Aurora Keynote:

Energy transition in Europe: revolution or evolution?

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Record-breaking energy prices created pressure to fundamentally reform the European power market design …

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Monthly spot power and gas prices
EUR/MWh

"We need to have a discussion about the market design in which the marginal power plant sets the price for everyone. This worked perfectly for the past 20 years, but suddenly it does not. This discussion is coming with force, and one must say, it does have some merit.

"This market system does not work anymore. We have to reform it. We have to adapt it to the new realities of dominant renewables.

"The formation of wholesale electricity prices should be decoupled from the high volatility of gas prices by having an "emergency brake" that would split the price-setting mechanisms of electricity markets.

Sources: Aurora Energy Research

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… however, by the time substantial proposals were presented, prices had returned to relatively normal levels

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Monthly spot power and gas prices
EUR/MWh

Greece: CfDs & marginal prices

- Greece adopted a price cap for the electricity market
- As a long-term solution, the government proposed to **split the wholesale market** into two parts:
  - **Inflexible technologies:** Compensation based on CfDs
  - **Flexible technologies:** Marginal pricing

Spain: CfDs & capacity markets

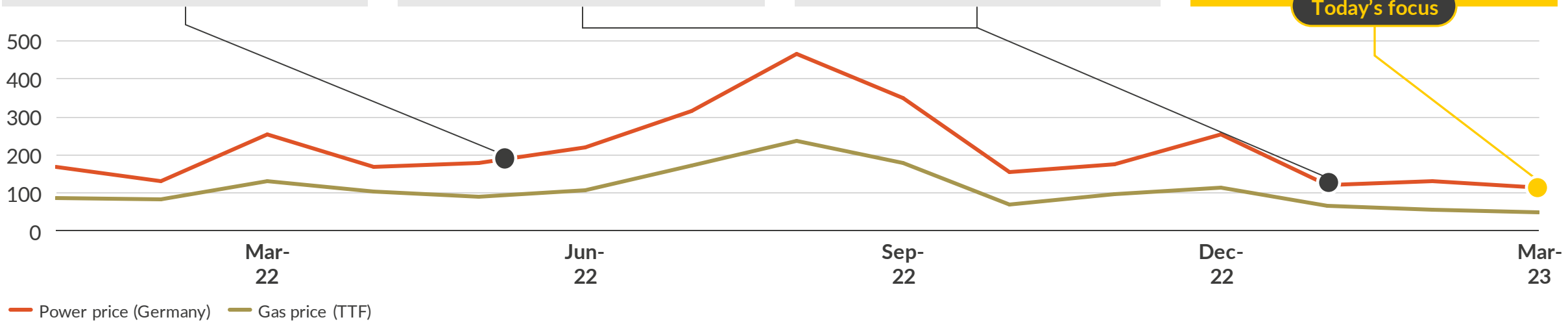
- The Spanish proposal for the long-term electricity market proposes **three main elements**:
  - **Renewables:** Voluntary CfDs for new and existing
  - **Nuclear & hydro:** Forced CfDs
  - **Conventional:** Capacity market

France: Post-market fund

- The French proposal maintains marginal pricing for all technologies
- But it proposes a **fund to redistribute revenues** above full costs from low carbon generation assets to consumers proportional to their consumption **post-market**

EU: Supporting existing market

- Also the new European commission proposal maintains **marginal pricing** for all technologies
- Instead of altering the fundamental market design, the proposal targets to strengthen **long-term markets** and **flexibility** and to enhance **consumer protection**



Sources: Aurora Energy Research

The European Commission proposal focuses on three key areas, but remains unspecific on capacity adequacy and local price signals

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Topic	European Commission Proposal	How drastic is the change?
1 Promoting long-term markets	**1 For producers** ▪ Two-way **CfDs** as direct price support scheme for new renewables preferred, but no details on implementation **2 For producers/consumers** ▪ **Strengthening PPAs** by incentivising the combination with CfDs and providing insurance for PPA offtake ▪ **Strengthening long-term hedging** by ensuring appropriate strategies for suppliers and establishing virtual cross-country hubs	Market-based ↔ Regulated
2 Promoting flexibility	**1 Improve wholesale markets** ▪ **Gate closure time** of intraday markets closer to delivery ▪ Lowering **minimum bid size** **2 Flexibility support** ▪ Better **incorporation** of flexibility **in capacity markets**, or direct **flexibility support schemes** **3 Peak shaving** ▪ New **peak shaving product** to **subsidise demand response**	
3 Consumer protection	**1 Peer-to-peer trading** ▪ Consumers have **right to share electricity** with other consumers **2 Security of long-term supply** ▪ Consumers have the right to access multiple tariffs and a **right** to both a **fixed price, fixed term** and a flexible **tariff** ▪ Member States obliged to appoint **supplier of last resort**	
4 Capacity adequacy	x **Not covered**	
4 Local price signals	x **Not covered**	

