

Aurora Keynote:

The EU's & Germany's market design reforms: Implications for renewables



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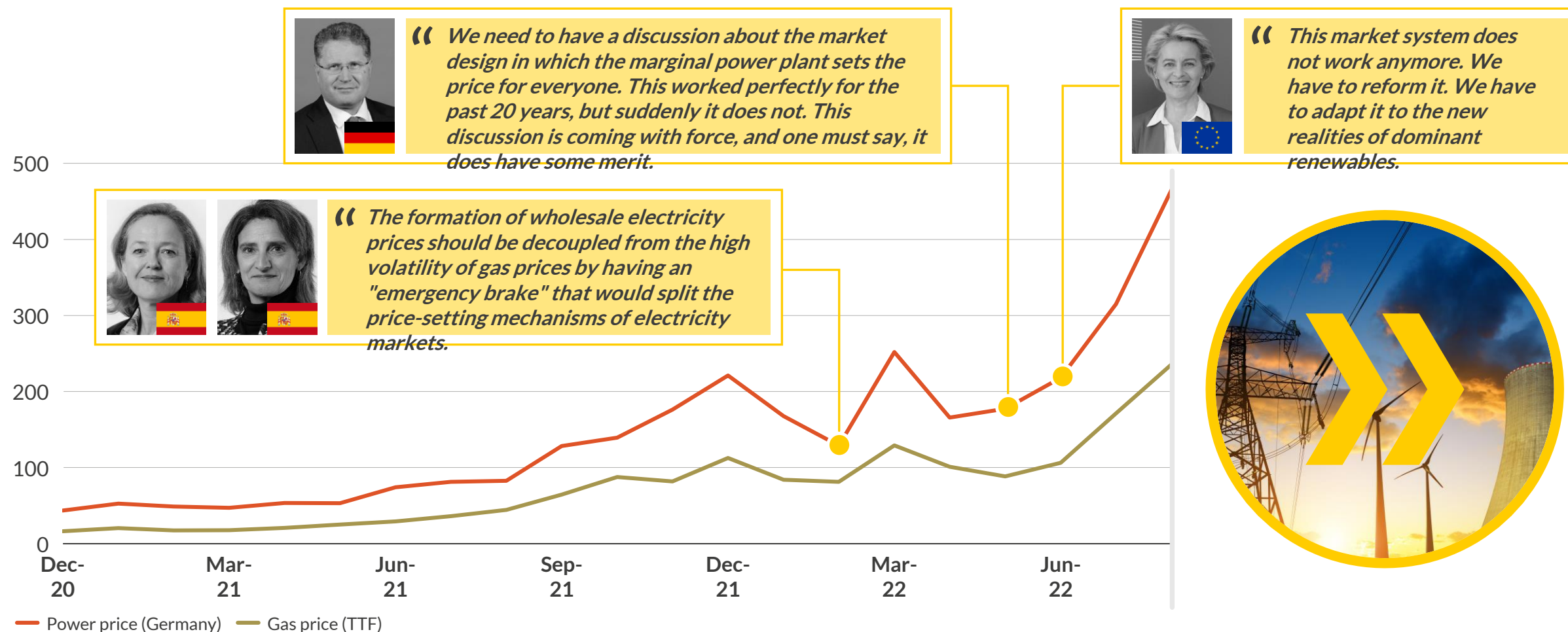


