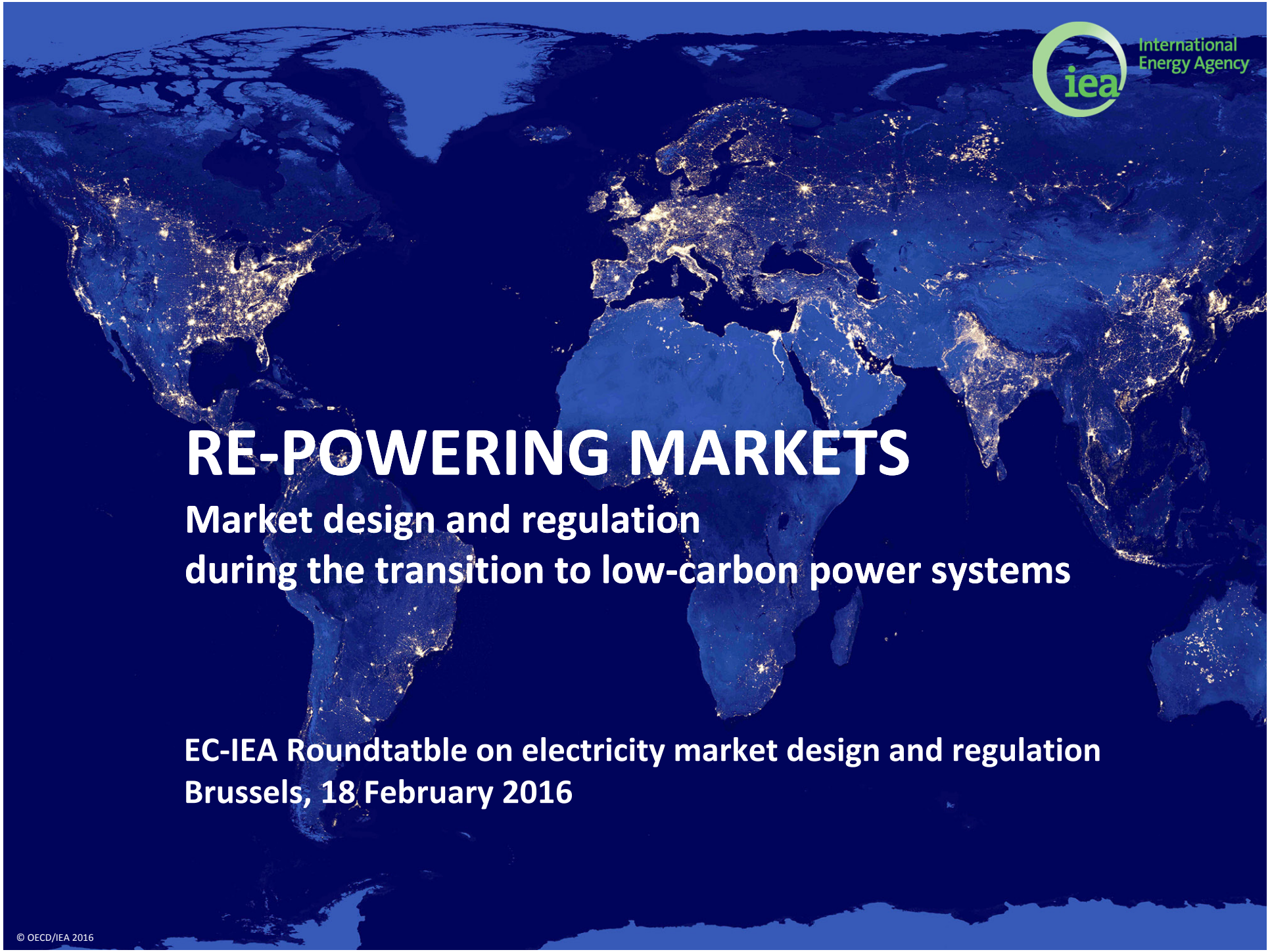


International Energy Agency

RE-POWERING MARKETS

Market design and regulation during the transition to low-carbon power systems

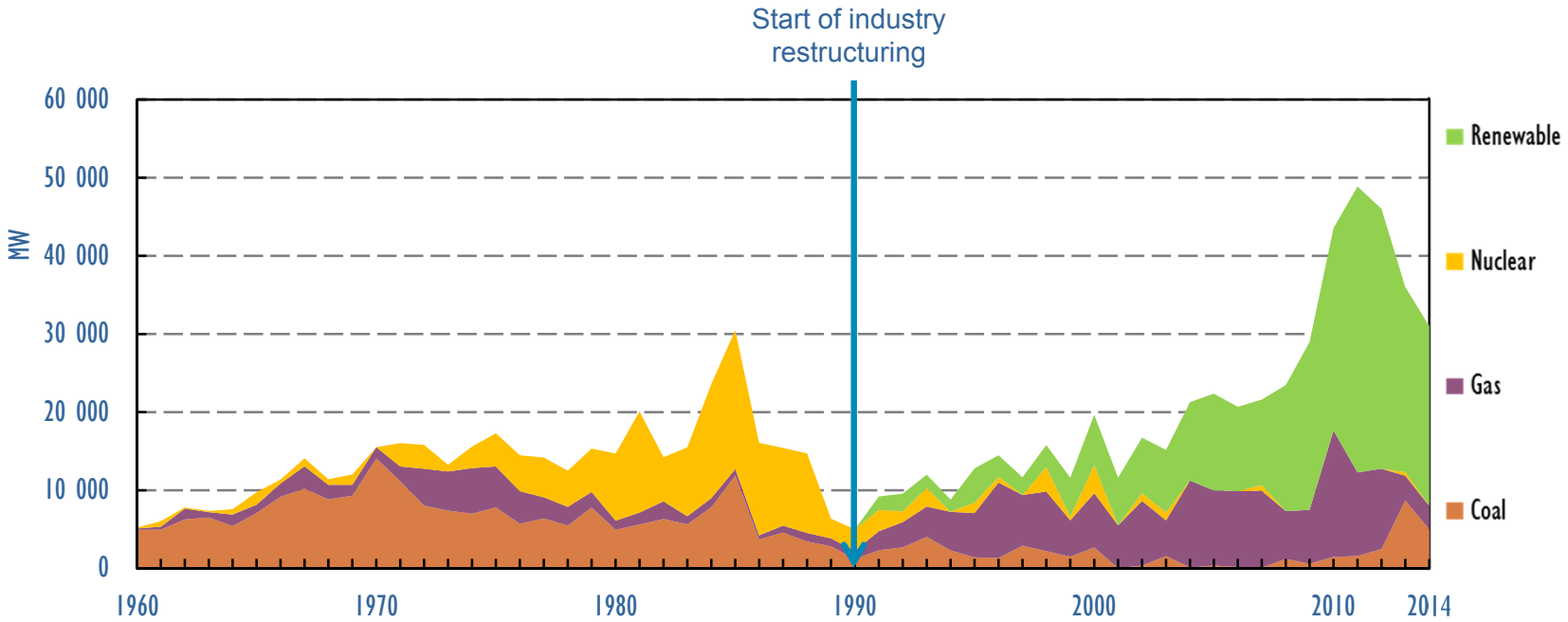
EC-IEA Roundtatble on electricity market design and regulation
Brussels, 18 February 2016

Power markets must evolve to facilitate a low-carbon transition

- **Competitive electricity markets are being challenged by the need to decarbonise**
- **A power market transformation is already underway**
  - ***Demand is stagnating in OECD Europe***
  - ***Renewables met 62% of growth in capacity in OECD Europe since 2000***
  - ***New technologies progressing (smart grids, demand response, storage)***
- **Electricity security is becoming more critical**
- **The massive investments required call for an improved market framework:**
  - ***Low-carbon investments***
  - ***Integration of wind & solar power***
  - ***Capacity markets***
  - ***Network investments & regulation***