Deep Dive ↔ Current European level regulation ↔ European Commission proposal

Sources: Aurora Energy Research

1 CfDs are difficult to combine with PPAs – the Polish CfD scheme can serve as an inspiration but also faces challenges

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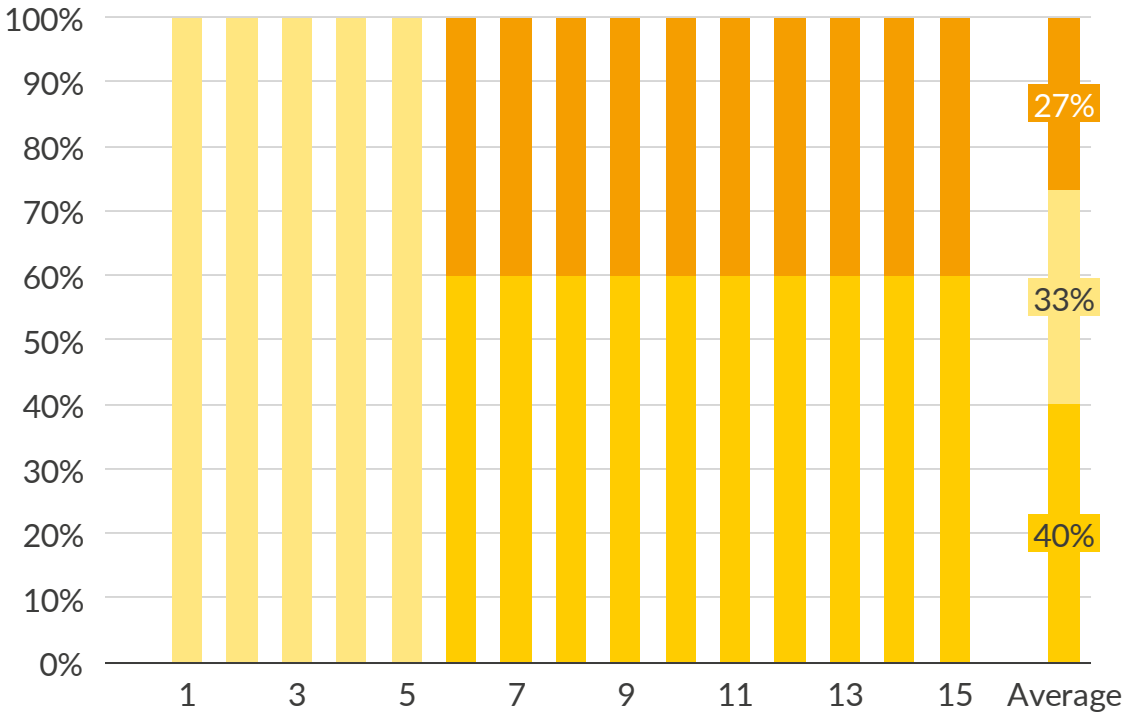
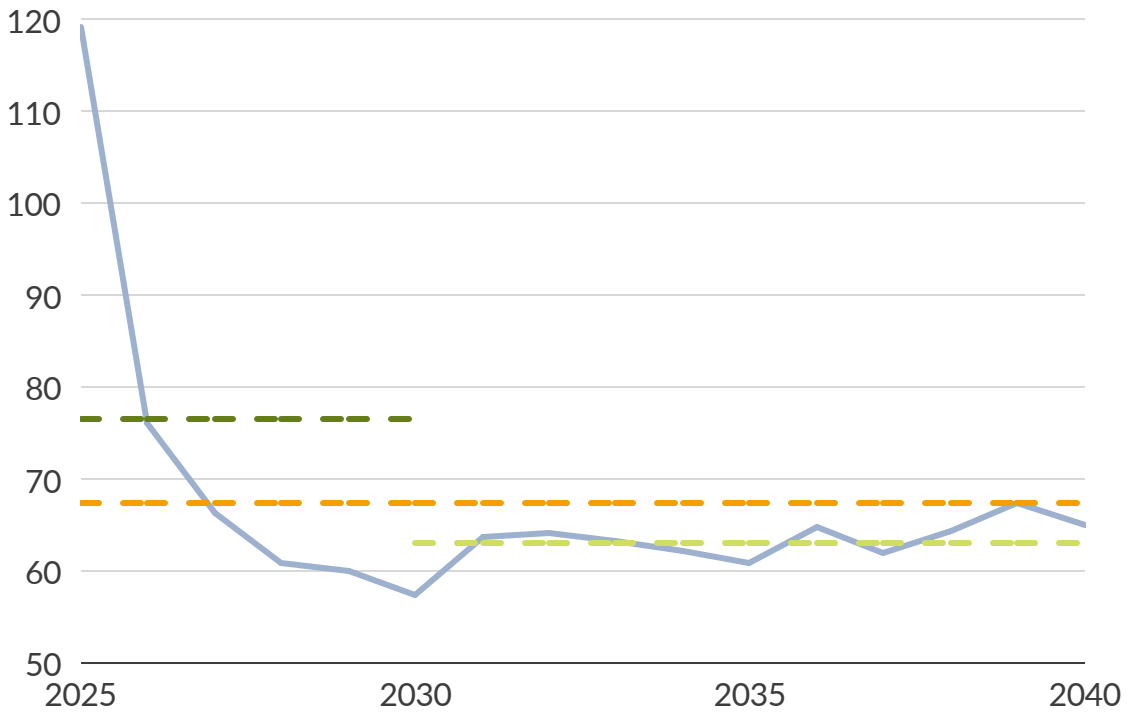
Illustrative share of revenues under the CfD scheme in Poland
% per year



