International Energy Agency

Presentation about electricity markets

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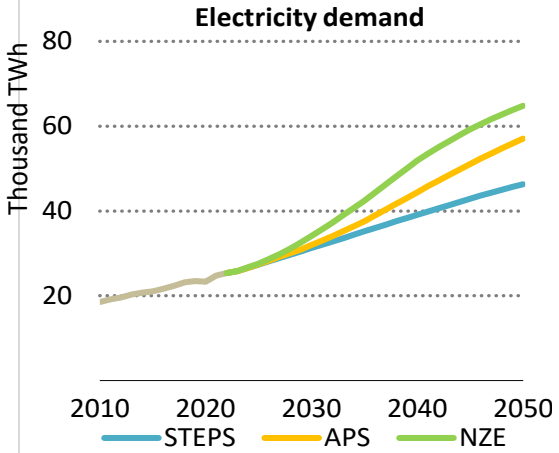
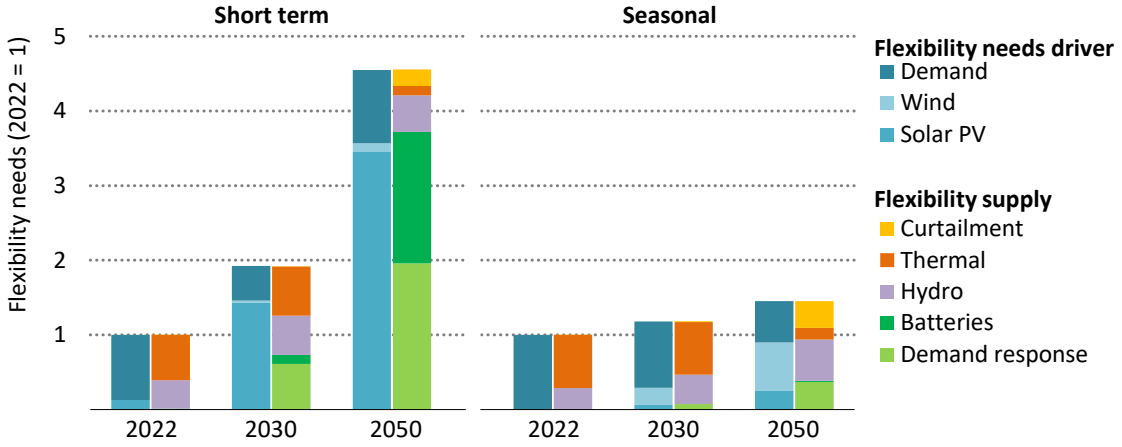
17 April 2024

Electricity demand is growing and system flexibility needs also increases towards decarbonisation



