

# Thermal power generation in Germany and Europe between decarbonization and security of supply

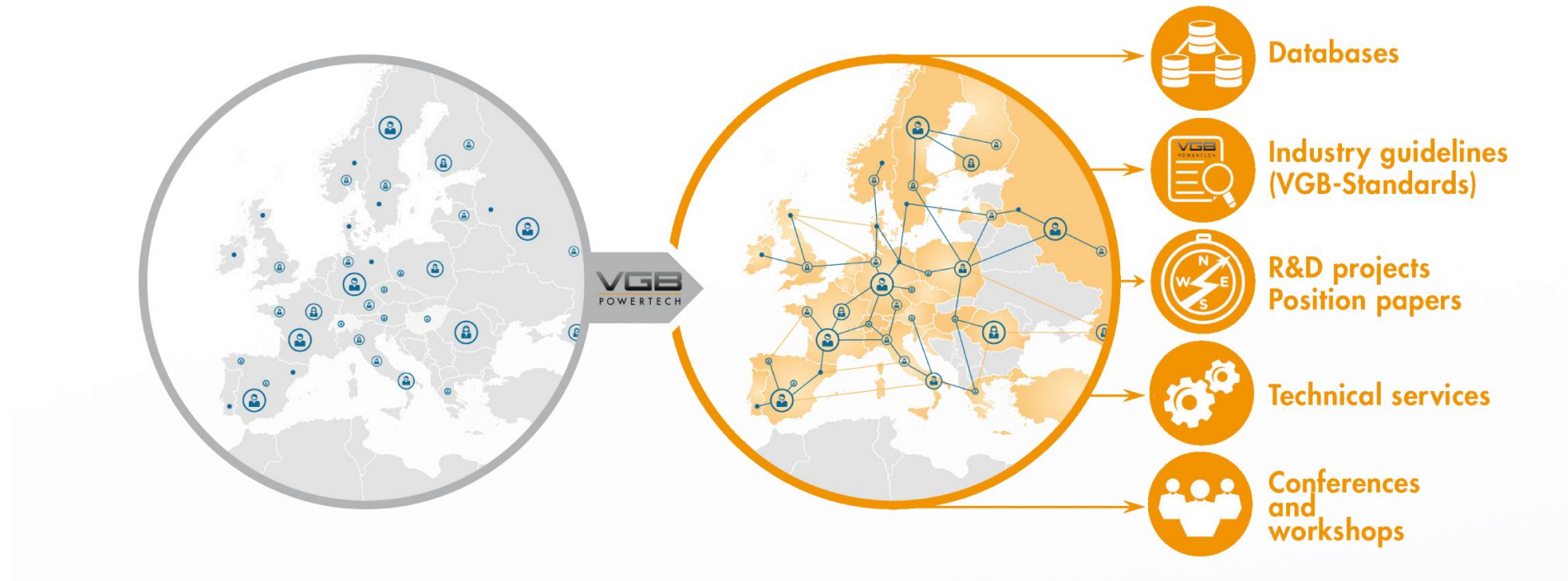
31<sup>st</sup> Clean Coal Day International Symposium  
Dr Oliver Then

Essen/Tokyo, 05 September 2022



# vgbe energy e.V. – who we are

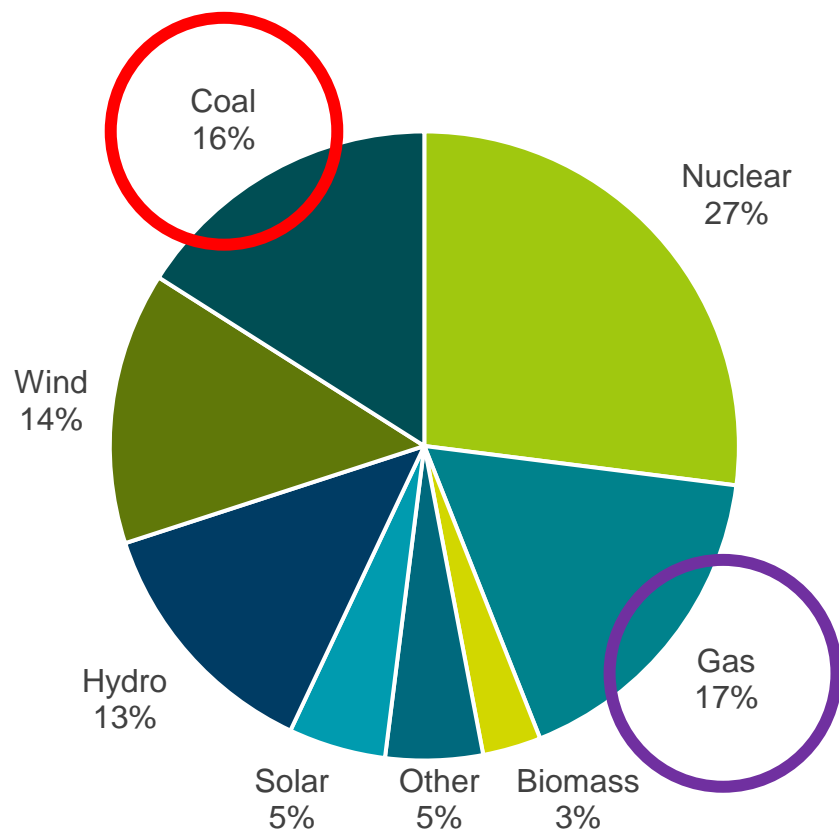
- We have **437 members in 33 countries**
- We represent an installed capacity of **302 GW** based on renewable and conventional energy sources.