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BACKGROUND

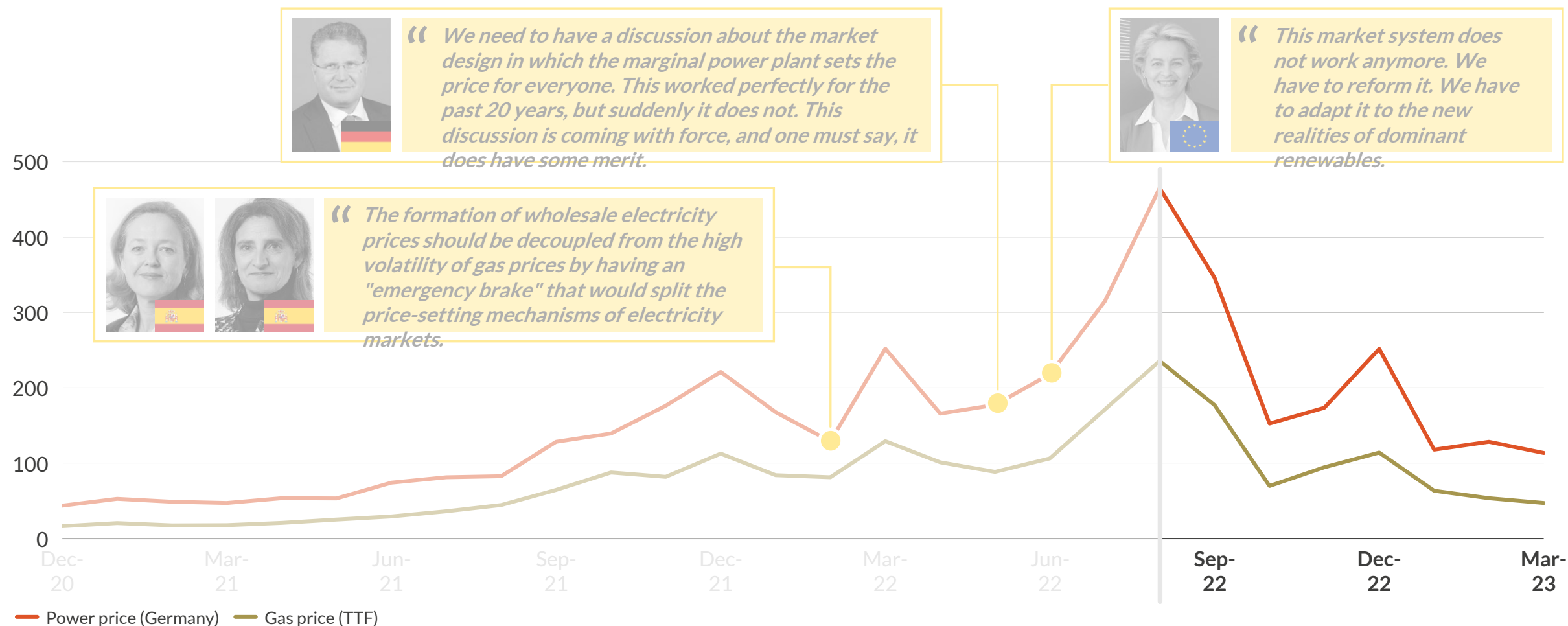
Record-breaking energy prices created pressure to fundamentally reform the European power market design ...