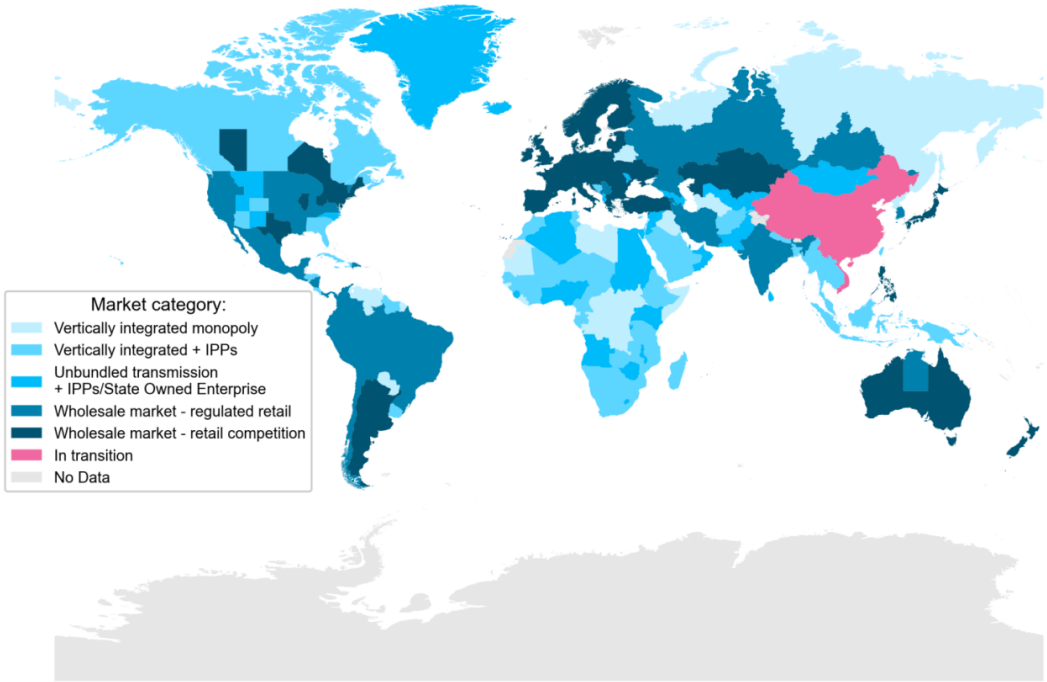


Source: IEA(2023), WEO 2023

By 2050, demand for electricity rises from its current level by over 80% in the STEPS, 120% in the APS. Much of the additional short-term flexibility that is needed is provided by batteries and demand response. Thermal power plants and hydropower continue to provide most seasonal flexibility

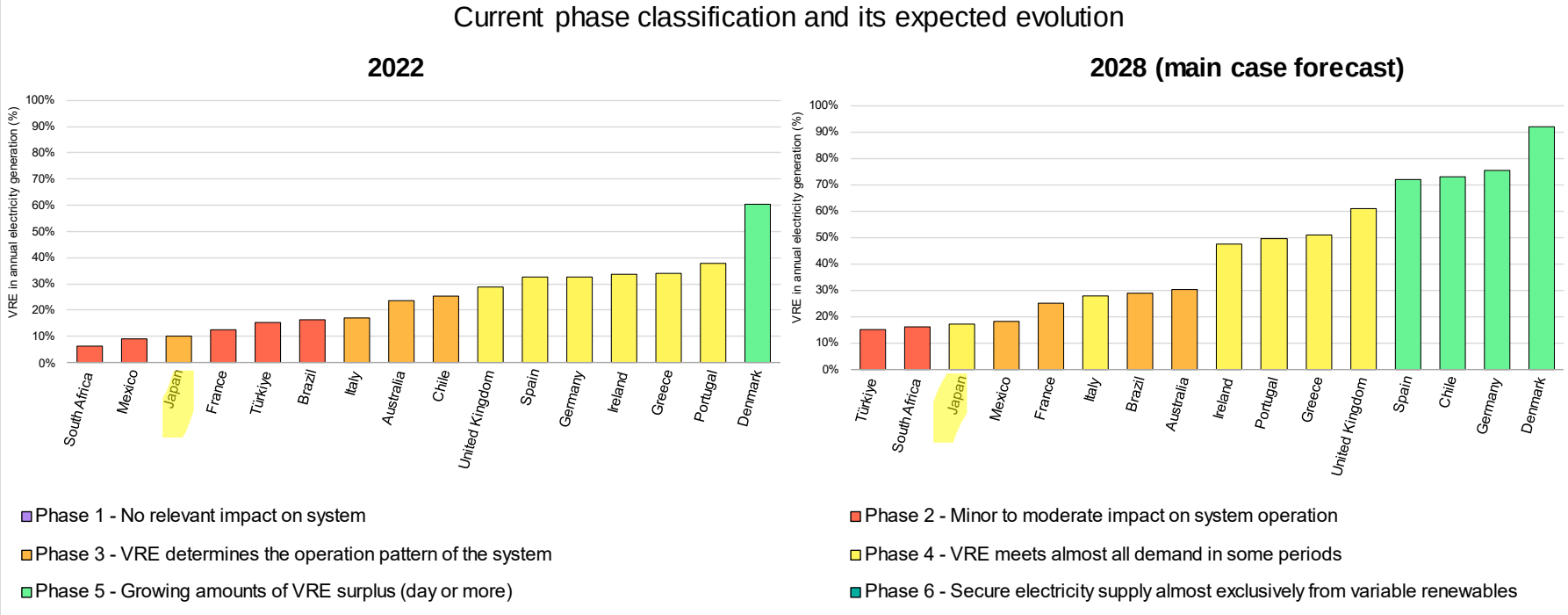
Electricity markets are central to decarbonising the sector

Status of electricity markets around the world in 2022



At present, around 50% of electricity in the world is consumed in power systems relying on liberalised markets; this will increase to approximately 86% once the People's Republic of China completes implementing power markets.