vgbe is the International Technical Association of energy plant operators. Founded in 1920 we cover power and heat generation from all fuels, renewables, energy storage and P2X technologies.

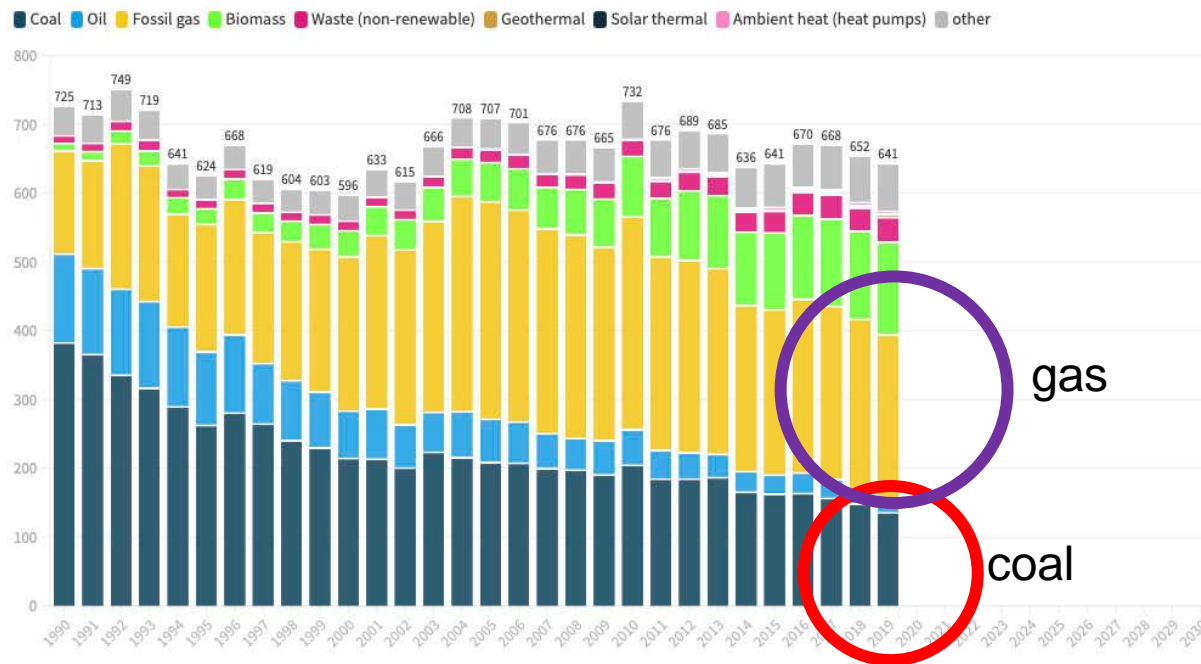
# The role of coal and natural gas in Europe's energy sector