- The Polish CfD scheme allows varying the amount of generation placed under the CfD annually
- This has led to developers increasing their market exposure in the short term through signing PPAs, which could be a model for other markets

Merchant PPA CfD

Onshore wind capture prices and wholesale market opportunity costs
EUR/MWh (real 2022)



- Expected wholesale market capture prices form the opportunity costs developers will take into account in both PPA negotiations and CfD bids
- By allowing the combination of PPAs with CfDs, the state likely foregoes near term revenues, but may achieve lower PPA prices in the longer term

Onshore Central CfD w/o PPA PPA CfD w/ PPA

Sources: Aurora Energy Research

2 The Commission proposal risks losing distributed demand flex potentials, while privileging demand response at the cost of other flex sources

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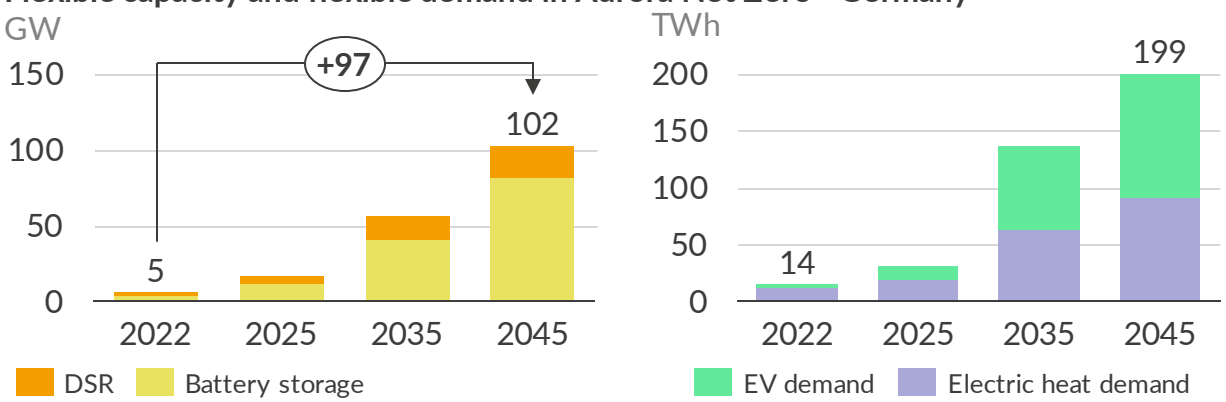
Flexible capacity and flexible demand in Aurora Net Zero - Germany