VRE shares are expected to grow at a fast pace in many countries



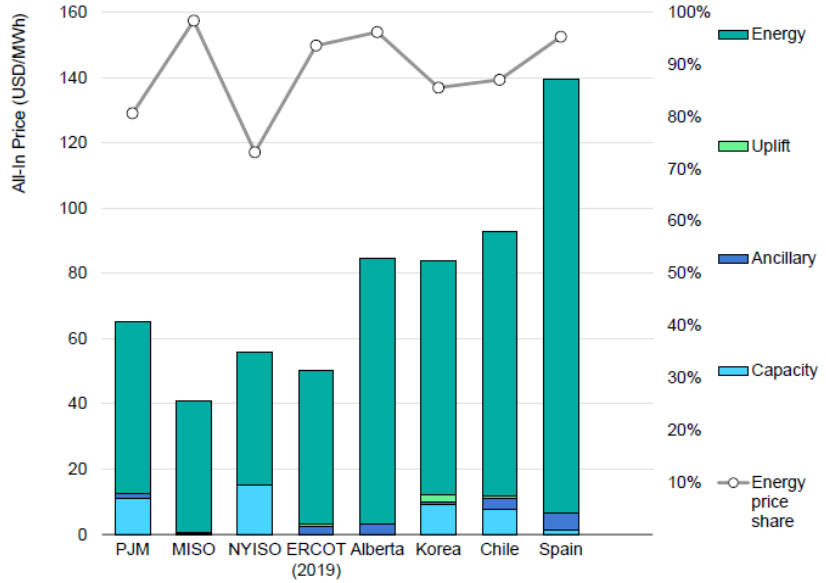
In the coming years a growing number of countries will reach more advanced phases of VRE integration.

The sale of energy in short-term wholesale markets is the main source of income for generators

- The sale of energy in short-term wholesale markets provides close to 80% of generators revenues.

- Short-term wholesale markets reveal the system value of resources through price signals
- Market design must balance planning and adaptability
- Designing markets to capture value from low-carbon technologies
  - Locational price signals provide geography-aware value
  - Settling contracts key to balancing long-term signals with real-time dispatching

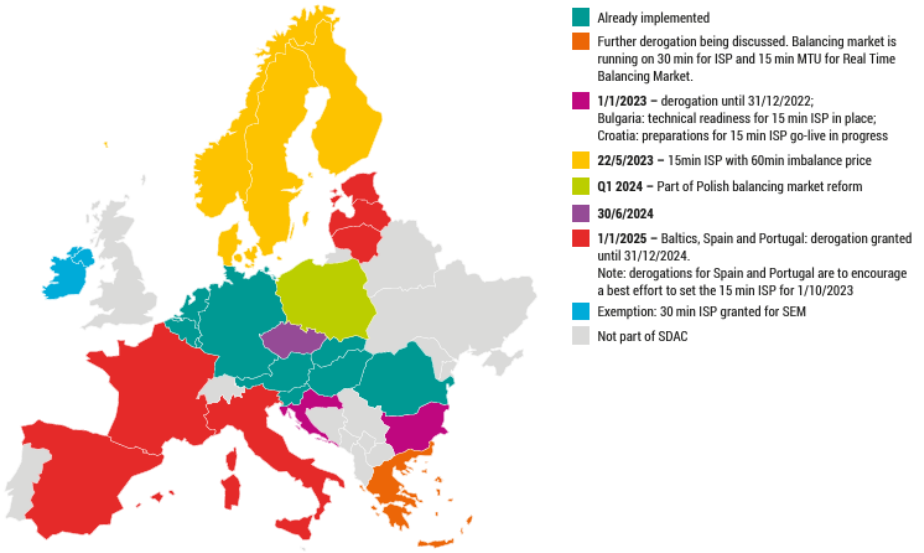
Sources of revenue for generators in selected competitive markets in USD per MWh, 2016



Price signals that reflect system conditions in the wholesale market are the first element of an efficient market design.