## Annual electricity generation 2021



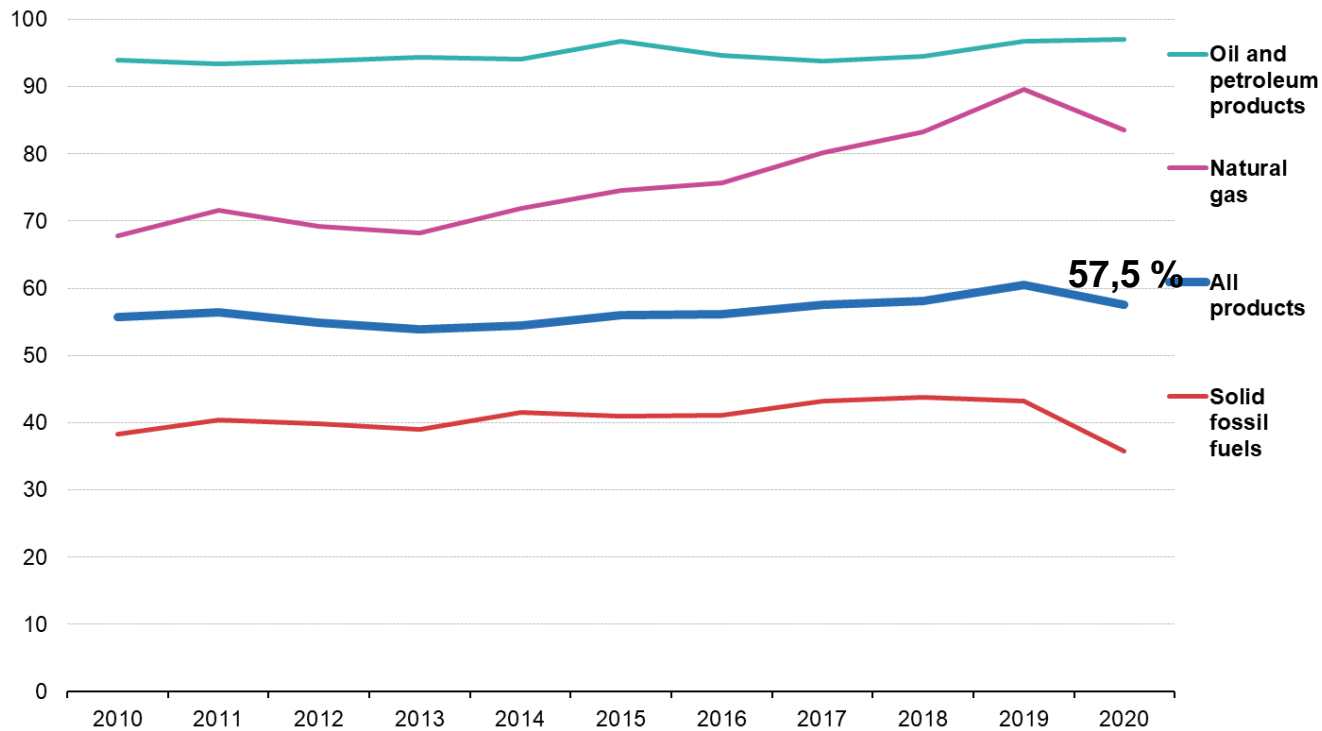
## Heat supply from commercial CHP plants and boilers

**Coal and oil are being replaced with fossil gas, biomass and waste**  
Heat supply from commercial CHP plants and boilers in the EU+UK, in TWh



# Energy Dependency in the European Union 2020

**Energy dependency rate, EU, 2010-2020 (%)**

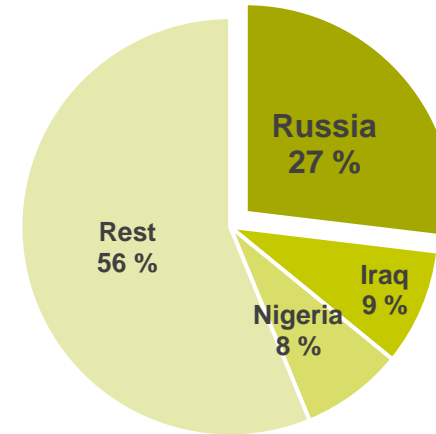


Source: Eurostat (online data code: nrg\_ind\_id)