Monthly spot power and gas prices
EUR/MWh



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

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



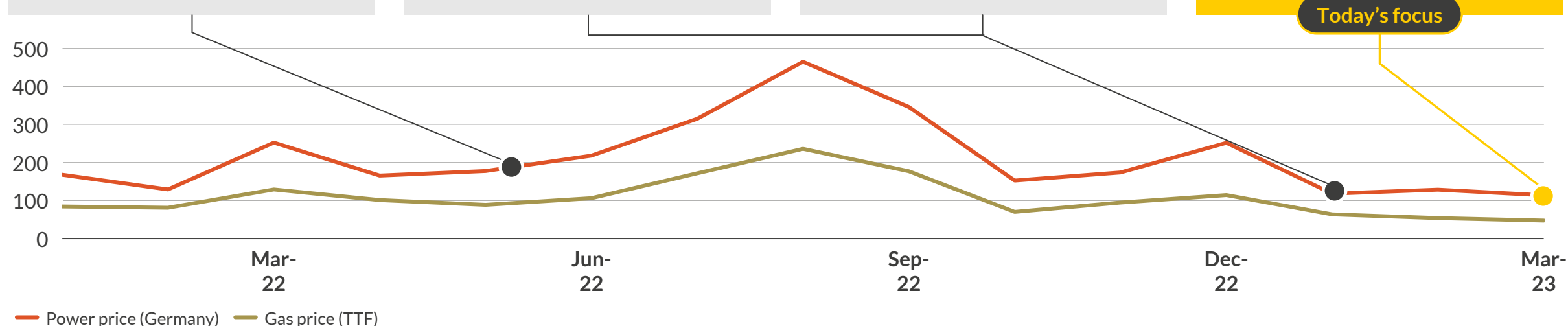
France: Post-market fund

- 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**



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

Topic	European Commission Proposal	PKNS ¹ working group 
<div>1</div>  Promoting long-term markets	<div>1</div> For producers <ul style="list-style-type: none"> Two-way CfDs as direct price support scheme for new renewables preferred. <div>2</div> For producers/consumers <ul style="list-style-type: none"> Strengthening PPAs by incentivising the combination with CfDs and providing state backing for PPA offtake. Strengthening long-term hedging by ensuring appropriate strategies for suppliers and establishing virtual cross-country hubs. 	<div>Renewables support</div>
 Promoting flexibility	<div>1</div> Improve wholesale markets <ul style="list-style-type: none"> Gate closure time of intraday markets closer to delivery Lowering minimum bid size <div>2</div> Flexibility support <ul style="list-style-type: none"> Better incorporation of flexibility in capacity markets, or direct flexibility support schemes. <div>3</div> Peak shaving <ul style="list-style-type: none"> New peak shaving product to subsidise demand response. 	<div>Flexibility</div>
 Consumer protection	<div>1</div> Peer-to-peer trading <ul style="list-style-type: none"> Consumers have the right to share electricity with other consumers. <div>2</div> Security of long-term supply <ul style="list-style-type: none"> Consumers have the right for multiple tariffs and a right for both a fixed price, fixed term and a flexible tariff. Member States are obliged to appoint supplier of last resort. 	
 Capacity adequacy	<div>x</div> Capacity Markets - Not covered <ul style="list-style-type: none"> Ensures sufficient reliable capacity is available by providing payments to encourage investment. Member states are not required to create a capacity market. Commission has already consulted on country-specific adequacy concerns and requires countries to publish an annual report. 	<div>Reliable capacity</div>
 Local price signals	<div>x</div> Locational pricing - Not covered <ul style="list-style-type: none"> Splitting market into zones incentivises more efficient location of storage and renewables. Currently there is no legislation on location pricing; this can create political issues. 	<div>Locational price signals</div>

Deep dive on upcoming slides

1) Plattform Klimaneutrales Stromsystem (PKNS) is a panel launched by the BMWK to bundle discussion and create unbinding suggestions towards a climate neutral power system. It is divided into four working groups.

1 For Germany, the Commission proposal (along with latest State Aid guidelines) could mean the end of the Market Premium Scheme