Refining time resolution unlocks flexibility of diverse technologies

Current status of Imbalance Settlement Period readiness/derogations in each country



Source: ENTSO-E(2023), ENTSO-E Market Report 2023

Market Time Unit

The granularity of the dispatch period for electricity traded on the markets

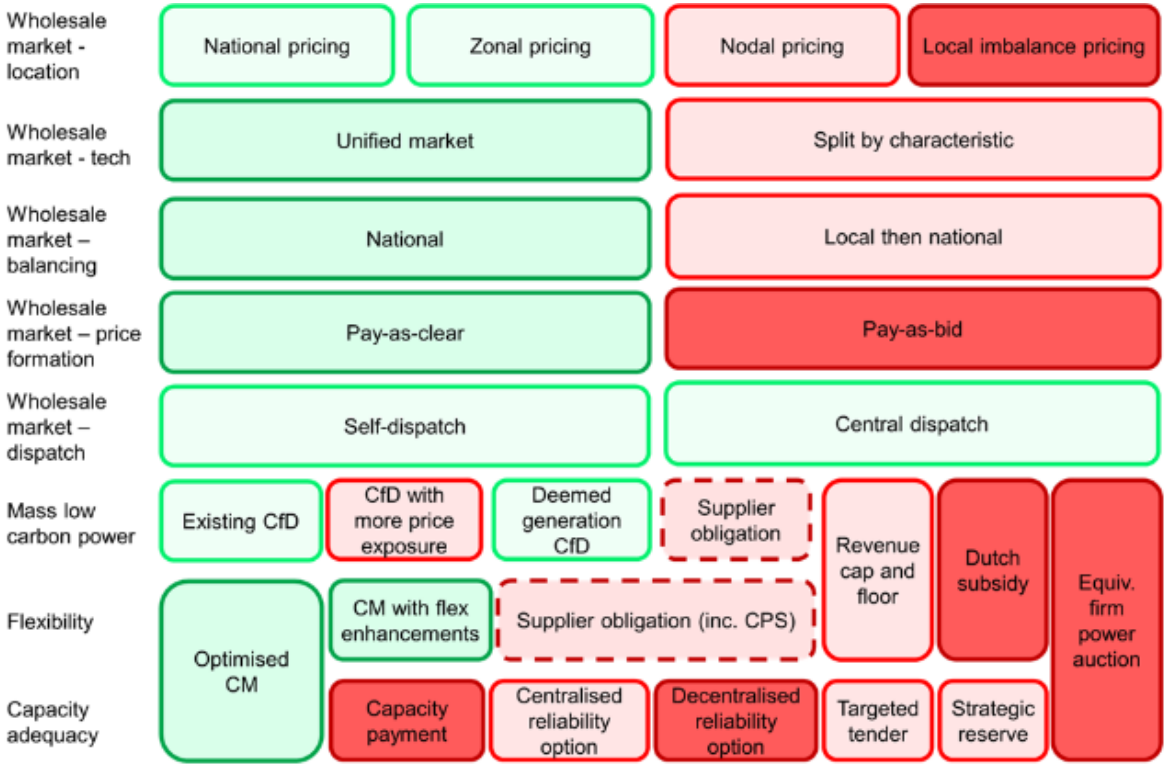
Imbalance Settlement Period

The minimum period of time during which the system operator will consider imbalances between scheduled and actual generation and consumption

