

Nuclear and Coal Phase-Out – Can It Be Done? – The German Case

The Federal Republic of Germany is demonstrating it is possible to do away with coal and nuclear power. The share of renewables has almost tripled since 2010 and currently accounts for 44 percent of the electricity generated. Coal-based production has declined more significantly than that of nuclear power plants.

Coal is in decline around the globe, at a pace exceeding that which the most optimistic of climate protection advocates had dared to hope. In the US, coal consumption has fallen to 1975-levels. Great Britain has seen its first week without using electricity from burning coal since the 19th century and intends to entirely phase out the use of coal by 2024. For now, nuclear power plants still cover 20 percent of electricity demand in the US, 15 percent in the UK and 12 percent in Germany. Can we make it without coal and nuclear power?

In April 2002, the German Bundestag adopted a law no longer aiming to promote nuclear energy but effectively providing an orderly phase-out of its commercial use. The plan was to be done with nuclear by the early 2020s. Two thirds of the phase-out from nuclear power had been completed¹ according to the agreed residual electricity-volumes that producers were allowed to generate when disaster struck the Japanese nuclear power plant at Fukushima in March 2011. Only shortly before had the German federal government pushed through a lifetime extension for existing nuclear power plants. And yet, as early as June 2011, a large majority in the German Bundestag voted for the gradual and complete phase-out of nuclear power by the end of 2022, thereby essentially resurrecting the phase-out decision of 2002. Despite this, there would be no increase in the amount of coal burnt. Quite the contrary.

In addition to the nuclear phase-out, increased efforts to boost energy efficiency and the expansion of renewable energy sources are central pillars of Germany's energy transition. Since 2000, the country's Renewable Energy Act (EEG) guarantees each operator over a

¹ Notification in acc. with sec. 7(1)(c) German Atomic Energy Act (AtG) - Jahresmeldung 2011.

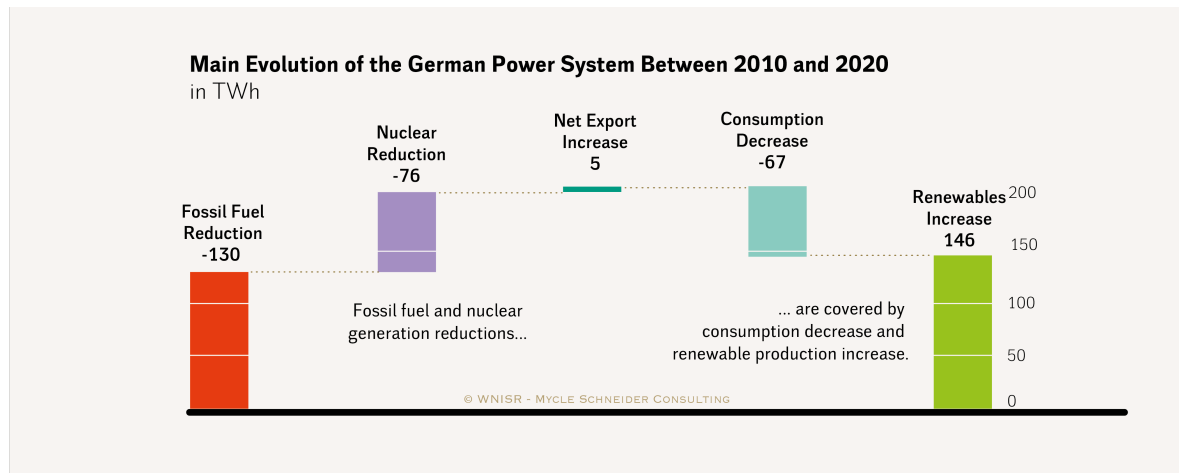
20-year period a fixed price for the clean electricity generated in their respective facilities—a so-called Feed-In Tariff (FIT)—and priority access to the public grid. In 2010, the Bundestag decided, by 2050, to increase the renewable energy share in power generation to 80 percent, to decrease primary energy consumption by 50 percent from 2008 levels, and to reduce greenhouse gas emissions by 80 to 95 percent from 1990 levels.

These objectives in themselves were only achievable if coal was to be completely abandoned. Coal-fired power plants account for roughly 80 percent of emissions generated by the German power sector and thus represent the crucial starting point for action to achieve the envisaged reduction in CO₂ emissions over the short and medium term.

The simultaneous phase-out of fossil fuels and nuclear power is well underway. Compared to 2010 levels, the year preceding the beginning of the Fukushima disaster, the combined gross electricity production by German power plants running on lignite, hard coal and natural gas declined by 130 billion kilowatt-hours (130 TWh) in 2020². At the same time, nuclear power production declined by 76 TWh (–54 percent), with national electricity consumption decreasing by 67 TWh (–11 percent) and net power exports increasing by 5 TWh. This profound transformation process essentially involves substituting fossil and nuclear electricity production with renewable energy generation. Over the same period, electricity produced with renewables increased by 146 TWh (+139 percent), growing nearly twice as much as nuclear electricity generation declined (see Figure 1).

² Compared to 2010, in 2020 lignite-fired generation fell by 37%, electricity from hard coal decreased by 63% and electricity from natural gas increased by 3%. Oil declined by 51% over the same period but hardly plays a major role as it accounts only for 0.8% of gross electricity generation. Source: Arbeitsgemeinschaft Energiebilanzen (AGEB), “Energieverbrauch in Deutschland”, 14 March 2021, see https://ag-energiebilanzen.de/index.php?article_id=29&fileName=ageb_jahresbericht2020_20210406b_dt.pdf.

Figure 1: German Electricity System Development between 2010 and 2020



Sources: WNISR based on AG Energiebilanzen (AGEB), 2021

Due to the COVID-19 crisis, the trend away from coal and nuclear power, which had already been observed back in 2019, continued at an accelerated pace in 2020. Last year, renewables accounted for 44 percent of gross electricity generation, compared to 17 percent in 2010.³ Moreover, electricity consumption is declining, as it is in most countries of the European Union (EU), thanks to the application of new technologies in households and industry, and has dropped to the 1990-level. As provided for by the latest amendment of the German Renewable Energy Act (EEG 2021), Germany intends to generate its electricity entirely greenhouse gas emission-free by 2050 at the latest.

Coal-based electricity is being driven out of the market at an even faster rate, as electricity from climate-disrupting coal-fired power plants is becoming more expensive due to the rising prices that power plant operators must pay for their CO₂ emissions. Therefore, many experts believe that coal will be phased out markedly sooner than currently envisaged in many EU member states. A recent study estimated that barely 2 percent of electricity in the EU will come from coal-fired generation in 2030⁴, and Germany should be at zero by then—despite completion of the nuclear power phase-out by the end of 2022.

³ AGEB, “Energieverbrauch in Deutschland”, op.cit.

⁴ Clean Energy Wire, “EU climate target of -55% would mean near-exit from coal in 2030’– experts”, 2. October 2020, see <https://www.cleanenergywire.org/news/eu-climate-target-55-would-mean-near-exit-coal-2030-experts>, accessed on 2 October 2020.