



EURACOAL Executive Committee

A European Perspective on Energy Security

Roger Miesen

Brussels, 23 January 2023

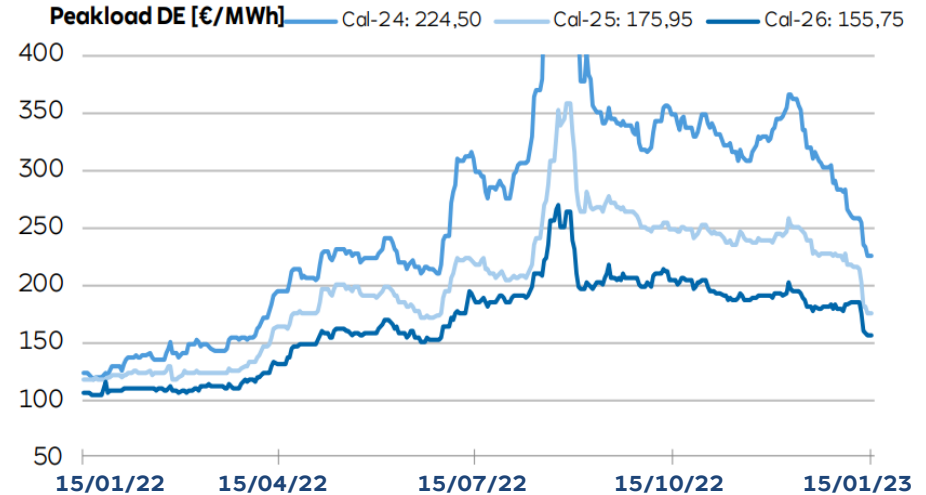


Power forward prices have risen sharply due to the Russian war of aggression in Ukraine

Forward prices electricity base Germany (Cal-23/Cal-24/Cal-25)



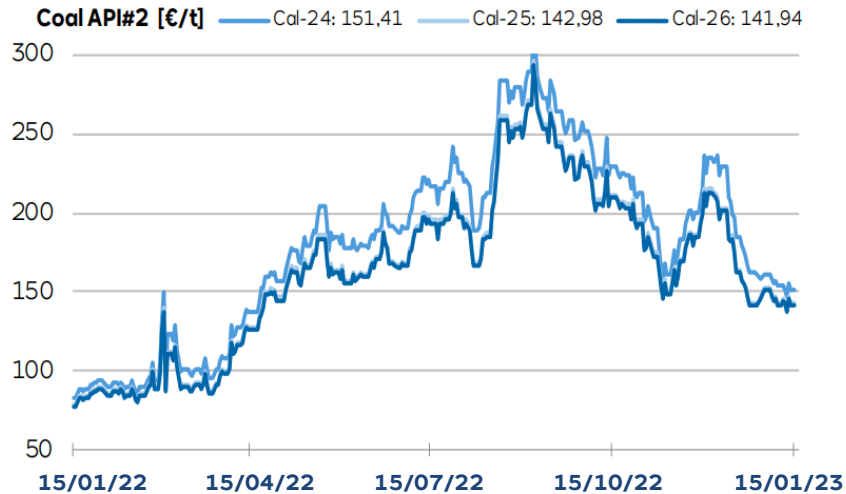
Forward prices electricity peakload Germany (Cal-23/Cal-24/Cal-25)