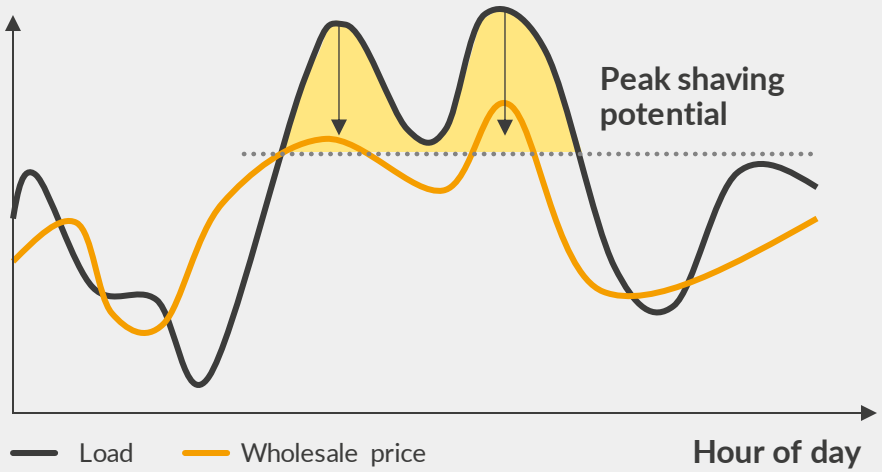


Germany alone requires 100 GW additional flexible capacities to reach Net Zero in 2045, which risk running inflexibly if faced by fixed retail tariffs

European Commission proposal

1. **Removing barriers for flexible assets to compete in wholesale markets**
   - ✓ Facilitating participation of smaller assets
   - ✗ Removing disincentivising grid tariff structures
   - ✗ Fixed retail tariffs destroy distributed flexibility potentials
2. **Targeted remuneration schemes for flexibility services**
   - ✓ Centralised support for flexible assets
   - ✓ Introduction of demand response peak shaving product

Do we need a peak shaving product?



- In a functioning wholesale market, the cheapest source of flexibility wins; by separating out certain sources, we risk increasing system costs
- Splitting peak shaving into a separate product **could even harm functioning market structures**, as revenue potentials for other flexibility services are reduced

Sources: Aurora Energy Research

3 Consumer protection is a key priority in the proposal, but measures might create adverse incentives

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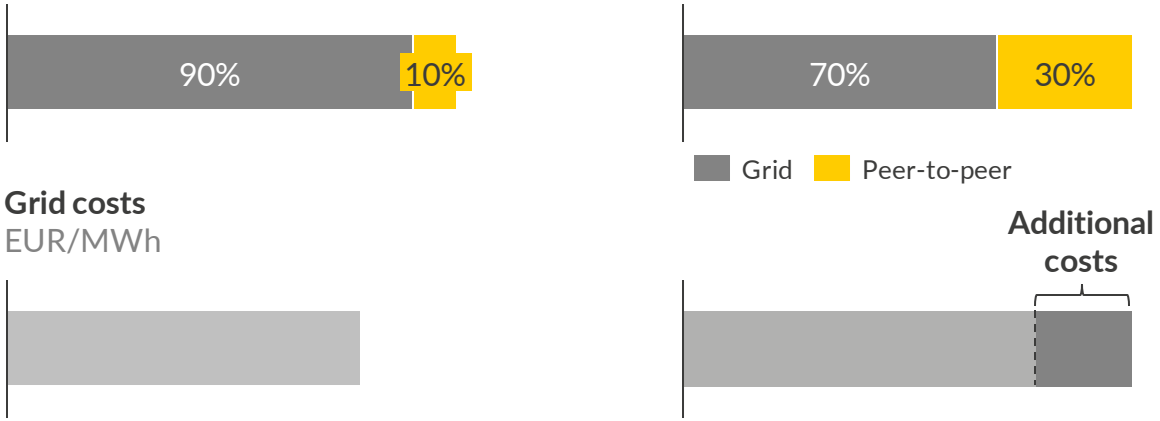
Peer-to-peer trading