European Commission proposal on renewables financing

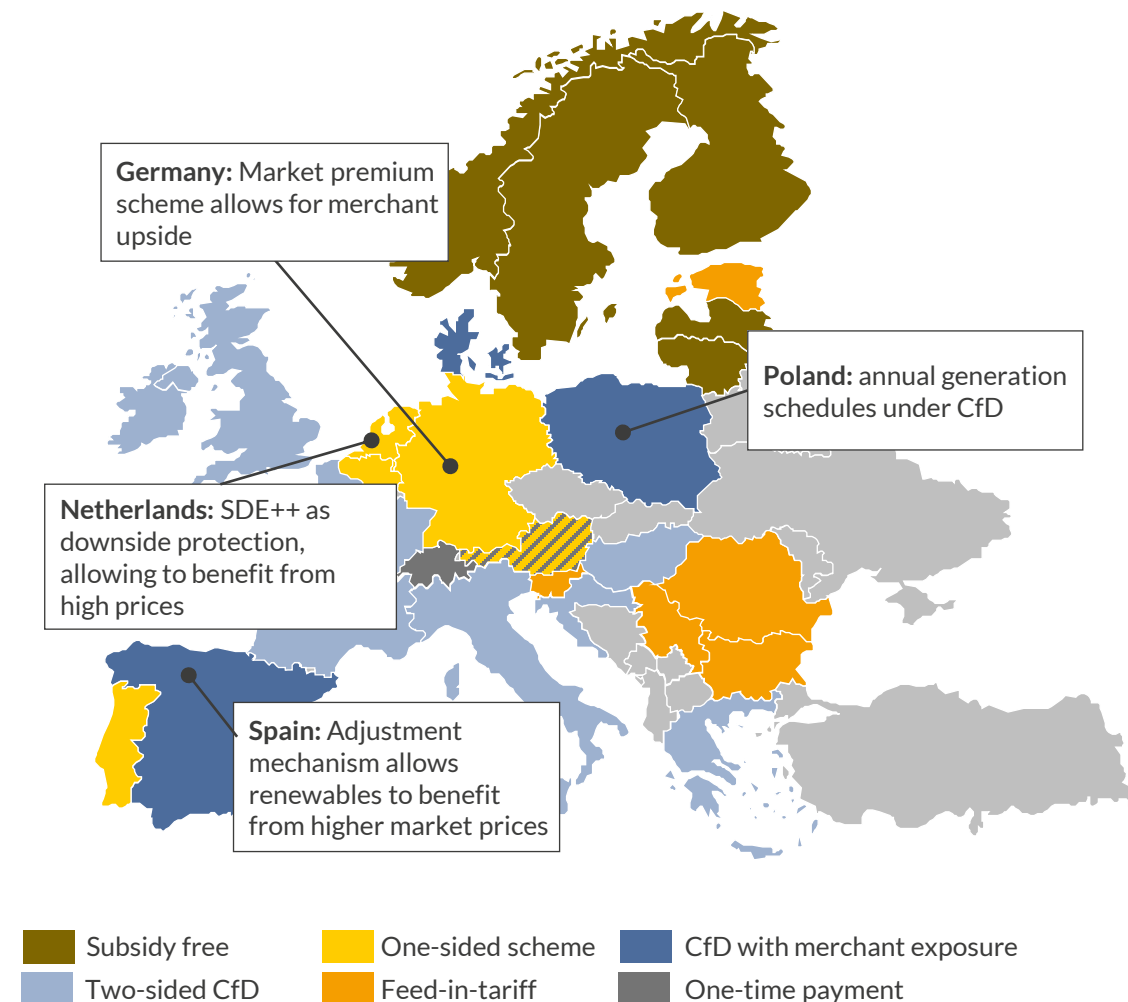
If Member States have a direct price support scheme, this **should have the form of a two-way contract for difference (CfD)**...

- for new assets, repowered assets and asset extension (lifetime or capacity),
- while the support scheme should allow for (and encourage) a **combination with power purchase agreements (PPAs)**, and
- preserve system-friendly behaviour of renewables.

Proposal's impacts for Germany

- ! Two-sided CfD would become new default support scheme for large-scale assets.
- ! If proposal is adopted, the support scheme will likely be changed towards
 - clearer guidance for PPAs and further incentives to use them
 - maintaining system-friendly behaviour.

Current renewable support scheme for large scale solar PV and onshore wind



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

Potential CfD design options for Germany

1) Options to combine PPAs and CfDs

- Implement CfD with cap and floor, between which PPAs can be signed
- Allowing for a fraction of capacity to be bid into auctions
- Awarding CfDs for a certain volume of generation for each year
- Use contracted PPA volume as auction bid criterion

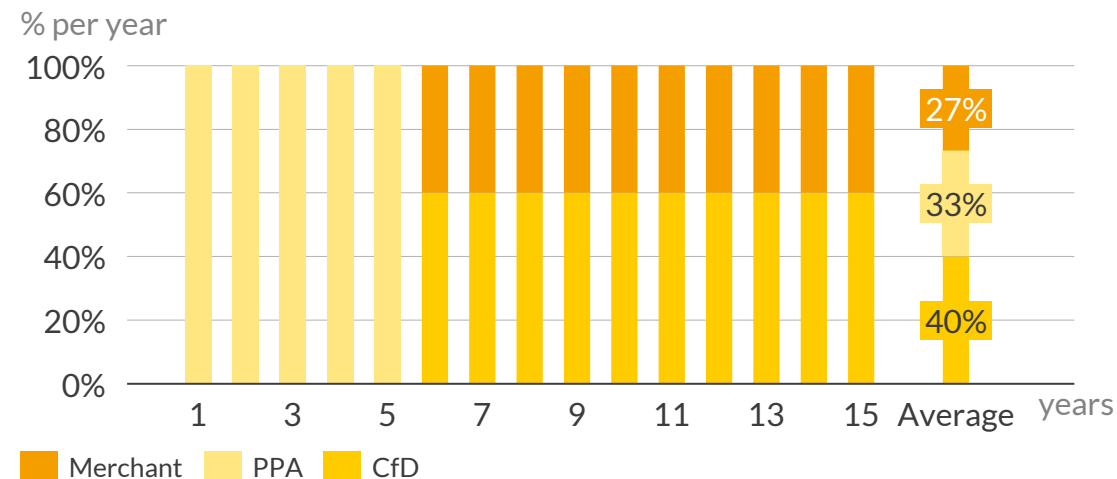
2) Incentivising system friendly behaviour