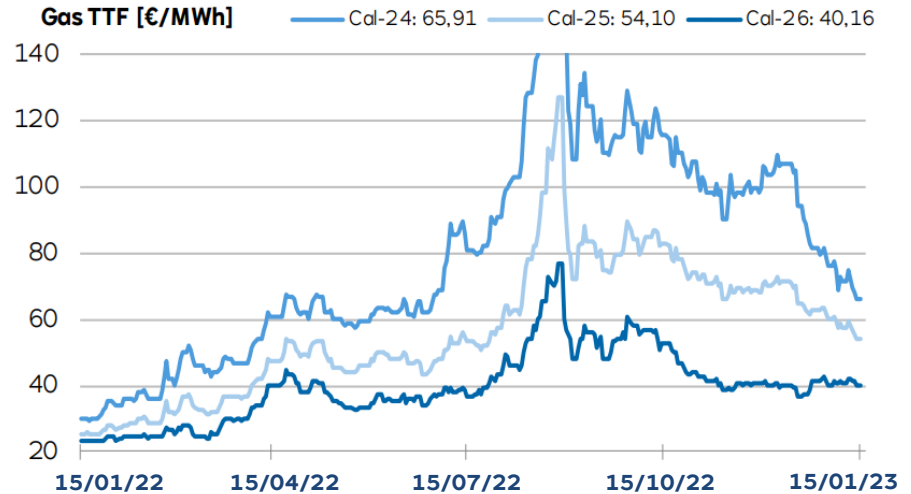
Source: EEX, RWE market research

Coal and gas forward prices have risen sharply due to the Russian war of aggression in Ukraine

Hard coal forward prices for API#2 (Cal-23/Cal-24/Cal-25)



Gas forward prices for TTF (Cal-23/Cal-24/Cal-25)



Source: EEX, RWE market research

Impact of the Russian war of aggression in Ukraine

Measures at EU level

The European Commission has taken energy policy measures in response to the Russian war in Ukraine.

- Strengthening security of supply
- Solving dependence on Russian energy imports by diversifying energy sources
- Accelerating the development of renewable energy

Key measures:

- **REPowerEU plan** to accelerate the expansion of **renewables** and the ramp-up of **hydrogen** to make Europe independent of fossil fuels from Russia "well before 2030".
- Winter Preparedness Package "**Save Gas for a Safe Winter**" to fill gas storage facilities and reduce gas demand by 15%
- EU countries adopt **emergency regulation** to tackle high energy prices: reduce electricity consumption by 10% (5% at peak times), **cap revenues** from some electricity producers, collect a solidarity contribution (windfall tax) from fossil fuel companies

European green deal as overarching programme towards 2050

Member states have creative leeway in implementation

2030 ambition

- 'Fit for 55' package to increase EU ambition level for CO₂ reduction to at least 55% by 2030
- Average required carbon emission reduction of ~260 mn. t of CO₂/y until 2030 flanked by reform of EU ETS
- **Hydrogen** needs to become an intrinsic part of the integrated energy system, with **at least 40 gigawatts of renewable hydrogen electrolyzers** and production of **up to ten million tonnes** of renewable hydrogen

2050 ambition

- The European Parliament endorsed the **net-zero GHG emissions objective** under a European Climate Law (in force since July 2021)
- New 2030 targets for emissions and RES are intended to comply with net-zero target for 2050
- **2030 to 2050: renewable hydrogen technologies at large scale across all hard-to-decarbonise sectors**



Conventional gas

- Decarbonisation mainly steered by the EU ETS
- Capacity reserve markets will be only accessible for existing power plants in line with emission performance standards



Hydrogen

- Clear target announced and funding mechanisms for direct investments in projects available
- Supported by strong RES build-out targets
- GoO's* for green hydrogen structured under RED II
- GoO's for blue hydrogen still unclear (in preparation)



Carbon capture and storage

- No explicit targets on EU level
- To be decided on member states level
- To be supported by Carbon Removal regulation (draft released in Dec. 2022)



Biomass and other

- No explicit EU target
- Solid biofuels for power production allowed, if sustainability criteria are met + efficiency >36%
- Further to be decided on member states level

Source: https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf, CEA-GE * GoO=Guarantee of Origin

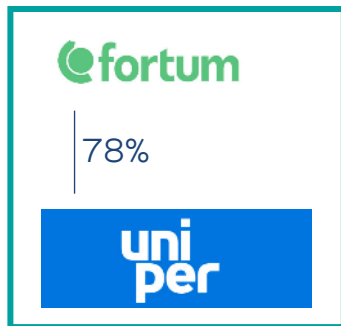
Effects of the Russian war of aggression in Ukraine