Competitive electricity markets are being challenged by the need to decarbonise

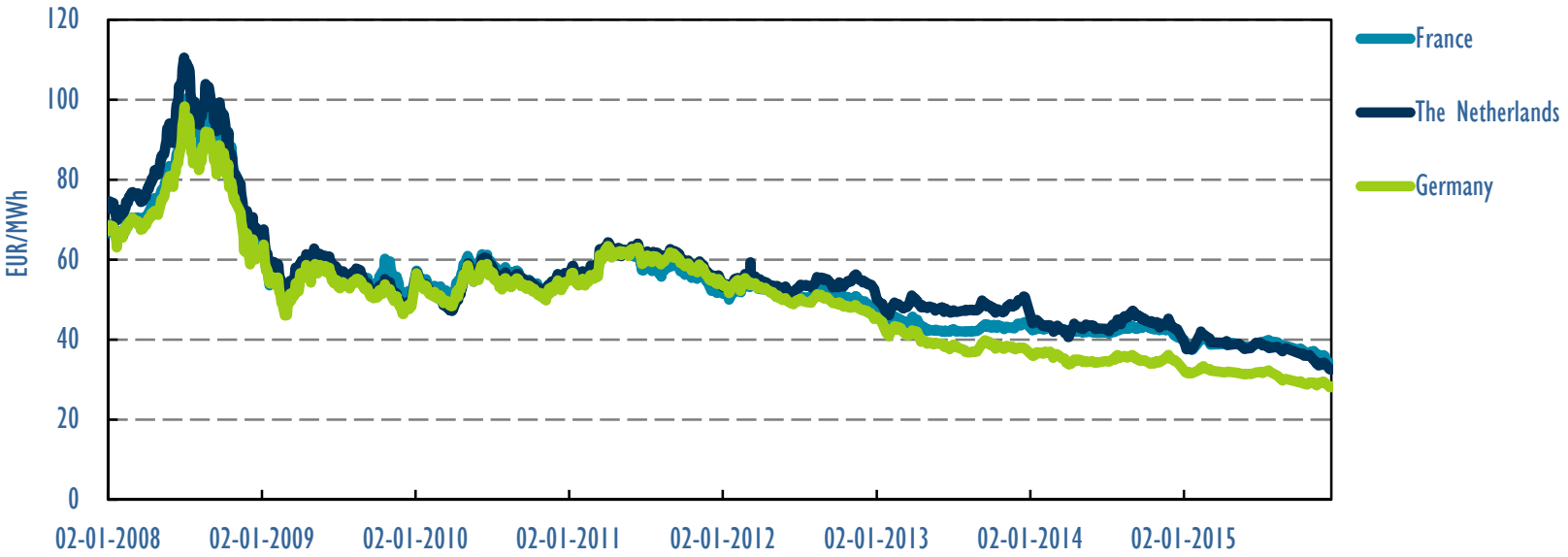
Capacity additions in OECD Europe by technology, 1960-2014



Massive investments needed during the transition will take place in competitive markets. Their design is key for decarbonisation while ensuring electricity security.

Current wholesale prices and long-term risks call for continuing support

Year-ahead forward market prices (Real price 2015), 2008-15



Long-term arrangements are still needed to make up the difference in low-carbon generation costs, and keep financing costs low for capital-intensive investments.

Integrating high shares of wind and solar

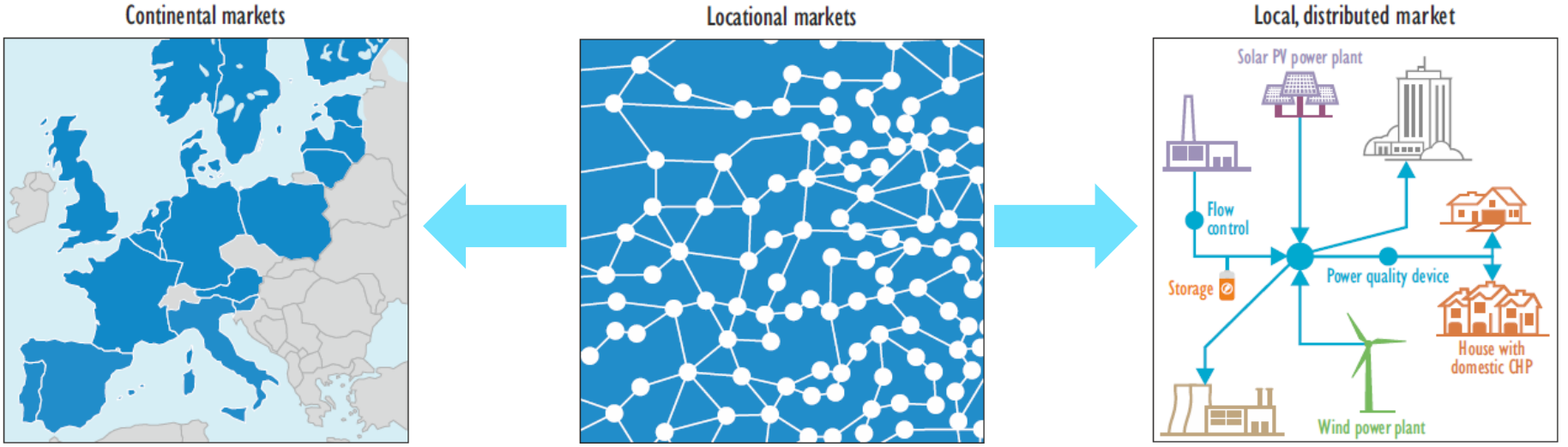
New operational requirements with high shares of renewables

(data for Germany using scaled wind data)

Source: Adapted from IEA (2014) THE POWER OF TRANSFORMATION

Short-term markets can unlock flexibility for efficient and secure system operations, and reap benefits of demand response, storage, flexible generation and networks.

