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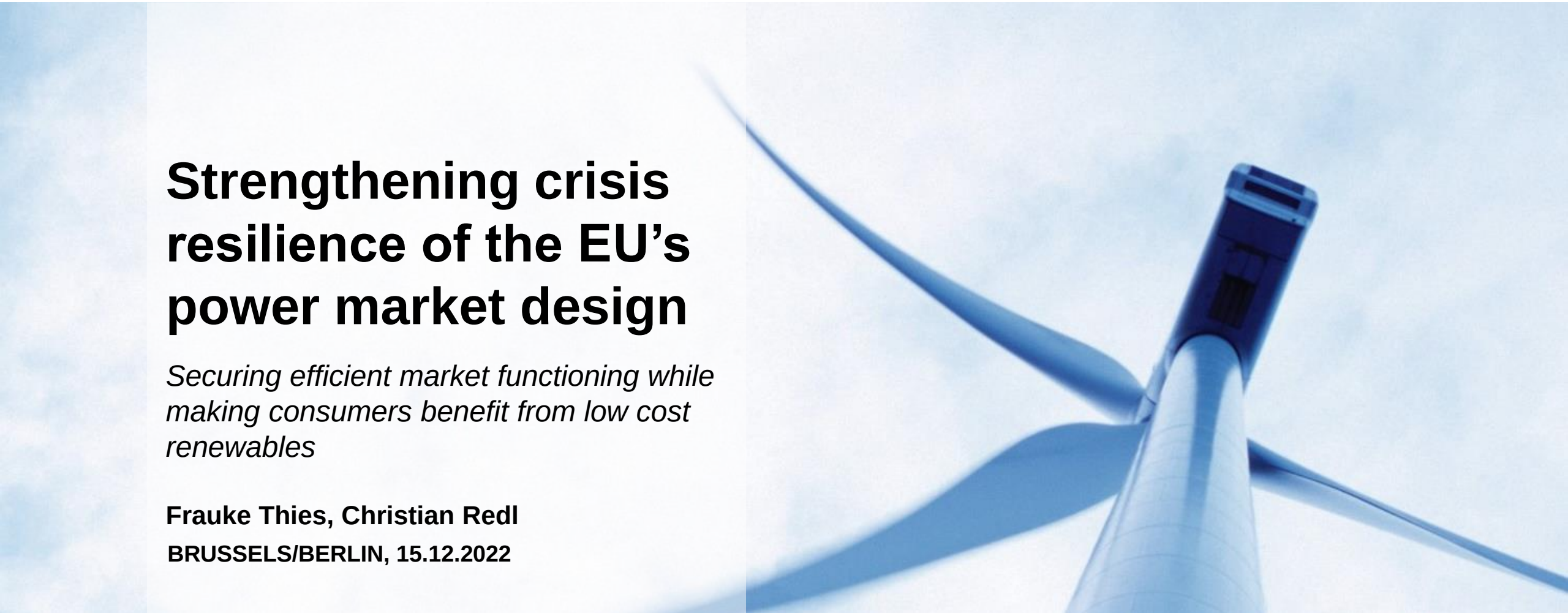

Strengthening crisis resilience of the EU's power market design

Securing efficient market functioning while making consumers benefit from low cost renewables

Frauke Thies, Christian Redl

BRUSSELS/BERLIN, 15.12.2022

Russia's war against Ukraine shows need to shield electricity consumers in Europe from fossil fuel supply shocks. But how to strengthen the crisis resilience of EU power market design?