Measures of the German Federal Government

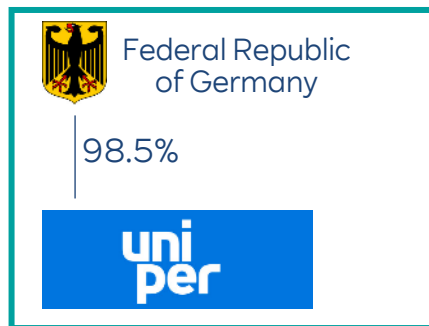
- **Wind-at-Sea Law** to accelerate offshore wind development in order to drive the transformation of the economy towards climate neutrality and the transformation of power generation.
- **LNG Acceleration Act** to speed up approval procedures and the construction of fixed and floating liquefied natural gas terminals and connecting pipelines.
- Act to make **replacement power plants available** – mainly coal and lignite – to reduce electricity generation in gas-fired power plants
- **Gas Storage Act** to increase security of supply in winter
- National implementation of EU regulation on **price caps** by technology specific revenue caps and power price limitation for households and industry
- **Lifetime extension of the three nuclear power plants still in operation** – Emsland, Isar 2 and Neckarwestheim 2 - **until 15 April 2023**. This is intended to provide additional generation capacity in the German electricity grid this winter to contribute to security of supply. New fuel rods shall not be procured.

German Government takes 99% share in Uniper to secure gas supply for companies, municipal utilities and consumers

Prior to June 2022



After stabilization package implemented



- Germany is more than 90% dependent on natural gas imports
- In 2021, approx. 55% of imports came from Russia

Uniper

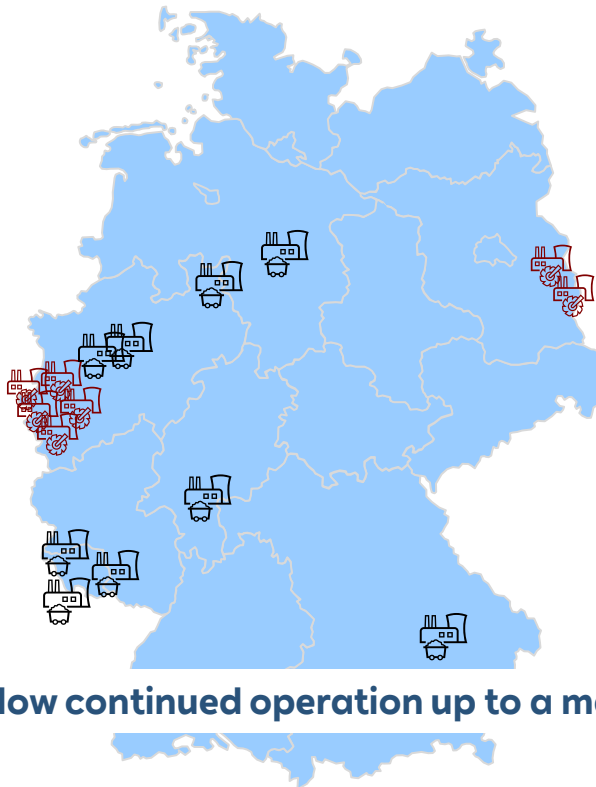
- Largest importer of gas for Germany
- Supplies over 200 municipal utilities
- Most important operator of gas storage facilities (7.4bcm)
- 33GW of power generation capacity
- Total of 11,500 employees
- Present in more than 40 countries

- EU Commission approved the stabilization package for Uniper under state aid law (20/12/2022). Thus, the stabilization measures will now be implemented immediately. As part of the approval, the EU Commission set out a number of structural remedies that Uniper must fulfil. The German Federal Government agreed to reduce its shareholding to a maximum of 25% plus one share by 2028 at the latest.
- At the Extraordinary General Meeting (19/12/2022), the shareholders of Uniper approved the proposed capital measures by a large majority.

In Germany, coal-fired power plants extend market operation to save natural gas and prepare for possible gas shortages

Hard coal power plants

- Heyden 4 (Uniper) 875MW
- Staudinger 5 (Uniper) 510MW
- Scholven C (Uniper) 345MW
- Bergkamen (STEAG) 780MW
- Völklingen-Fenne (STEAG) 466MW
- Weiher (STEAG) 724MW
- Bexbach (STEAG) 780MW
- Mehrum (EPH) 690MW
- RDK 7 (EnBW) 517MW



Lignite power plants

- Niederaußem E (RWE) 300MW
- Niederaußem F (RWE) 300MW
- Neurath C (RWE) 300MW
- Neurath D (RWE) 600MW
- Neurath E (RWE) 600MW
- Jänschwalde E (LEAG) 500MW
- Jänschwalde F (LEAG) 500MW

