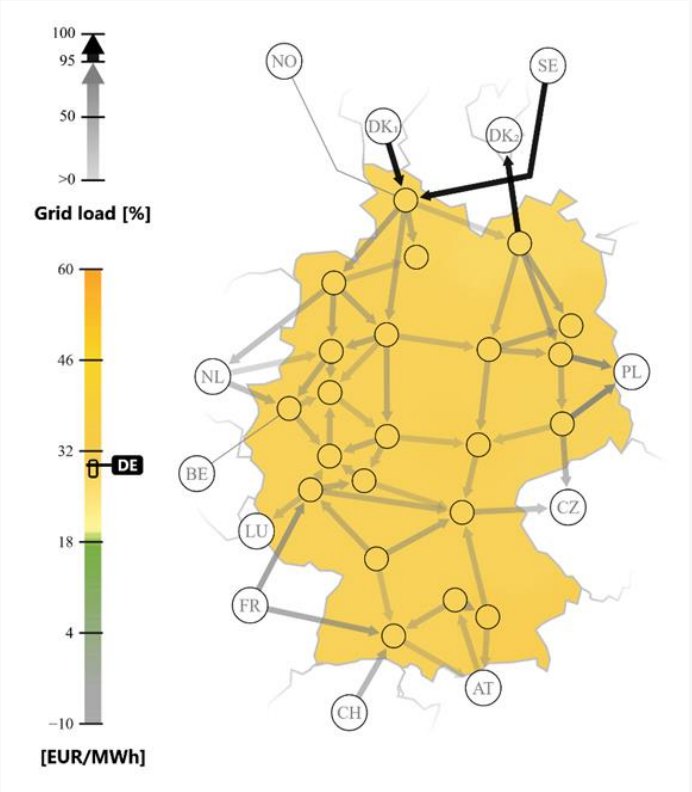
Live-tool: Visualization of exemplary situations