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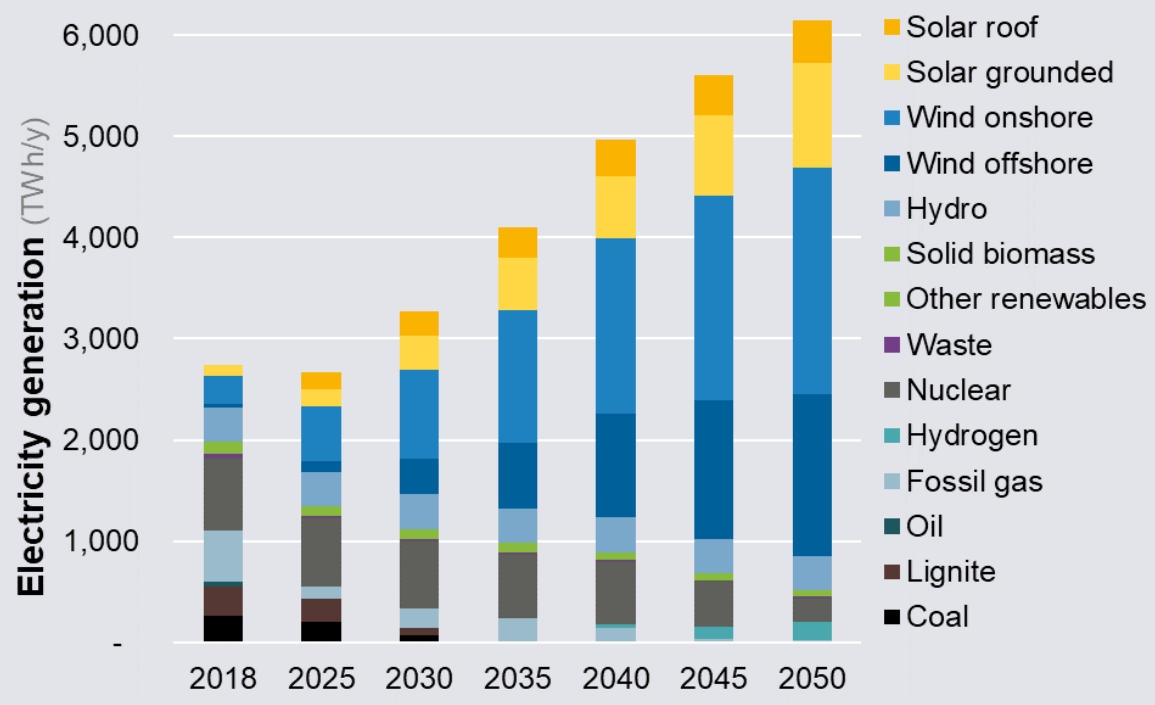
- Currently high power prices in Europe are primarily a consequence of very high fossil gas prices.
- The politically set objective is to de-couple the dominant influence of gas on the price of electricity and ensure that consumers reap the benefits of low-cost renewables.
- Any **structural adjustment** to EU power market design **must improve overall market outcomes** in terms of **efficiency, flexibility, security of supply and innovation**, and bear in mind **mid- and long-term implications for fully decarbonising** our power system.
- **A short-term solution** should turn on two elements:
- 1) **Voluntary two-sided Contracts for Difference** for renewable energy generators, and a
- 2) A **coordinated approach to taxing windfall profits**, replacing the infra-marginal revenue cap

An emission free power system for Europe

Europe needs a largely emission-free power system by 2035 with wind power and solar PV at its core. This is a main pillar for EU to be climate neutral by latest 2050

EU power generation

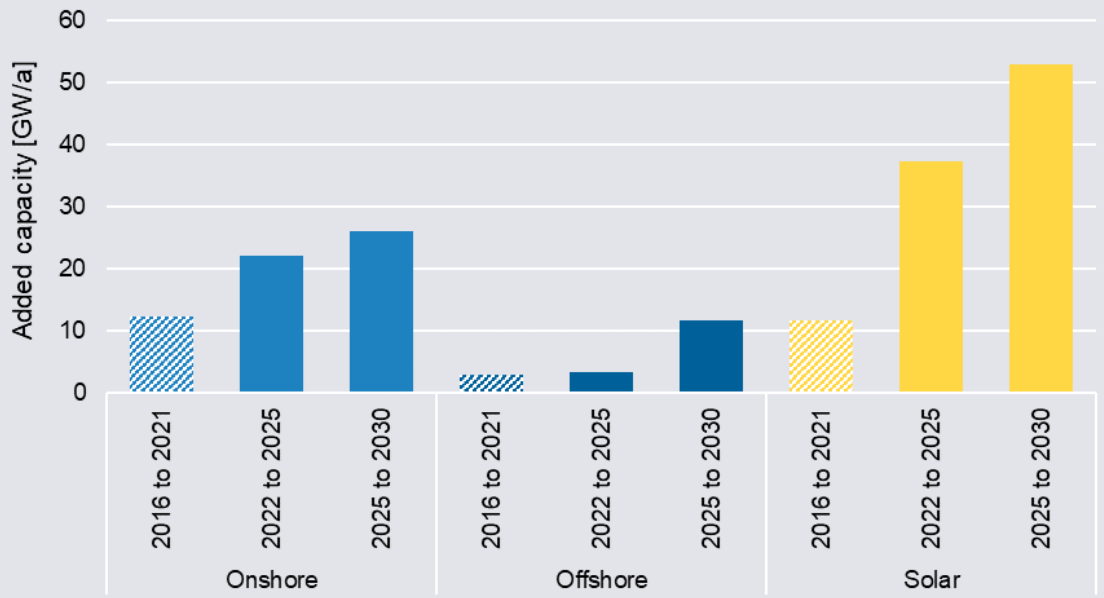


Artelys (forthcoming)