Lifetime extensions allow continued operation up to a maximum of 31/03/2024

Coal currently plays an important role in electricity generation in several European countries, but the exit has been decided

Coal supply in the EU-27 in 2021

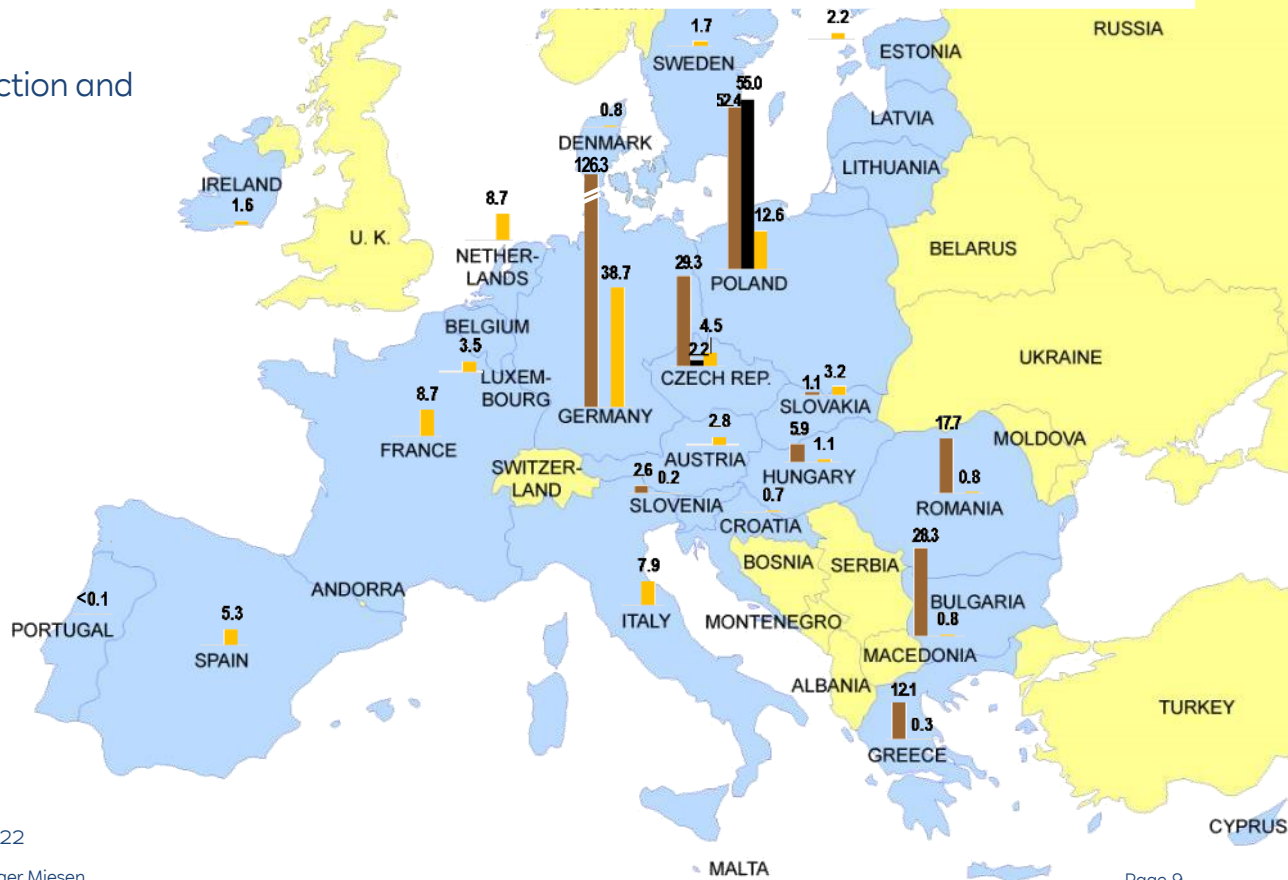
Lignite production, hard coal production and hard coal imports in Mt

