Accelerating the German coal phase-out and lowering electricity prices - both are possible provided renewables expand fast enough

Germany parliamentary elections are around the corner, but what will the election result mean for future German and European energy policy? An accelerated expansion of wind and solar capacities could potentially lead to falling prices despite a reduction in thermal generation capacity due to the phasing out of coal. However, adequate expansion of storage and grid infrastructure will be essential to avoid supply bottlenecks and reduce electricity price peaks.

September 26th will see a reshuffling of the cards in German politics. Due to the fragmented political situation, three parties will likely come together to form a federal government.

The tasks facing this new government are enormous: counteracting climate change, detailing the phase-out of coal-fired power generation, reassessing the renewable build-out strategy while all the while taking into account the impact on electricity prices.

We have analysed the energy and climate policy content in every party's election manifesto and evaluated the implications of alternative government coalitions on the German and European energy markets.

The party manifestos under the microscope

Though the pandemic has dominated headlines for a long time, climate, energy and environmental issues are, according to Statista, the most important issues in Germany in the run-up to the election.

Public perception has been strongly influenced by the recent extreme weather events, the Fridays-for-Future protests, as well as the decision of the Federal Constitutional Court on the German Climate Protection Act. Almost all democratic parties cover climate policy in their manifestos.

However, there are clear differences in the both the prominence and position that climate policy plays in the different parties' policy platforms. While Bündnis90/Die Grünen (B90/G) and, to a lesser extent, Die Linke (The Left) set clear targets for the expansion of renewables, set a 2030-deadline for the early phase-out of coal and aim for higher CO_2 prices, the SPD, CDU/CSU and FDP remain rather vague.

To assess the impact of the party manifestos, we have used our pan-European electricity market model to simulate the electricity market and analyse how the parties' positions might affect electricity generation, wholesale electricity prices and CO_2 emissions. We have focused primarily on the measures specifically mentioned in the manifestos and derived the following scenarios:

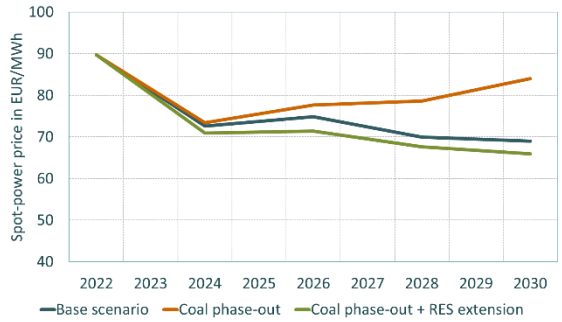
- Base scenario: Coal phase-out by 2038 as currently envisaged. Renewable expansion compatible with the political target of 65% of electricity generation by 2030. This scenario is our reference scenario. In the baseline scenario, coal (incl. lignite) accounts for about 5% of total production in 2030. Installed coal capacity (incl. lignite) corresponds to about 16 GW in 2030.
- Coal phase-out by 2030 with most capacity retiring in the second half of this decade.
- Early coal phase-out as above, complemented by significant renewables expansion. The wind and solar expansion paths are derived from the Green party manifesto. This results in an additional 95 GW of wind and solar capacity by 2030 compared to our base scenario.

The results presented here are not to be understood as a price forecast, but are primarily intended to illustrate the effect of the different measures.

Electricity prices will rise if the coal phase-out is brought forward without countermeasures

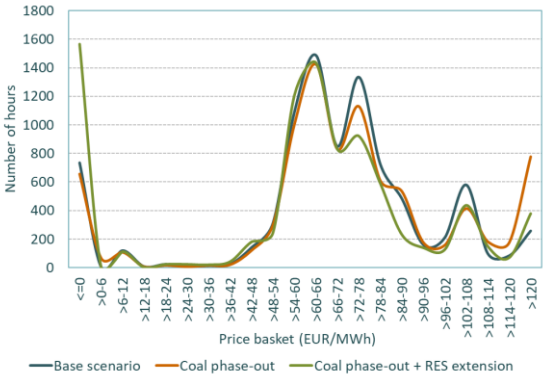
Phasing out coal by 2030, as called for by B90/G and the Left Party, pushes up electricity prices, especially from the mid-2020s. Figure 1 shows average annual electricity prices in the three scenarios out to 2030.

Figure 1: Electricity price trends to 2030 (real 2021 EUR/MWh)



The electricity price increase is driven primarily by higher peak prices in the winter months. Figure 2 illustrates the effect on the price structure, mapping the number of hours in different price segments. The share of high-price hours increases significantly when assuming an earlier coal phase-out, with some hours well above 250 €/MWh. This is an indication that capacity shortages and possible supply bottlenecks could occur if the coal phase-out is accelerated in isolation.

Figure 2: Hourly electricity prices in January 2030 (real 2021 prices).



Strong renewable buildout could reduce the number of extreme price hours. This is reflected in our third scenario, which shows average electricity prices below those in the base scenario (Figure 1).

However, the renewables scenario still suggests a tight market balance during peak load periods as displayed by the higher number of high-price hours in Figure 2. The fall in average prices is mainly driven by a significantly increased share of zero-price or negative-price hours. Indeed, the scale of renewable capacity is such that a significant amount of potential renewable generation cannot be used in this scenario (order of magnitude 10 TWh in 2030). If grid congestion were also taken into account, this amount would be even larger.

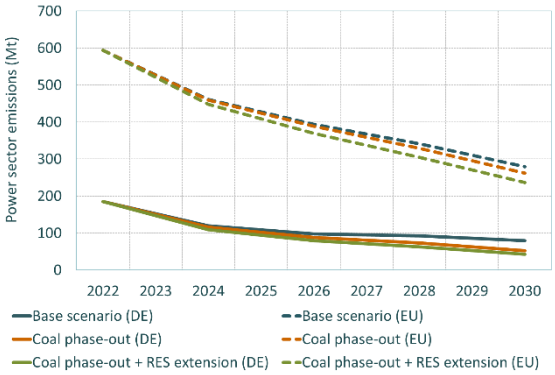
The results suggest that not only is further renewable expansion needed, but that this would need to be coupled with investment in storage technologies to avoid grid congestion. Batteries alone are unlikely to be sufficient, given their comparatively limited storage capacity. An accelerated expansion of wind and solar capacities would also require further investments in network infrastructure that go far beyond Germany's planned '*electricity highways*'.

Power sector emissions will fall, despite some offsetting increases

The coal phase-out will reduce power sector emissions. This is true for both Germany and European power sector emissions more broadly (see Figure 3, the solid and dotted lines represent German and European emissions respectively).

If the coal phase-out were to be brought forward without increased renewable build-out, German power sector emissions would fall more sharply than those for Europe as a whole. The reason for this is a partial waterbed effect, with reduced national coal-fired power generation replaced in part by the use of thermal power plants in neighbouring countries. These include both gas- and coal-fired power plants. German gas-fired power generation would increase by only 5.7 TWh in 2030 compared to our reference scenario, with most of the reduction in German coal generation covered instead by increased imports.

Figure 3: Electricity sector emissions in million metric tons of CO_2



With accelerated renewable build-out, as assumed in our third scenario, the additional generation from this renewable capacity would largely displace imports, and thus foreign thermal production. The effect of the additional renewable capacity on German emissions is limited, but European power section emissions are reduced by an additional 25 million tonnes of CO_2 in 2030.

The energy transition pathway adopted by the new German government will depend strongly on the resulting government coalition. Market participants should therefore prepare for noticeable changes in German policy and the long-term market outlook.

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