- A zero-emission power system is key for economy-wide decarbonisation due to electrification of transport, industry and buildings sectors
- **Key principles** of a decarbonised power system:
  - **Wind power and solar PV** are the main pillars
  - **Flexibility options** complement RES (storage, green H2 power plants, demand side response, sector coupling)
- RES and flexibility options need **market incentives** for a cost-efficient, deep ramp-up

Renewables establish resiliance to fossil-fuel price shocks. An unprecedent ramp-up of vRES deployment rates is required

Annual net deployment of wind & solar PV for reaching zero emissions power, and historic values



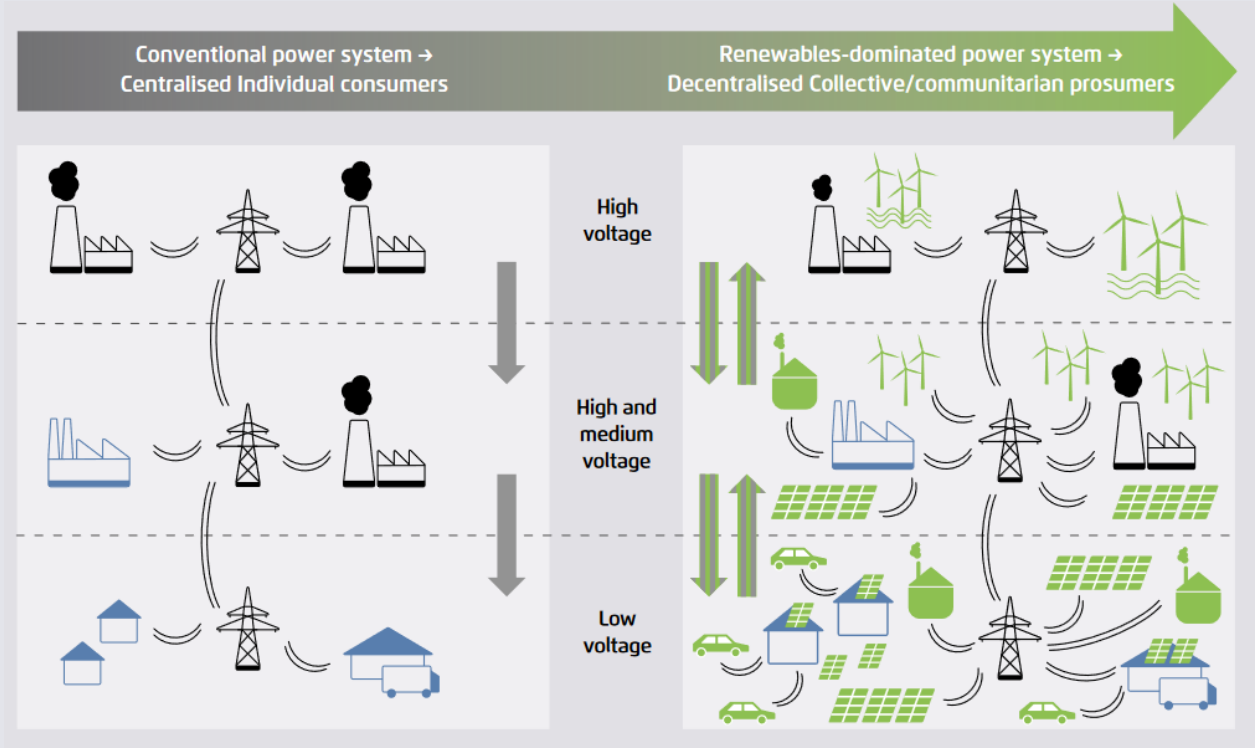
Agora based on Artelys (forthcoming)

→ For the EU's power system to be largely emission-free by 2035:

- Annual **onshore** wind deployment rates need to **triple by 2030**
- Annual **offshore** wind deployment rates need to **quadruple by 2030**
- Annual **solar PV** deployment rates need to **quadruple by 2030**

Towards zero emission power systems, a “one-way street” is replaced by a decentralised, networked structure