Low peer-to-peer uptake | **High peer-to-peer uptake**

Market distribution – grid based vs. peer-to-peer

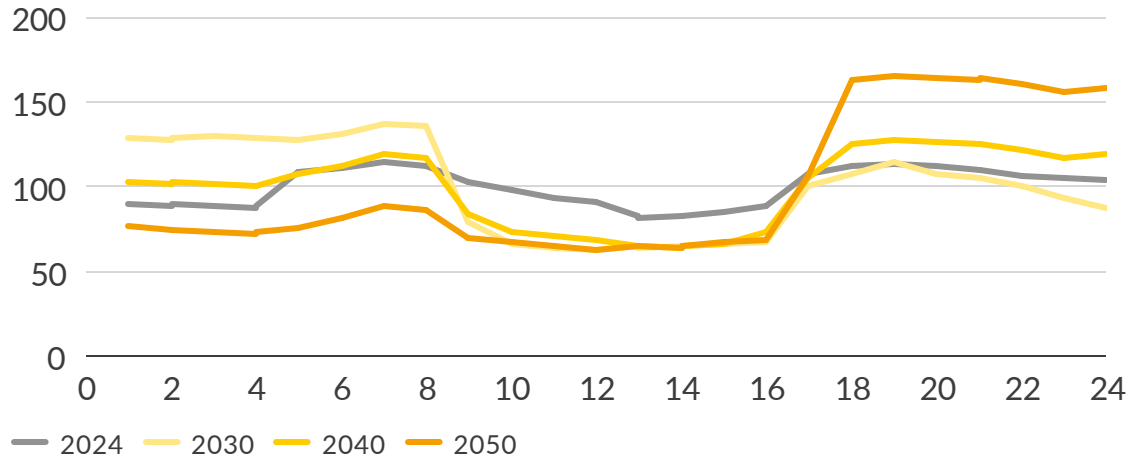


Grid costs
EUR/MWh

- **Peer-to-peer trading can improve consumer resilience against high and volatile wholesale electricity markets**
- **However, it can lead to system cost arbitrage if not designed correctly:**
  - With fewer consumers using the grid, this will increase the burden shared across the remaining consumers
  - This is in turn will increase the incentive to avoid grid costs through peer-to-peer trading

Right for a fixed-price power tariff

Power prices Germany – Aurora Net Zero scenario
Sample day, scaled to 100



- **Fixed-term contracts can effectively shield consumers from price spikes**
- **However, they pose a risk of losing decentral flexibility potentials:**
  - With the recent crisis in mind, consumers might be less inclined to enter dynamic pricing contracts

Sources: Aurora Energy Research

4 Capacity adequacy and local price signal are not part of the proposal, but would benefit from a stronger European framework

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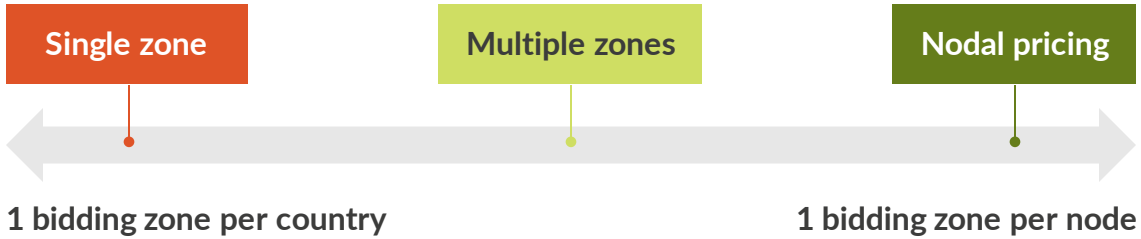
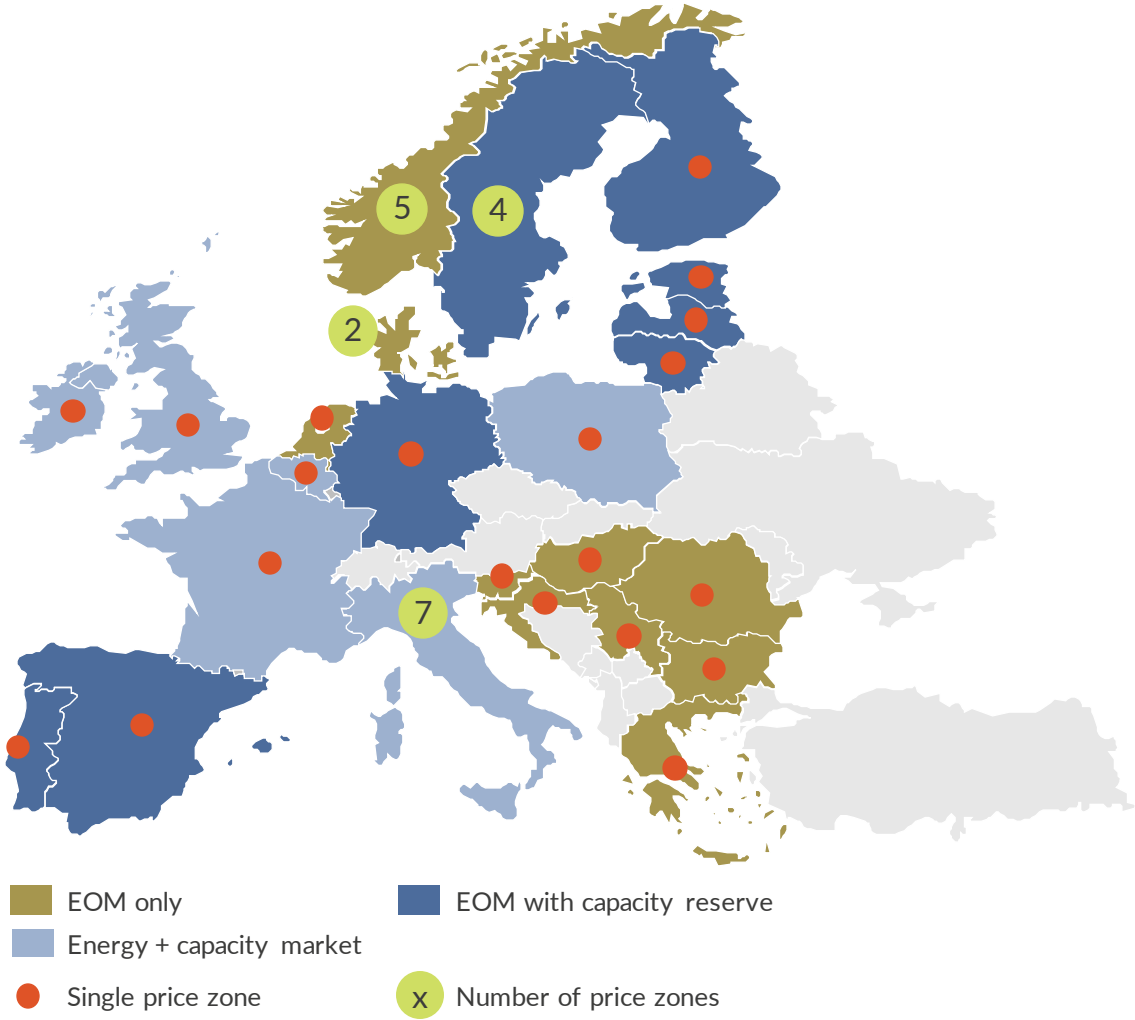
Capacity adequacy

