



Building a Paris Agreement Compatible (PAC) energy scenario

CAN Europe/EEB technical summary of key elements

June 2020



2.1 Phasing out coal

Key assumptions

It is as indispensable¹ as inevitable that most of the hard coal and lignite consumption will be phased-out by the year 2030.

- National coal phase-out plans for electricity generation exist in most EU Member States. These will be implemented or even anticipated by power plant operators because of high carbon prices and low economic attractiveness.² Coal fired power plants that supply district heat tend to be retired later.
- The increase of the carbon price and renewable capacities will strongly reduce the full load hours of the remaining coal capacities. Most of them will be retired by 2030. Very few reserve capacities remain.³ Neither retrofitting of existing coal capacities nor new mines are considered economically viable.
- Renovation will lead to a quick replacement of individual heating based on coal. In industry, energy savings as well as electrification and renewable hydrogen will substitute the most important coal supply in the steel, cement and ceramics industries. The introduction of CCS is not considered realistic.

Evolution of energy supply

Coal-fired power plants have become risky assets for most operators in most countries.⁴ In addition, air quality legislation leads to earlier shutdowns. In 2030, only 7 TWh of electricity are produced by remaining capacities in Germany, Poland, Estonia and Czechia. These are used as back-up capacities with very low full load hours.

In the energy-intensive industry, the phase-out of coal will progress only slightly slower than in electricity generation. Coal supply falls from 394 TWh in 2015 to 140 TWh in 2030 to disappear by 2035. This development is largely due to developments in the steel industry. Firstly, the reduced steel demand cuts coal consumption. Besides this trend, a massive increase of the electric arc furnace route for steel production together with the introduction of the Direct Reduction of Iron (H-DRI) process reduces the coal supply for blast furnaces.⁵

Integration of members' and experts' feedback

The coal-phase out trajectory was developed in close collaboration with experts and members. Assumptions were discussed at the PAC scenario workshops.⁶ Key figures for the electricity sector are based on the Europe Beyond Coal campaign's database of coal-fired power plants.⁷ In addition to the Öko-Institut's market modelling (see page 38), several country-specific studies were considered to substantiate the phase-out trajectory.⁸

Sensitivities and limitations

Depending on the short- and mid-term evolution of the EU Emission Trading System (ETS) carbon price, capacities for electricity generation could be retired even more quickly. A potential fuel switch of coal-fired power plants from coal to

¹ Climate Analytics: Global and regional coal phase-out requirements of the Paris Agreement, September 2019.

² Carbon Tracker: Powering down coal. Navigating the economic and financial risks in the last years of coal power, November 2018; Sandbag: The cash cow has stopped giving: Are Germany's lignite plants now worthless? July 2019.

³ This was confirmed by Öko-Institut's electricity market modelling with PAC scenario assumptions and a carbon price of €84/t.

⁴ Carbon Tracker: Apocalypse now, October 2019; Carbon Tracker: Lignite of the living dead, December 2017.

⁵ Material Economics.

⁶ CAN Europe/EEB: Summaries of PAC scenario workshops and General Assemblies workshops.

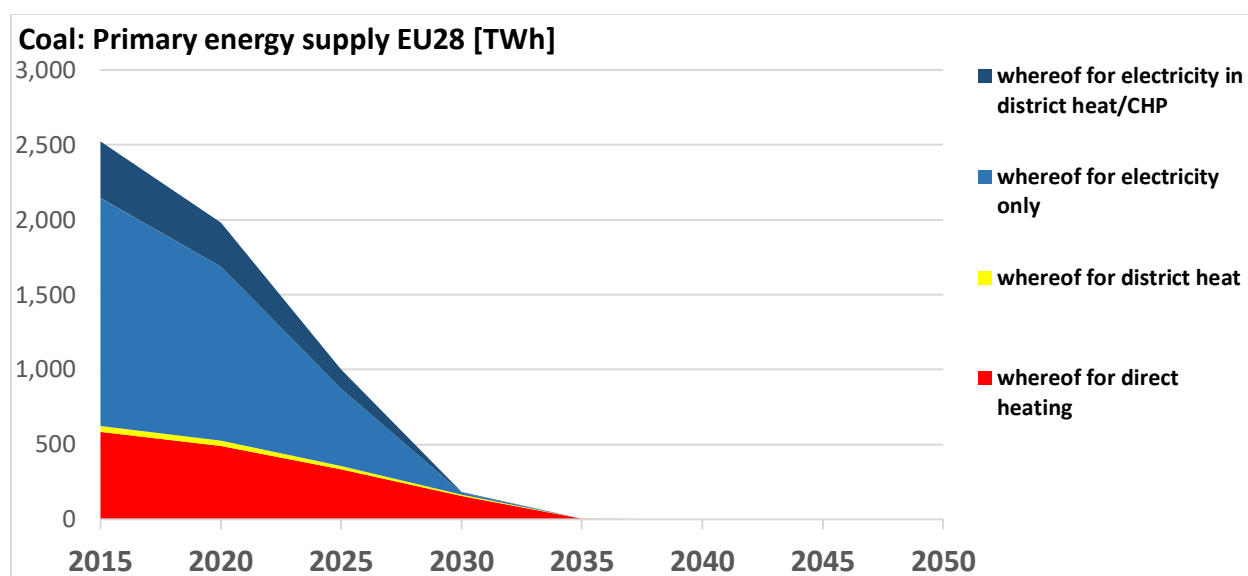
⁷ Europe Beyond Coal: European Coal Plant Database. Status: 12 July 2019. Country-specific updates were integrated by May 2020.

⁸ Forum Energii: PEP2040 scrutinized by Forum Energii. Comments and recommendations, Nov. 2018; Energynautics: Czech power grid without electricity from coal by 2030, May 2018; REKK et al.: Accelerated lignite exit in Bulgaria, Romania and Greece, May 2020; Bartholdsen et al.: Pathways for Germany's low-carbon energy transformation towards 2050. In: Energies, 2019, 12, 2988, Aug. 2019.

biomass has not been analysed in detail. Given the environmental risks associated with it, such a conversion or co-firing should be avoided.⁹

Key results¹⁰

- NGOs’ policy demand of phasing out coal by 2030 will mostly be implemented: In electricity generation, renewables and the carbon price drive the quick phase-out in almost all Member States by 2030. Support schemes such as capacity mechanisms can delay this trend only by a few years.
- Poland and Germany are the two Member States that dominate the remaining hard coal and lignite capacities. In 2030, Poland produces 2 TWh and Germany 4 TWh of electricity from coal.
- As the use of coal in industry is mainly concentrated in a limited number of energy-intensive steel production sites, their gradual modernisation during normal investment cycles will bring about a switch from coal to renewable electricity and hydrogen (see also chapter 1.1 on industry’s energy demand).



⁹ Sandbag: Playing with fire. An assessment of company plans to burn biomass in EU coal power stations, Dec. 2019.

¹⁰ Findings in this chapter also include the extraction and combustion of oil shale which statistically accounts as hard coal. In the EU, it is used for electricity generation in Estonia only. In 2030, oil shale fired capacities of 659 MW remain in Estonia with <1 TWh of electricity produced according to Öko-Institut’s electricity market modelling. It is possible that these capacities will be retired earlier.