The power system’s transition to a decentralised, networked structure



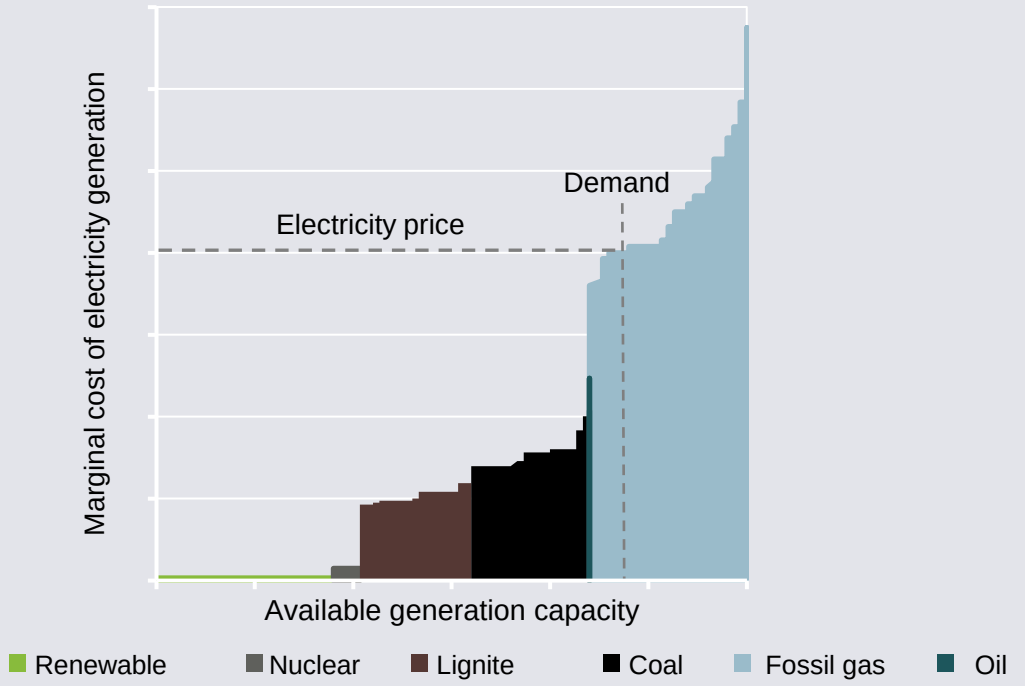
Agora Energiewende (2019)

- Traditionally, a few large power plants generated electricity which was transported through the grids to end-consumers
- The introduction of millions of renewable energy plants has upended this system
- Europe’s **fully decarbonised power system** will be much more **decentralized, characterized by RES, flexibility** and an **active demand-side**
- Large and small producers will **generate** electricity **at every level of the grid** and electricity **demand applications** such as electric cars or heat pumps will be used as resources to **integrate variable renewables** and **decarbonize buildings, industry and transport**

Options for short-term power market design reform

Marginal pricing ensures efficient use of electricity and enables key flexibility options: Demand-side flexibility and storage. Average pricing would be counter-productive

Stylised merit order of the German power system, 2022



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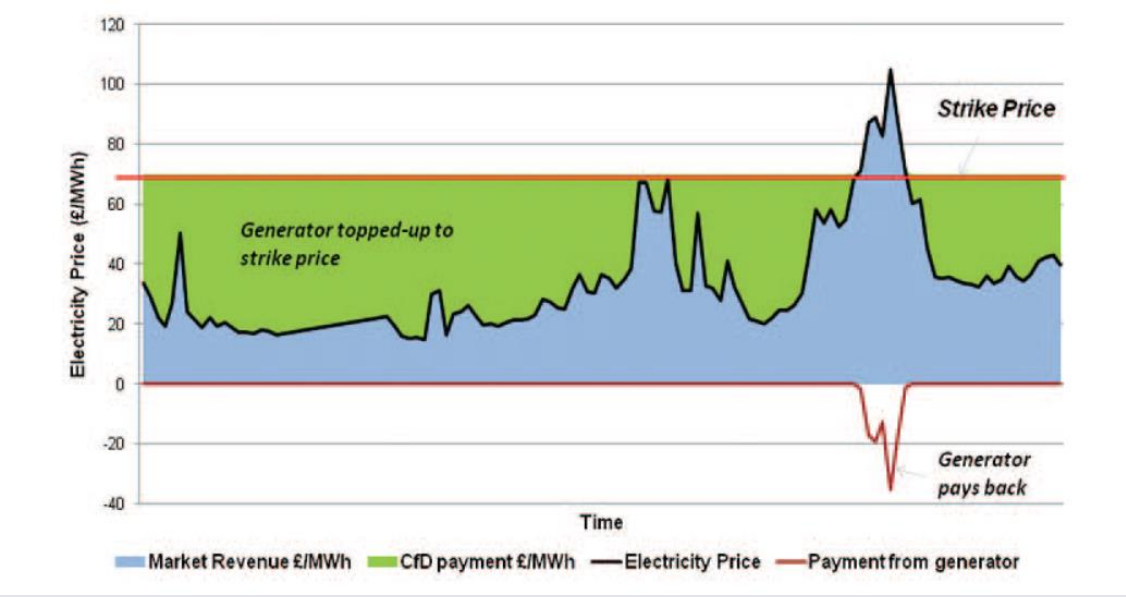
- Changing wholesale price formation from marginal towards **average pricing strongly reduces investment incentives** for flexibility and “capacity adequacy”, esp. for “modern” flexibility like demand-side response, and **distorts cross-border trading**
- Average pricing could be possible through **pay-as-bid** pricing. Yet, market actors would estimate the marginal bid and increase their bids to this level so that the **de facto outcome is again marginal pricing**
- Such a **pay-as-bid** approach would thus need to be **highly regulated** with incomplete information for regulators in a hugely complex system. It **strongly hampers innovation and flexibility** potential that is needed for a fast transition