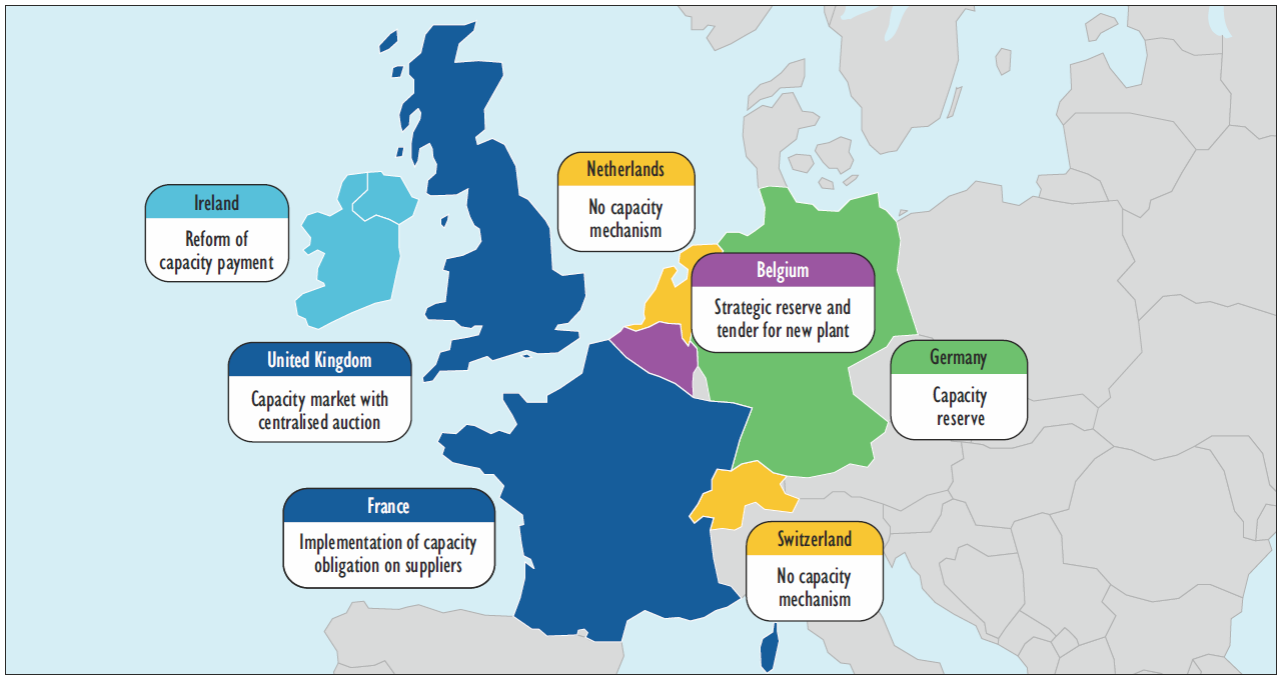
When and where to operate and invest?



Markets prices with a high geographical and temporal "resolution" can provide incentives for efficient and secure coordination of more complex power resources.

Capacity mechanisms: are they needed?