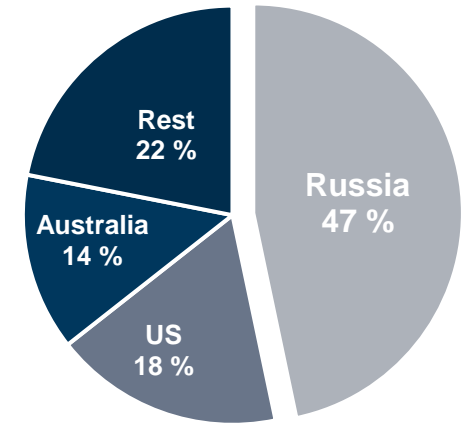
eurostat

**The EU and its Member States are all net importers of energy.**

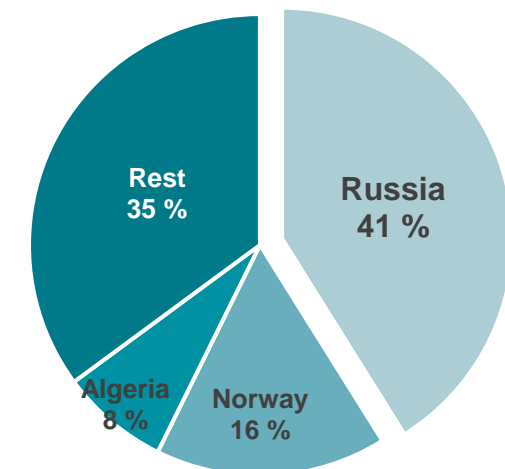
**Crude Oil Imports**



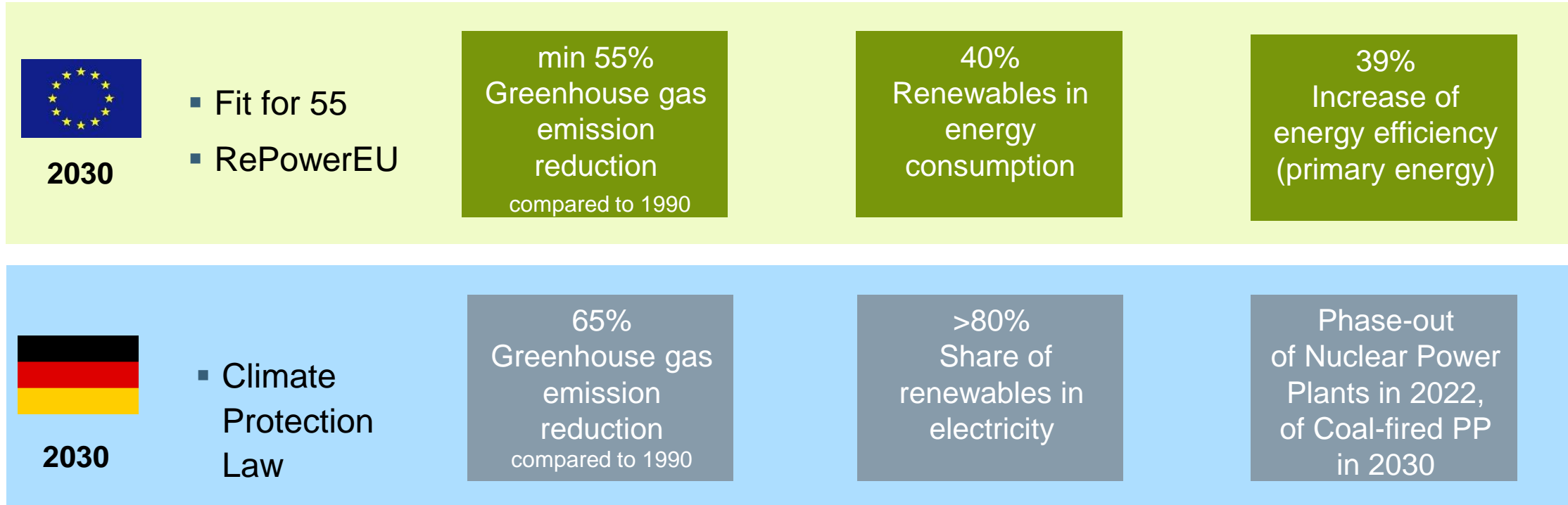
**Coal Imports**



**Natural Gas Imports**

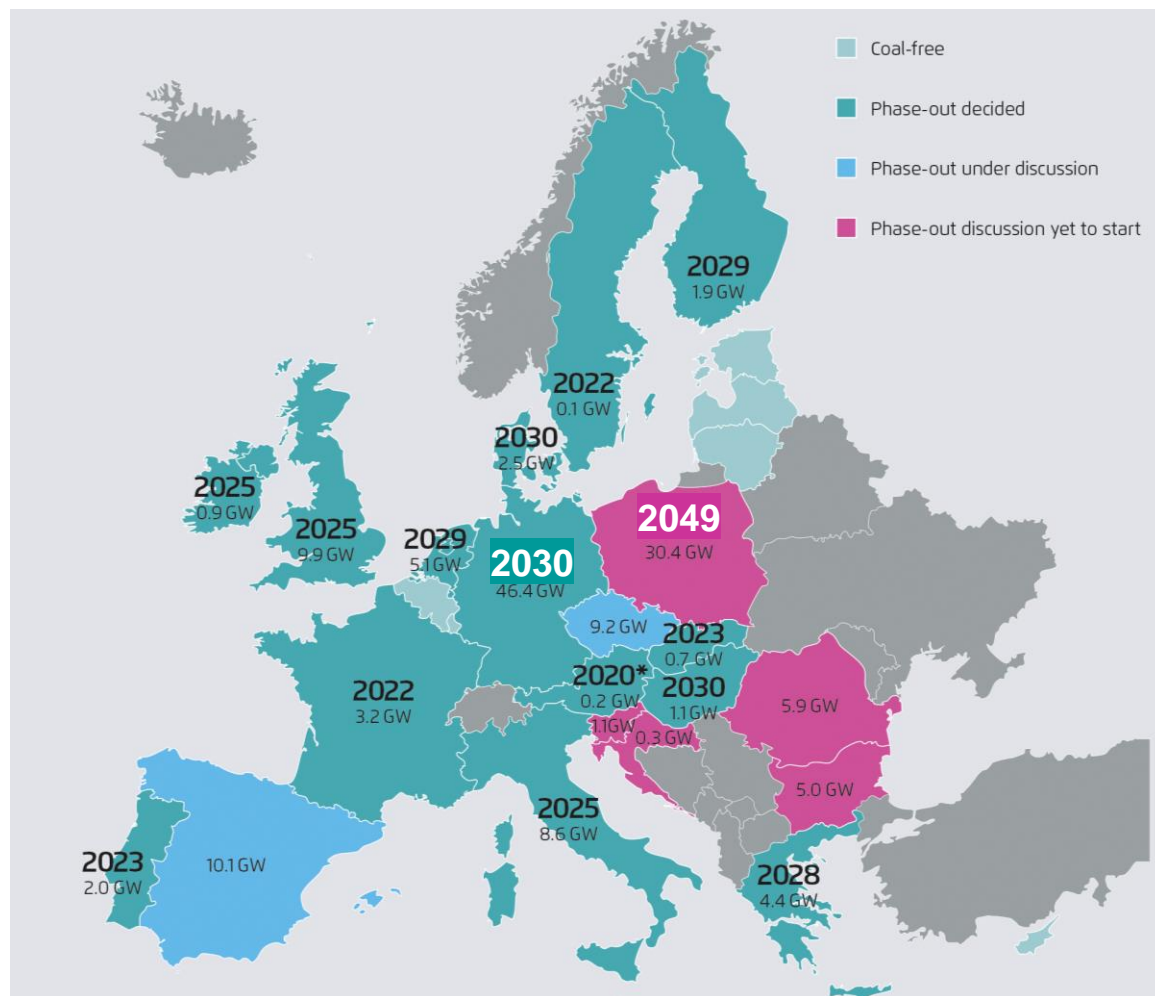