Adjustments to power market design can increase resiliance to fossil fuel price shocks and keep consumer prices in check

- Any **adjustment** to Europe's power market design **must enable a faster transition** to a high-RES, high flexibility and active demand-side power system
- Thus, power market reform **must keep efficient pricing mechanisms** on the wholesale markets
- Immediate power market reform **must not restrict options for future, structural reform** for fully RES based power system
- A combination of **voluntary CfDs** and **windfall taxes** will shield households and companies from spiking wholesale power prices as a result of fossil fuel supply shocks, while ensuring that households and companies benefit from low-cost renewables. CfDs and windfall taxes enable raising of **revenues for redistribution**

Element 1: Voluntary two-sided Contracts for Difference for low-cost renewables to reduce market-related uncertainties for investors and enable targeted consumer support

Schematic principle of a two-sided Contract for Difference



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- Technology costs for **wind & PV** have dropped strongly and will drop further. Yet, *high up-front capital intensity* is an impediment to scaling. 1% WACC increase yields 8% LCOE increase for onshore wind.
- For investors to invest at required scale, **they depend on a robust investment framework**. This is ever more important given rising interest rates, thus higher cost of capital
- **Key instrument for derisking are market-based**, two-sided Contracts for Differences. They combine long-term investor certainty with efficient short-term market functioning
- **2-sided CfDs eliminate windfall profits** as CfD holders must pay the difference between power price and CfD strike price. This enables government income when market prices are above strike price which can be redistributed.

Contracts for Differences must remain voluntary to preserve innovation and industry-led initiatives

Voluntary CfDs

- allow for parallel merchant RES investments, e.g. through PPAs, which is key to give space to private initiatives
- ensure a market-based transition and innovation; e.g. combinations of RES with storage systems, new market products
- allow to reach deep RES deployment
- can be linked with pooling of corporate PPAs between energy-intensive industry and RES developers, organized by governments, minimizing counterparty risks

Mandatory CfDs

- define a return to regulated, state-controlled investments only, prohibiting merchant-based renewables development, including PPAs
- hinder innovation as all details of investments are determined by centralised regulatory bodies
- might be implemented with average pricing which eliminates incentives for demand-side flexibility and efficient market operation
- constitute a barrier for investments in small RES (self-generation, community projects) and puts deep deployment at risk

Element 2: Introducing a common approach to taxing and re-distributing windfall profits seems preferable to an extension of the inframarginal revenue cap

- **Revenue** for targeted relief sensibly **raised with energy companies gaining windfall** profits. Council Regulation 2022/1854 provides revenues of inframarginal plants can be capped at 180 EUR/MWh
- **Inframarginal revenue cap** comes with **serious implementation challenges**. Trading strategies could emerge that would avoid falling under the cap. Cap increases investment uncertainty
- Due to broader scope, lower depth of intervention in market processes and preservation of price signals, **windfall profits tax appears as better alternative** to inframarginal revenue cap
- **Voluntary two-sided CfDs,** over time**, reduce the need for price interventions, even in crisis situations**
- Any **revenue or price control mechanism** needs to come with an **end-date**

Complementary elements: State aid, RES deployment policies, market design refinements and security of supply

- → Any **renewables capacity** built **using** the **voluntary two-sided CfD** should have **automatic state aid approval**
- → **Eliminate RES planning and permitting barriers**
- → **Minimally invasive measures** for safeguarding system adequacy that are consistent with decarbonisation objectives as well as enhanced power system flexibility
  - Strategic reserves / administrative shortage pricing / capability mechanisms
- → **Make energy markets more flexible** to enable power system integration of variable renewables:
  - Reduce gate closure times and implement 15-minute time units in the day-ahead market
  - Strengthen cross-border intraday auctions
  - Implement time-varying grid charges
- → **Optimize bidding zones**
- → Implement **holistic infrastructure planning** across energy carriers

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