Neighbouring capacity mechanisms in North-West Europe

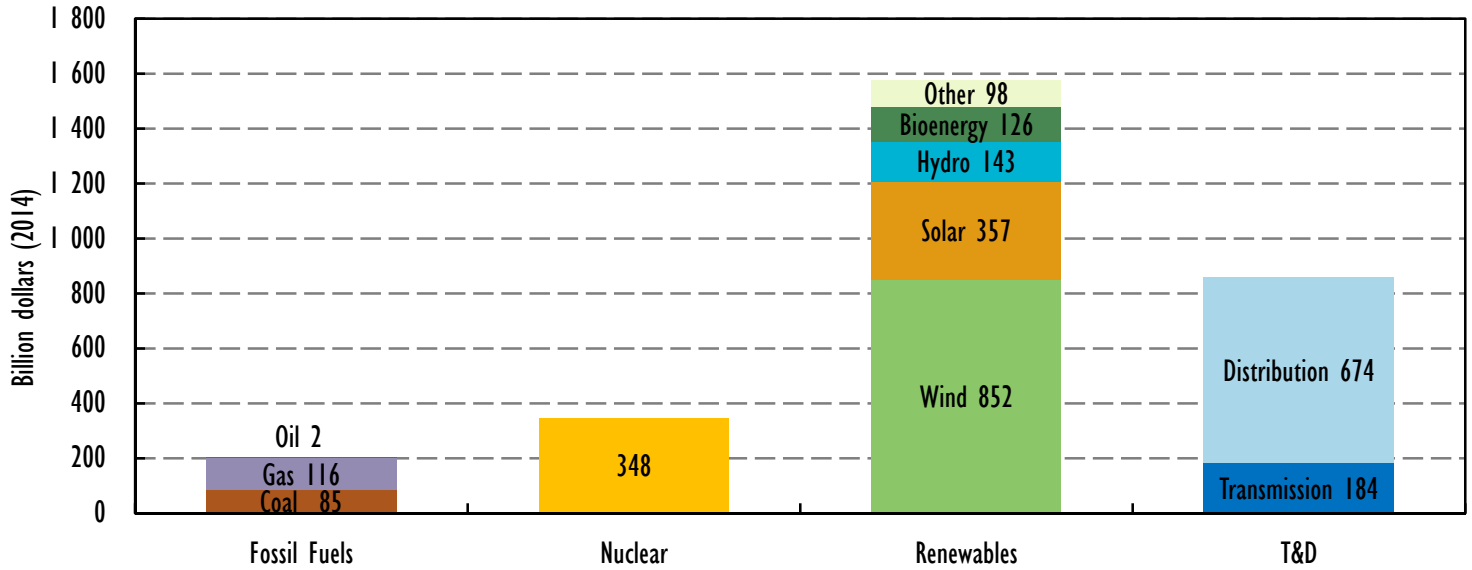


This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Getting scarcity prices right during capacity shortage is a pre-requisite, still capacity mechanisms are increasingly used to create a safety net during the transition.

Low-carbon power and networks require the largest investment

Power-sector cumulative investment by type, 450 Scenario, OECD Europe, 2015-2040

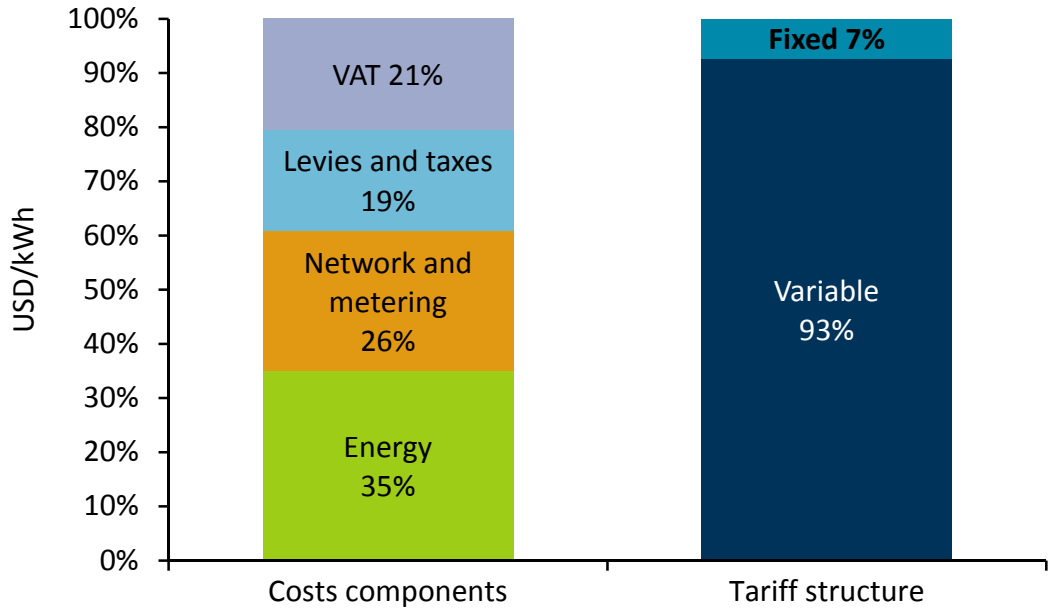


Source: WEO

Decarbonisation involves both capital-intensive investments and a modernised regulatory framework for transmission and distribution networks.

Modernizing retail tariffs

Cost components and tariff structure of selected retail electricity prices
(average for Paris, Berlin and Amsterdam)



Prices have to better reflect the underlying costs level and structure in order to induce efficient investment in solar PV and batteries on the consumer side.

Conclusion: Re-powering markets

- **Decarbonisation of the power sector is forcing a rethinking of electricity market design**
- **Incremental changes – re-powering - can facilitate the transition:**
  - ***Short-term markets with detailed and transparent information on when and where to operate and invest***
  - ***Consistent framework for low carbon support, CO2 pricing and markets***
  - ***Electricity security requires reliability standards and pricing scarcity right, with capacity mechanisms providing an additional safety net***
- **A comprehensive market framework balances rules set by regulators and competitive markets**
- **Many recommendations are relevant outside Europe, including IEA partner countries**