# Europe's and Germany's energy policy targets for 2030 / 2050



**The so-called European “Green Deal” aims at climate neutrality for the European continent (in fact EU26) in 2050. Germany plans to achieve this goal in 2045!**

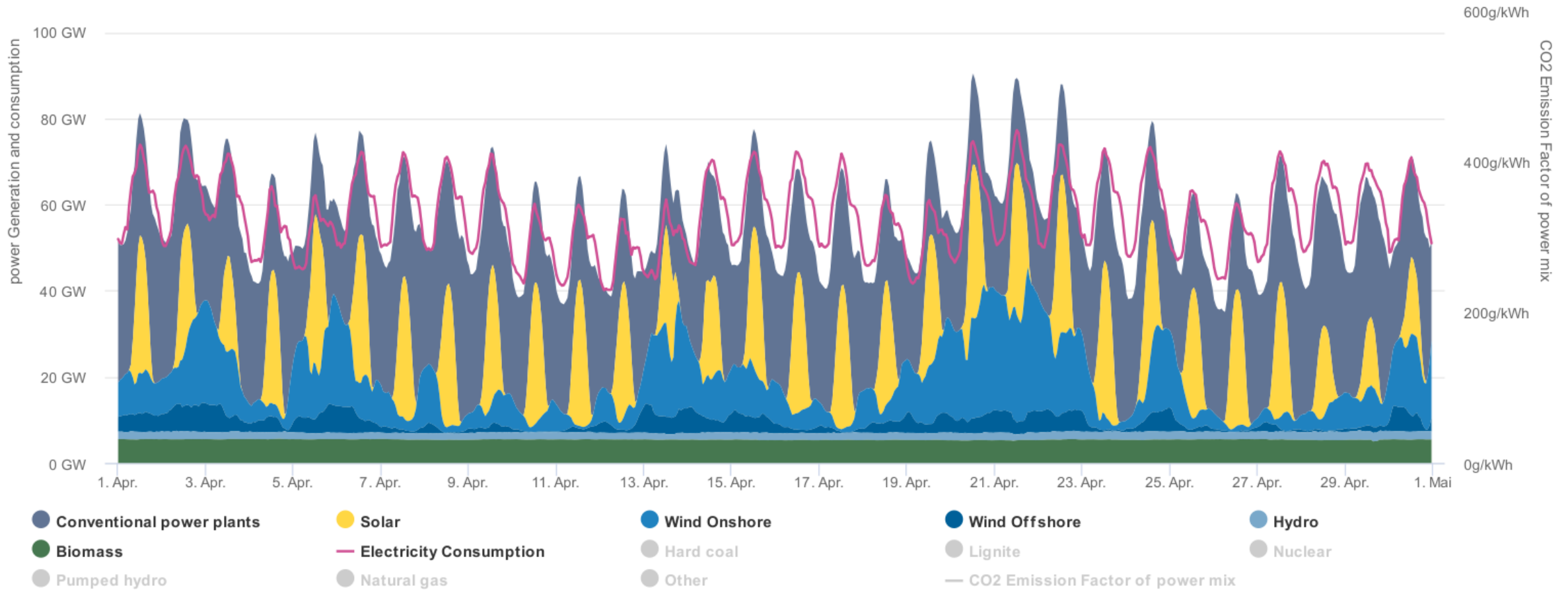
# Coal phase-out in Europe



Source: Europe beyond coal (2021)