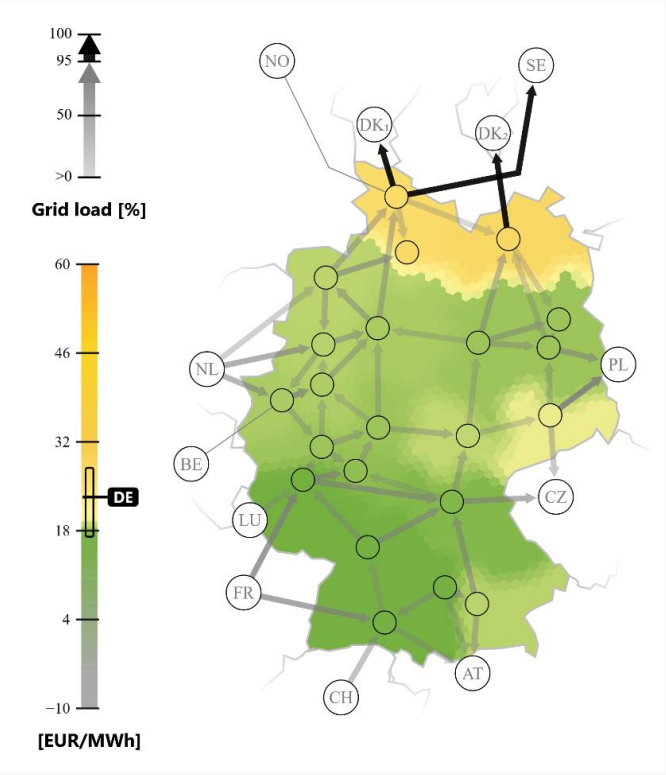
High wind feed-in



Uniform price

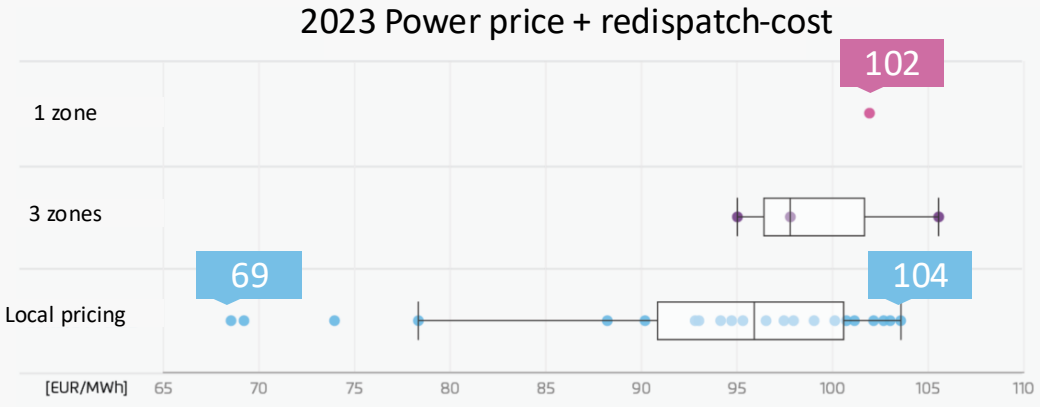


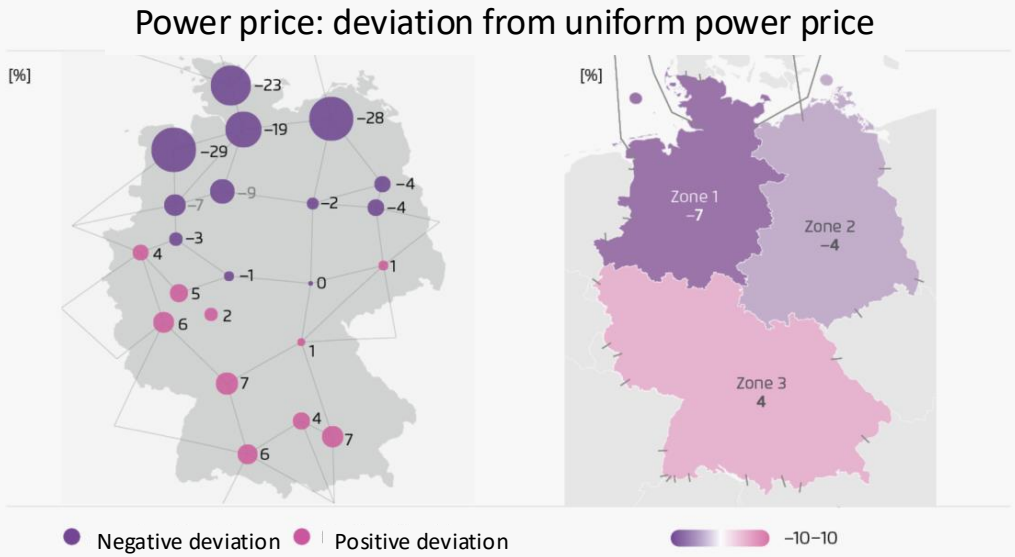
Lower prices in the south



 Local agorameter (tool): https://www.agora-energiewende.org/data-tools/agorameter/locational/map

Result 2: System of local prices leads to falling electricity prices on average.





- → At local prices, electricity costs fall in 18 of the 22 hubs and in the consumption-weighted average
- → Electricity costs: Electricity price plus the redispatch costs rolled into the grid fee (2023, one zone: 5.3 EUR/MWh)
- → **Distribution effects**: While electricity costs are falling on average and especially in the north, the price of electricity for industry in the south is rising and RE plant operators in the north have substantially lower electricity market revenues
- → **Solution**: Compensation for RE in the north via the EEG and for industry in the south via new domestic bottleneck rents