Refining the time resolution of the market

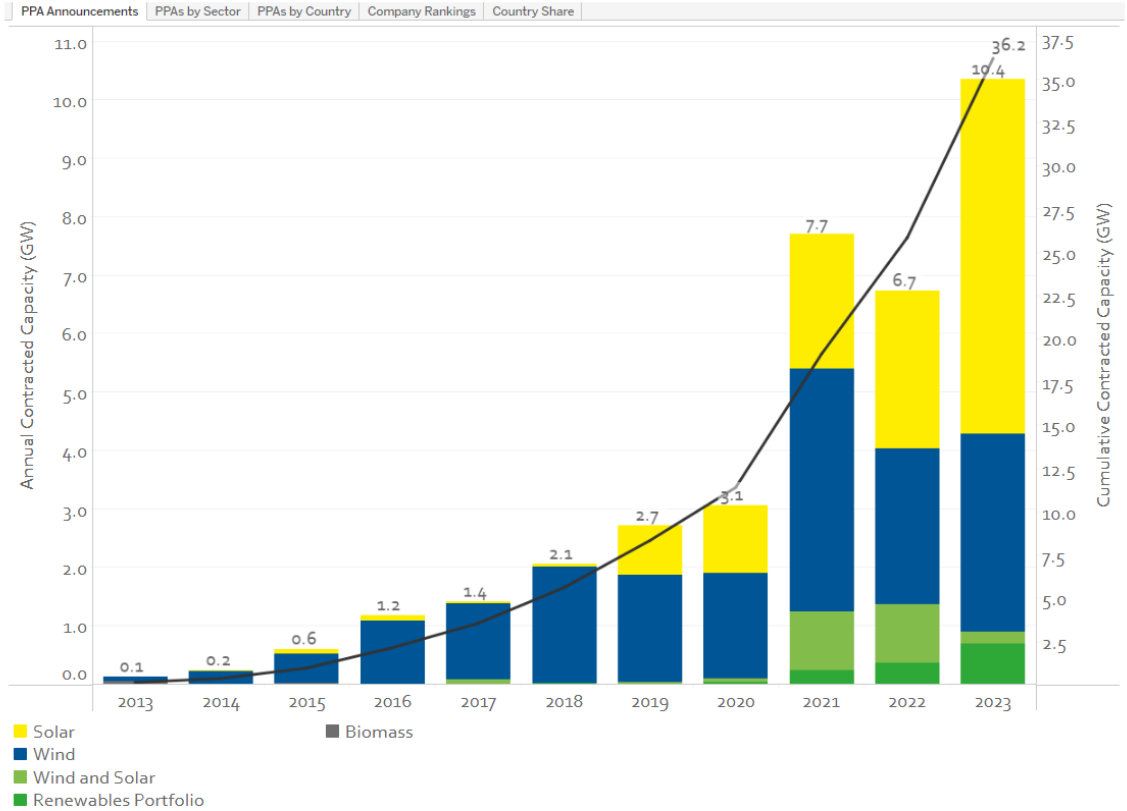
With higher resolution of the market, it is possible to provide market players with more detailed price signals that better reflect the status and needs of the system at a particular point in time and, in turn, to improve the scheduling of system assets.

Design of power markets is being reviewed in many systems



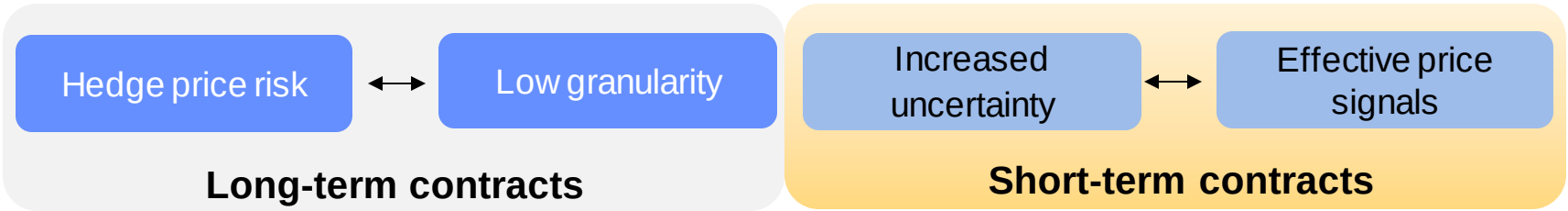
UK analysis has reaffirmed the role of wholesale markets and marginal pricing, as well as put focus on need for capacity and adequacy through long term markets.

PPA market in EU is growing



PPAs have been growing significantly as a way to support decarbonisation of the power system, but the way they are designed is very important.

Ensure long-term contracts do not impede optimal dispatch



A high enough volume in short-term markets is essential to ensure the clearing price reflects the cost of the system itself while also limiting the possibilities to exercise market power.

The market design must ensure that long-term markets do not impede adequate volume of trading in short-term markets.