EU-27

■ Lignite production: **275Mt**

■ Hard coal production: **57Mt**

■ Hard coal imports: **106Mt**



Source: EURACOAL, Annual Report 2021, Brussels, July 2022

Coal is on the way out, but some countries have yet to commit to a phase-out deadline

National pledges to phase out coal in Europe, indicating the date for the coal phase-out

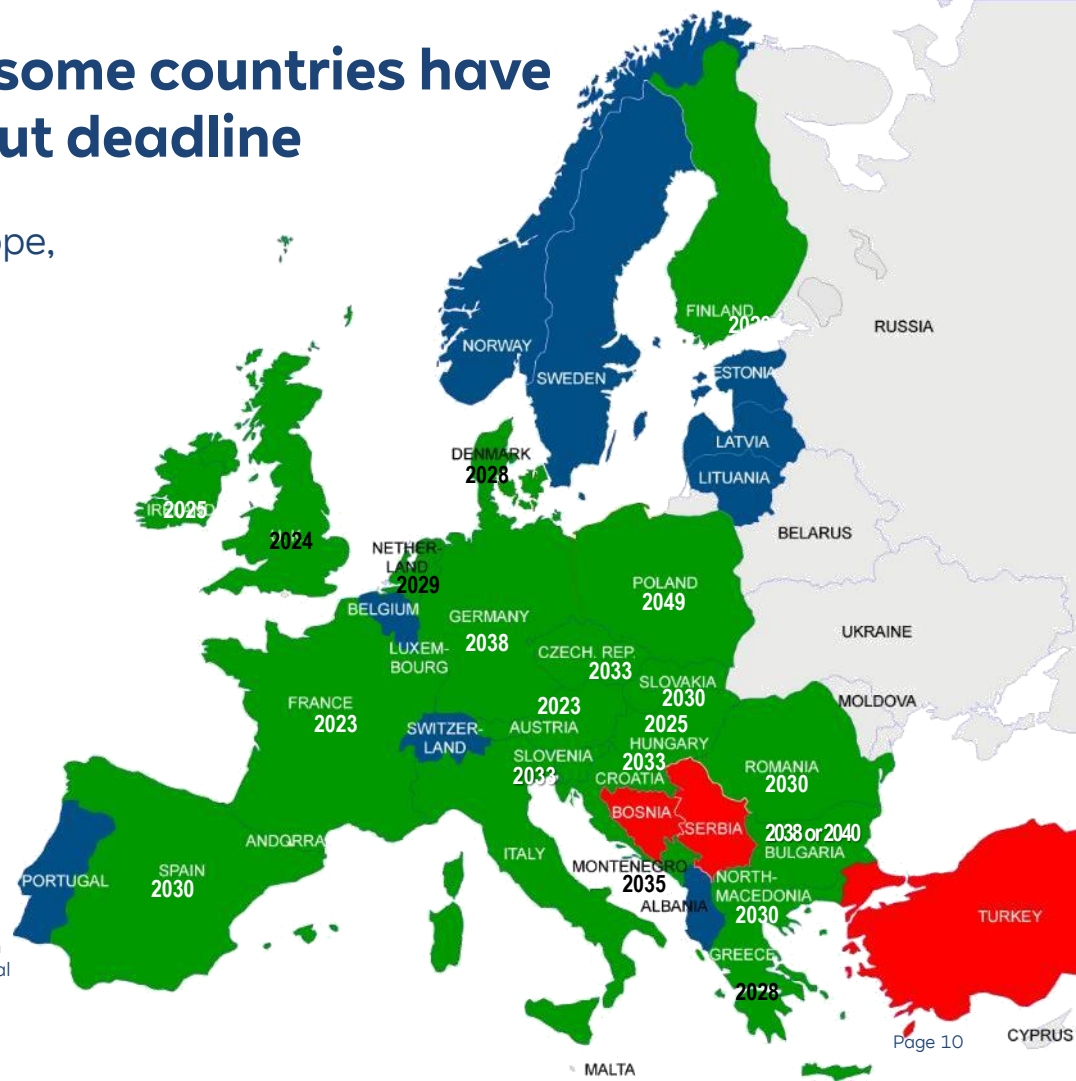
Coal phase-out decided

Coal phase-out discussion not yet started