- The “Green Deal” and following packages like “Fitfor55” and “RePowerEU” have set ambitious GHG reduction targets.
- Political acceptance of coal based generation falling rapidly.
- Need for major investments in RES, grids, energy storage and sector coupling technologies.
- **Natural gas as a bridge to the decarbonized “Hydrogen era” suddenly doubtful.**
- **Coal/Nuclear as the “new bridge”?**

# German generation portfolio in GW



Period: 1-30 April 2020

VRE are fluctuating on a hourly, daily, weekly and seasonal level thus imposing short- and long-term flexibility requirements on the energy systems.



# Flexibility options in energy systems



Storage and sector coupling

## Dispatchable Generation

- Hydro, gas, biomass, nuclear, coal



Dispatchable generation

## Storage

- Pumped storage
- Sector coupling
- Batteries

# Flexibility options

## Demand-Side Management

- Demand-side response of consumers
- Demand-side response by industries



Grid

## Grid

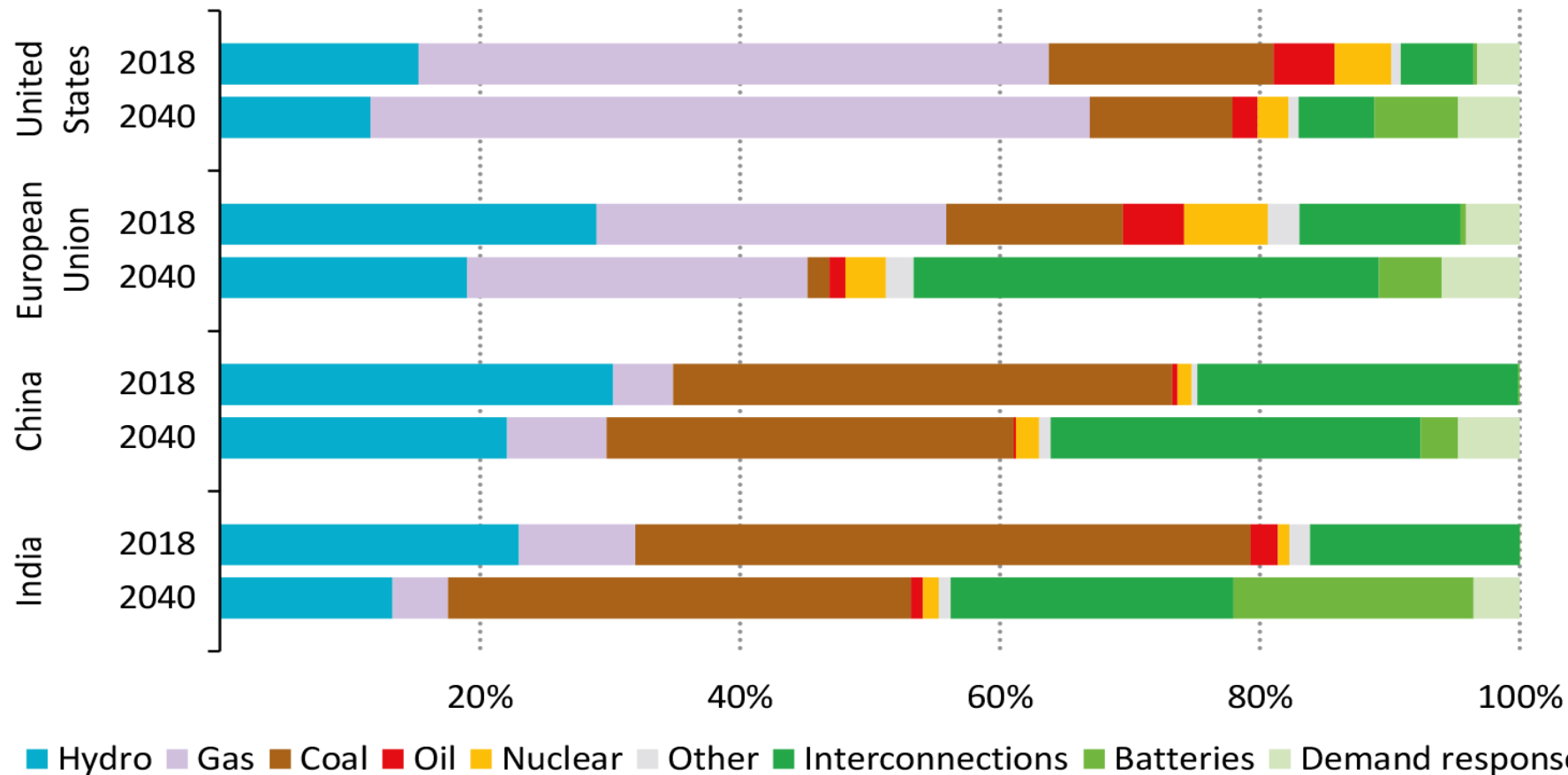
- Interconnections



Demand-side Management



# Flexibility options per region

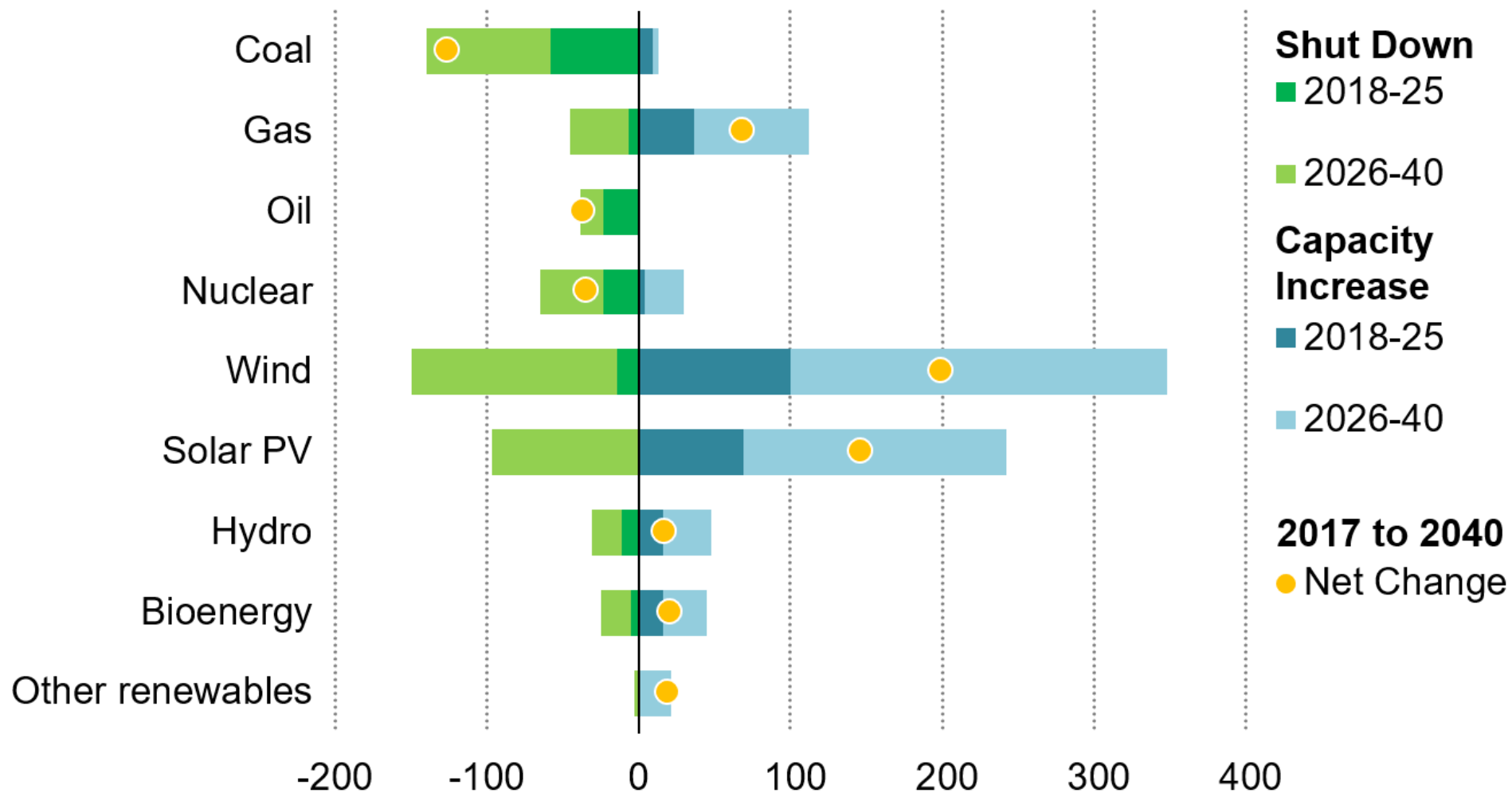


- Dispatchable generation is the essential option to balance VRE to date
- Non-/Low-carbon technologies necessary for decarbonization
- Other flexibility options only available significantly in the mid-/long-term