- Long settlement periods for CfDs
- Decoupling CfD payments from actual plant generation (e.g., moving to fleet averages or fictional generation)¹

Case study: Polish CfD scheme

- CfD auctions are awarded for a certain **volume of generation for each year, rather than capacity**, which allows for flexible generation timeline below asset generation
 - This allows CfDs to be combined with short-term PPAs while preserving bankability
- However, the Polish CfD scheme reduces expected revenues for the government:
 - In **high price periods** operators are likely to maintain **PPAs** but **opt out of CfDs**, they would switch back to CfDs when prices decrease

Illustrative share of revenues under the CfD scheme in Poland



1) e.g., Yardstick CfDs, Financial CfDs

The PKNS working groups on renewables support, locational price signals and flexibility are likely to substantially affect renewables economics

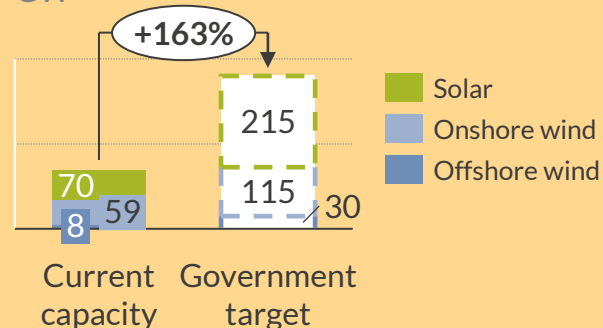
Renewables support

How can renewables buildout be financially incentivised, so that buildout targets are reached?

- Switch to CfDs as required by EU market design?
- How to combine PPAs with CfDs and an industrial power price?

Renewables capacity in 2030

GW



Flexibility

How can flexibility on the supply and demand side be increased to respond to a system dominated by volatile renewable generation?

- Obstacles to flexibilising demand are substantial, especially in grid fee structures.
- Improving infrastructure and legal frameworks to enable and facilitate the distribution of Smart Meter Gateways and dynamic power contracts will be key.

Reliable capacity

How can the funding of flexible and reliable capacity be ensured?

- Germany will require a fast buildout of dispatchable capacity (power plants, storage and demand side management).
- Clear strategies needed to address uncertainties for hydrogen-ready plants (availability of infrastructure, pricing, and transition from natural gas to hydrogen).
- Unification of currently uncoordinated subsidy instruments, potentially via a capacity market.

Locational price signals

How can the power market reflect the restrictions of the grid's topology?

- Grid congestions will become even more frequent; currently no incentives to consider grid restrictions in asset buildout or operating decisions.

national

local

One price zone
(status quo)

Split in price zones
(2 to X zones)

Nodal pricing

Key takeaways

- 1** The EU power market reform is **shaping up to be less drastic than feared**, but could still **fundamentally alter the way power markets function** (and not only for the better).
- 2** In particular, the European Commission will likely **end the German market premium model**, forcing a **switch towards CfDs**
- 3** The “**Plattform Klimaneutrales Stromsystem**” (PKNS) has been formed to discuss potential changes to the power market design, focussing on the key topics of **renewables support, flexibility, security of supply and locational pricing**.
- 4** Besides the switch to CfDs, **faster flexibilisation of demand** and a **potential price zone split** could be key outcomes of PKNS affecting renewables.

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