Addressing the missing money problem

Different approaches to address the missing money problem

Energy price adders	Capacity remuneration mechanisms	Regulated procurement
Allowing prices to exceed variable costs when system operator becomes short of the desired level of generation to support energy and reserves (reliability payment in Argentina, adequacy payments in Australia)	Payments given for generation or demand-side resources to be available when needed	Amount and/or the price of capacity are determined by a regulatory body (RAB model in UK, Strategic reserve in Germany)

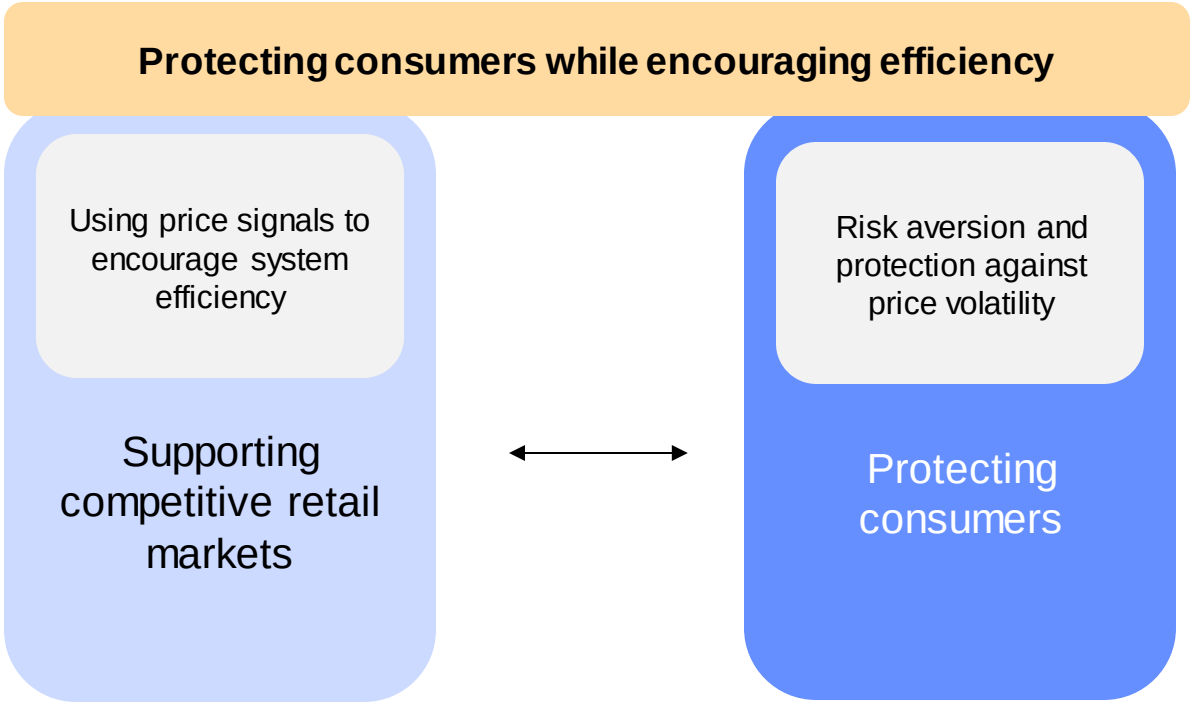
A sufficient level of resources needed to ensure secure power systems

Administrative/ Regulatory decision	Centrally Planned	Energy + Centralized Capacity Market	Energy + Decentralized Capacity Market	Energy only
Reliability Standard	•	•	•	•
Energy Prices in periods of stress		•	•	•
Level of Operating Reserves	•	•	•	•
Peak Demand Forecast	•	•		
Defining technologies capable of deliver the product	•	•	•	
Product definition	•	•	•	
Amount of Capacity to be procured /Capacity Demand Curve	•	•		
Technology/ Fuel	•			
Location	•			
Size	•			

- **Energy Price adders**
  - Reliability payment: Argentina
  - Adequacy payments: Australia
- **Capacity remuneration mechanisms**
  - Strategic reserve: Belgium, Germany, Poland and Sweden
  - Capacity Payment: Italy, Poland, Portugal and Spain
- **Regulated procurement**
  - Auction / Tender: Germany to tender 10 GW of hydrogen-ready gas capacity (Feb 2024),
  - Regulated Asset Base (RAB) model: UK BEIS
  - CfD (Contract for Difference)
  - Australia to have a tender as the Capacity Investment Scheme (CIS)