Source: IEA Stated Policy Scenario, World Energy Outlook 2019

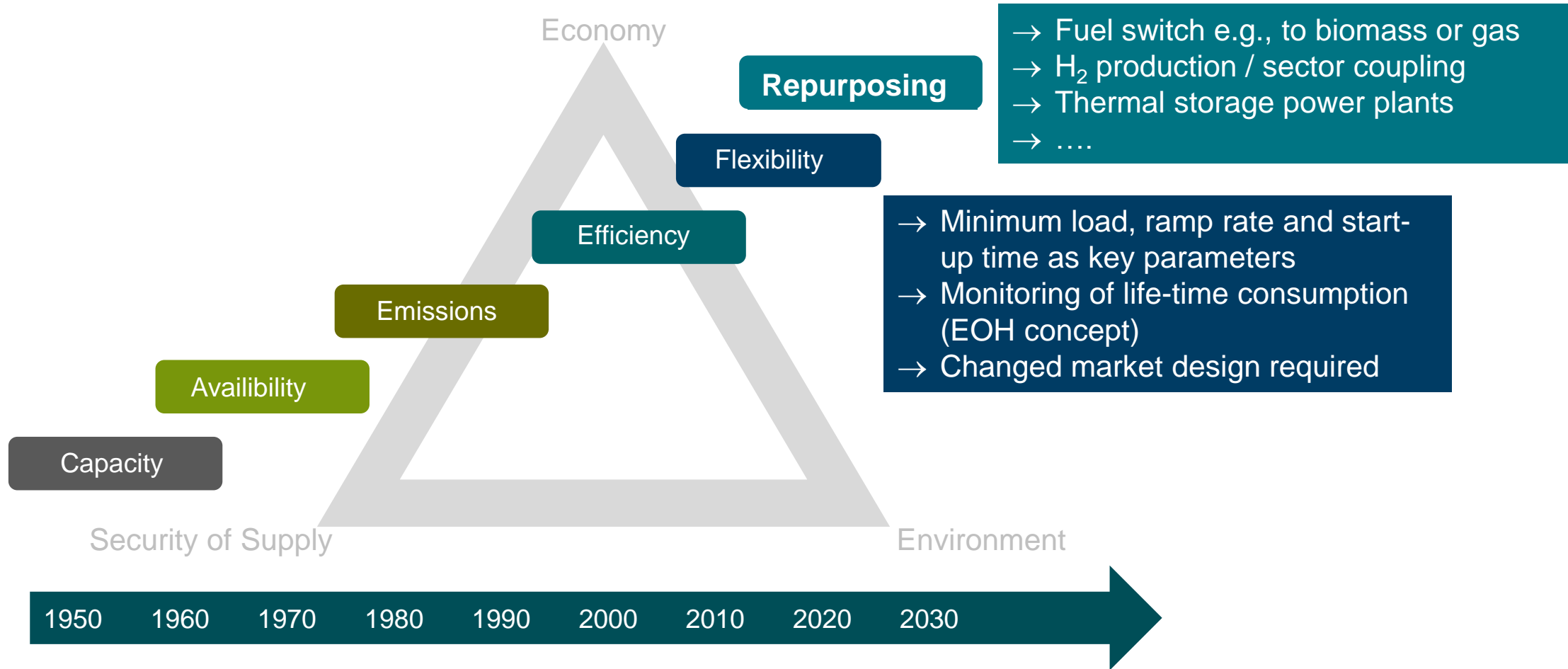
The provision of grid services for network operation, grid stability and security is facing the same situation and challenges.

# Development of generation portfolio in EU28



Reduction of major dispatchable generation capacity requires large-scale and economic viable availability of storage and electrolysis capacities as well as P2X-implementation.

# Coal Power Plant Technology Drivers



➤ The drivers of coal power technology development have changed significantly.

# RECPP – repurposing coal power plants during energy transition



- > 20 partners/associates – led by VGB/vgbe (2020-6/2022)
- 400 sites / 800 units mapped
- Evaluation covering
  - Infrastructure
  - Technologies
  - Sustainability
  - Economics
  - Legal boundaries
- Follow-up projects to detail technical solutions

# Conclusion

- (1) European energy politics aims at an energy system mainly based on VRE requiring a high level of system flexibility and alternative grid stabilisation.
- (2) In the absence of large-scale, long-term storage options conventional generation is still essential for security of supply in the mid-term.
- (3) Reduction of major dispatchable generation capacity requires electrolysis capacities and power-2-x.
- (4) Coal is still one of the pillars of the European power and heat generation. But the age of coal is ending – only the need for security of supply might extend the transition.

Thank you for your attention.

**be energized**  
**be inspired**  
**be connected**  
**be informed**

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