Electricity markets are transforming towards a high share of fluctuating renewables. It is questionable whether the current market design will be able to incentivise enough firm capacity to balance out volatile generation and demand.

Local price signal

Locational pricing involves determining market clearing prices for several locations on the transmission grid, called nodes. This incentivises more efficient regional renewables deployment, helping ease grid congestion.





Sources: Aurora Energy Research

While less extreme than feared, the Commission proposal would fundamentally alter the European power market as we know it

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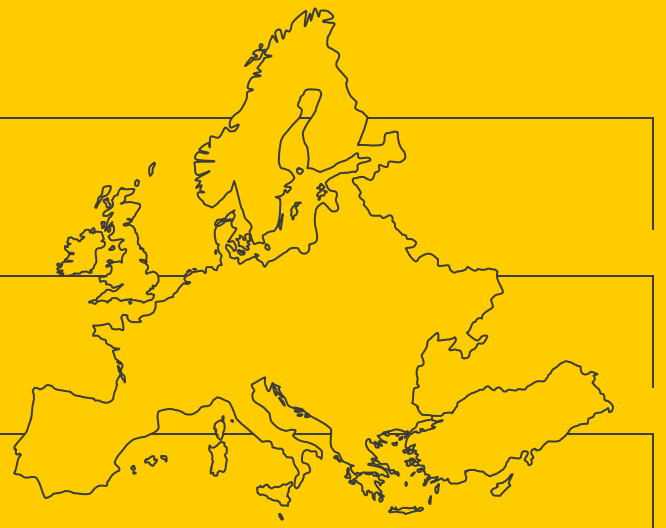

1 **The European Commission market reform proposal is less extreme than many feared**

2 **Still, it shows a strong move towards a larger role of long term markets and the state**

3 **For many of the proposed reforms, the devil is in the detail; key issues are:**

1. The proposal does not address design elements of CfDs required to prevent adverse effects on the market, and how they are to be integrated with PPAs
2. It proposes very granular measures for promoting certain flexible technologies, without addressing how these potentials will most efficiently be activated and ensuring competition between various flexibility sources
3. It presents a strong shift towards consumer protection which could negatively affect efficient market signals for flexible demand

4 **Moreover, the proposal fell short of addressing some of the bigger topics and lacks clarity on capacity mechanisms and granular pricing**

Sources: Aurora Energy Research

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