No coal in electricity mix

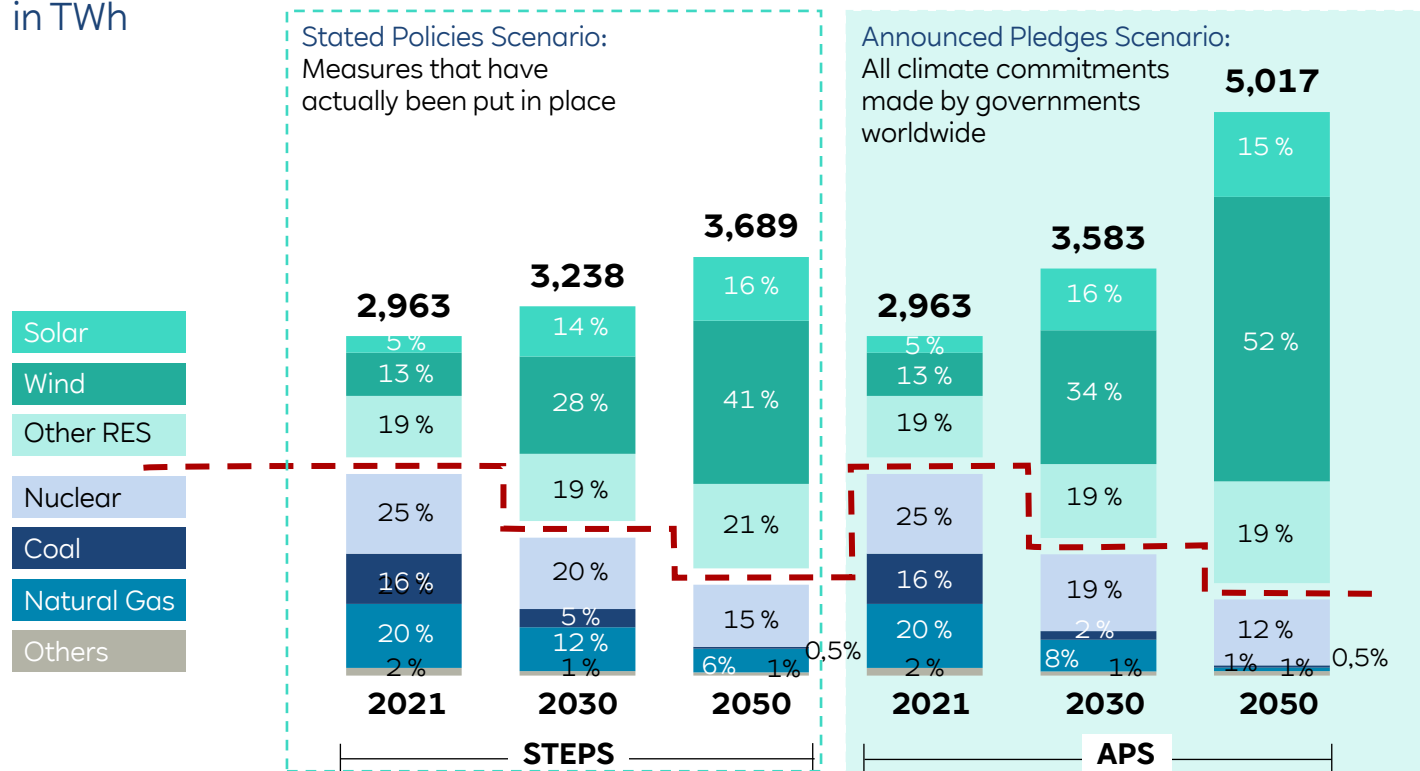
Share of coal in total electricity generation 2021 in EU-27: 15.2%

Source: Europe Beyond Coal (2022), Europe's Coal Exit, Overview of National Coal Phase out Commitments. Updated 14 July 2022; <https://beyond-coal.eu/europes-coal-exit/> as well as additional information from Euracoal for Poland (social agreement with the trade unions to end coal mining in 2049).