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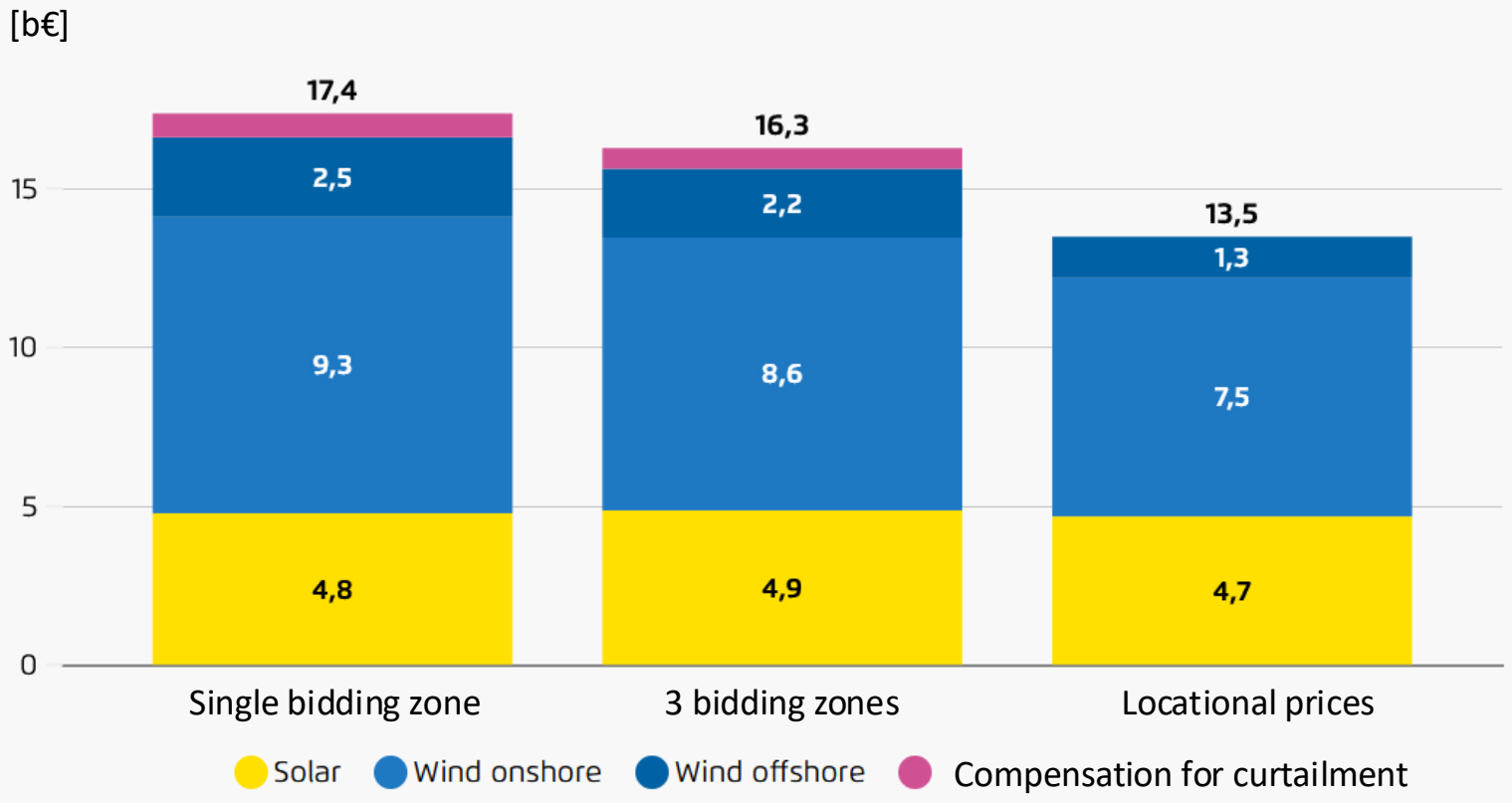
Lower electricity prices lead to falling market revenues for solar and wind in the north.

Modeled electricity market revenues and compensation payments for renewable energies, 2023



→ Operators of **existing renewable energy plants** in the north would have significantly lower market revenues in 2019 to 2023 due to local electricity markets, **compensation** (and **absorption** in the south) via the EEG account would be necessary

→ For **new renewable energy plants**, the location-specific market revenues are an opportunity to supplement the investment security of the EEG with incentives for **system-compatible site selection** through a reform.

 Agora Energiewende and Fraunhofer IEE (2025): Local electricity prices. Lower electricity costs through better market design.