Through different designs, policy makers vary in whether they assign certain decisions to planners or leave them to market participants,

Protecting consumers while encouraging efficiency

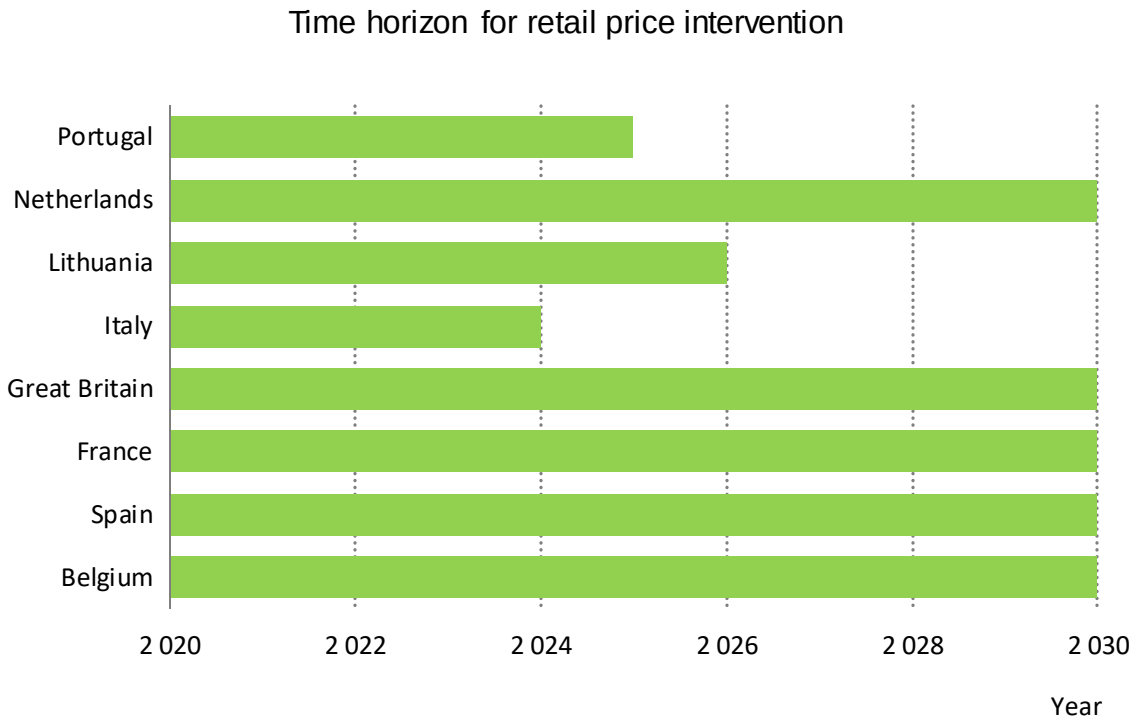


Retailers serve a critical role in the market liberalisation process. Therefore, retail market design should constantly assess how well it responds to the needs of the consumers as well as the system.

Considerations for retail market design

Innovative tariffs for demand-side participation	significant efficiencies can be gained by creating tariffs (e.g. capacity subscriptions) that involve some exposure to spot market prices but do not create excessive risk.
Prudential regulation for consumer protection	Regulation should guarantee that retailers are able to fulfil their contracts with final consumers, in particular when the tariff is meant to provide some rate stability
Using technology to manage consumption	policy makers should allocate the responsibility to educate customers on ways to use smart technologies to manage their consumption and be transparent regarding the use of technologies
Protection of basic services	consumers who “opt-out” of the choice to actively manage their consumption should be able to choose fixed tariffs from financially stable suppliers. This can be combined with a mechanism that introduces some form of competition to serve small customers at lowest cost.

Regulated prices as retail price intervention in EU



Source: IEA analysis based on ACER(2023), Energy Retail and Consumer Protection 2023 Market Monitoring Report

In 2020, twelve Member States of EU still had some form of price intervention.
Italy (2024), Portugal (2025) and Lithuania (2026) are planning to phase out the price intervention.