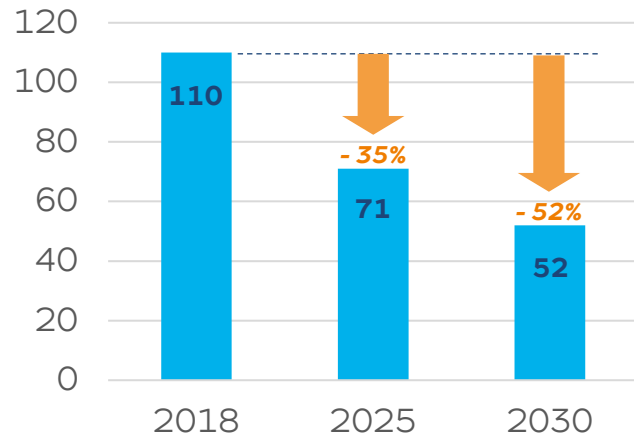
IEA scenarios show strong decline of coal and future dominance of renewables in EU electricity generation

Electricity generation in the European Union
in TWh



ewi analysis: Controllable power plant capacity in Germany declines significantly due to early coal phase-out

Controllable power plant capacity* and flexibility in Germany with coal phase-out 2030 (GW)



* Hard coal, lignite, biomass, other conventional generation, waste incineration plants, hydropower, gas, nuclear

Source: Analysis of the security of supply until 2030, ewi Köln (5/2022)

RWE 23/01/2023 EURACOAL Executive Committee Roger Miesen

ewi Institute of Energy Economics
at the University of Cologne

- No supply gaps are expected in Germany until 2025 under the given assumptions.
- In 2030, supply gaps are possible in Germany due to a complete coal phase-out by the end of 2030. System is kept stable mainly by imports.
- Complete resilience of the electricity system against possible extreme weather events is not guaranteed in 2030.

RWE: Agreement on lignite phase-out by 2030 and strengthening of security of supply in the energy crisis

- **RWE will end lignite-based electricity generation as early as 2030** (instead of 2038).
 - Reduction of CO₂ emissions by 280 million tonnes.
 - RWE will adjust CO₂ reduction plan to the 1.5-degree path.
- For the coal phase-out in the Rhenish lignite area to be possible, the energy turnaround must be so far advanced in 2030 that Germany's security of supply is not at risk. **RWE will make a massive global investment of more than 50 billion euros** gross by 2030 in the expansion of wind and solar power plants, storage facilities and additional guaranteed capacity in the form of modern gas-fired power plants that can be operated with hydrogen in the future, 15 billion euros of which will be invested in Germany.
- The two RWE power plant units of **Neurath D and E** (a total of 1,200MW) **will continue to operate until 31 March 2024** instead of being decommissioned by end of 2022 in order to strengthen security of supply and displace gas from electricity production.

Bio-Energy with Carbon Capture, Utilisation & Storage (BECCUS) for negative CO₂ emissions and 'green carbon'

- **RWE** intends to develop a solid **technical & economical concept** for BECCUS at Eemshaven and Amer that is **widely supported by the general public and policymakers**
- **Amer** is at **80%** biomass co-firing (to reach 100% in 2022/23), **Eemshaven** is at **15%** biomass co-firing
- Preliminary work has already been done, **concept studies on 100% biomass and CCS** are being used as a **pragmatic starting point**
- We are developing **partnerships along the CO₂ value chain** and will **pro-actively approach stakeholders in society and politics** to offer solutions for the energy transition
- Given a supportive regulatory framework, both stations can presumably gradually be converted to **100% biomass and CCS step by step by 2030**; projects **kicked off in February 2022**



Conclusion

- Loss of Russian gas imports with massive impact on energy markets, in particular strong increase in electricity and commodity prices
- Energy affordability is a concern for industry and households
- Security of supply is the order of the day - at the same time, climate protection remains one of the central challenges of our time
- For the coal phase-out to become possible, the expansion of renewable energies and the ramp-up of the hydrogen economy must be accelerated
- This requires a massive expansion of wind and solar power plants, storage facilities and additional guaranteed capacity in the form of modern gas-fired power plants that can be operated with hydrogen in the future
- Short-term need for coal-fired power generation to ensure security of supply; based on the agreement, German and North Rhine-Westphalian Government confirmed the removal of the Lützerath village as this is needed to excavate sufficient amount of coal to run the lignite plants
- No abandonment of the long-term goal of decarbonisation in Europe