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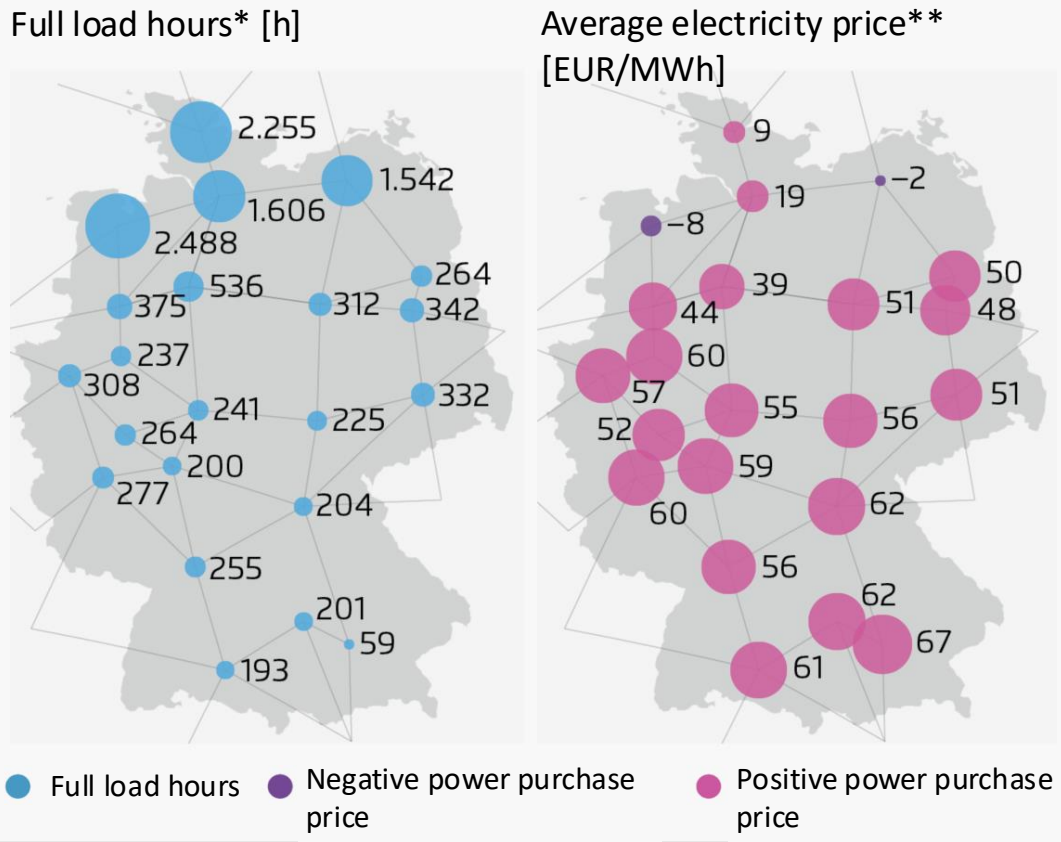
Result 3: The low local electricity price is an important investment signal

Full load hours and average electricity price for electrolyzers, 2023



- With increasing demand in the north, e.g. through investments in electrolyzers and large batteries in the north
  - the network can be used more efficiently
  - the RE electricity market revenues can be increased
- This is because local prices greatly increase the economic viability of electrolysers near electricity generation centers in the north and ensure that cheap green electricity is used for hydrogen production.
- In the vicinity of the demand centers in the south, investments in renewable energies become economical, as many flexible customers for electricity can be reached without congestions.

Agora Energiewende and Fraunhofer IEE (2025): Local electricity prices. Lower electricity costs through better market design. *For operation below 20 EUR/MWh. ** For operation of 3,000 full-load hours per year and at least 180 full-load hours per month.

Conclusion and recommendations

A comparison of the system costs from 2019 to 2023 showed that Cost-based redispatch is still a cost-effective option. But:

→ Cost-based intervention in the power plant schedules by the grid operators is an economically sensible option **only until consumers react to the electricity price on a large scale.**

→ However, flexible consumers and storage are a necessary element of the climate-neutral electricity system

➔ Locational electricity prices would…

1. systemically lower consumer electricity prices on average,
2. increase system stability through better market & grid coordination, and
3. thus, enhancing system resilience

Conclusion and recommendations

1 **The uniform electricity price in Germany is blind to the utilisation of the transmission grid and is therefore sending increasingly problematic false signals to consumers, storage systems and producers.**

2 **Local electricity prices can avoid most interventions by grid operators.**

Conclusion and recommendations

3 **The introduction of local prices would reduce electricity prices for the majority of consumers; disadvantaged industries could be compensated without additional funding.**

4 **A locally organised electricity market increases the cost efficiency of a climate-neutral electricity system.**

The German government should develop a roadmap coordinated at European level in the new legislative period to set out the prospects for introducing local prices. A first step could be to supplement the price zone with local investment signals. Before changing the pricing system, liquid futures trading for local electricity markets should also be established and the economic viability of investments in renewable energies secured across the country.

Thank you!

Do you have any questions or comments?

Thorsten Lenck
Thorsten.Lenck@agora-energiewende.de

www.agora-energiewende.de