

Corona Effect on Power Generation in Germany

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Power generation in Germany

The German electricity market is characterized by a transformation due to the energy transition (Energiewende) towards an almost full supply with renewable energies. Currently, about 40 % of electricity is still generated from fossil energy sources; especially coal (see Figure 1). The energy transition envisages increasing the share of renewable energies from about 40 % today to 80 % in 2050.¹ The nuclear phase-out envisages that all nuclear power plants currently still in operation will be successively shut down by 2022.

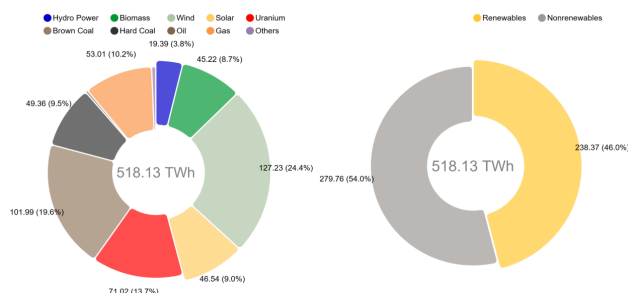


Figure 1: Net public power generation 2019
Source: Fraunhofer ISE; www.energy-charts.de/energy_pie.htm?year=2019

In implementing these goals, Germany is following the EU guidelines. The EU roadmap envisages increasing the share of renewable energies to 80 % by 2050. The² EU also aims to reduce greenhouse gases by 80 to 95 % over the same period. This is to be achieved above all by a so-called “de-carbonization” of electricity generation, i.e., the significant increase in renewable energies and the improvement of energy efficiency. Germany has decided to reduce greenhouse gases by 40 % by 2020 compared to 1990. Recently, greenhouse gases have risen slightly; it is feared that the reduction targets will probably not be achieved.³ The expansion of renewable energies and the improvement of energy efficiency, particularly in the mobility and transport sectors, are the main pillars for achieving the climate targets.

The economic profitability of conventional power plants declines with the expansion of renewable energies. As renewable energies enjoy feed-in priority and produce more and more electricity, the production times of conventional power plants are reduced. On the other hand, the growth of renewable energies leads to falling electricity prices on the stock exchange, due to the so-called merit order effect⁴ Power plants that are used at peak load, such as gas-fired power plants, thus lose their economic attractiveness.

Effects of Corona on electricity generation in Germany

In the first quarter of 2020, a significant reduction in coal-fired power generation in Germany is evident for three reasons:

1. high feed-in of wind power,
2. comparatively high CO₂ price and
3. low gas price, which led to a fuel switch from coal to gas-fired power plants.

The load development in the first quarter of 2020 shows almost no effects of the corona crisis compared to the load in comparable past first quarters

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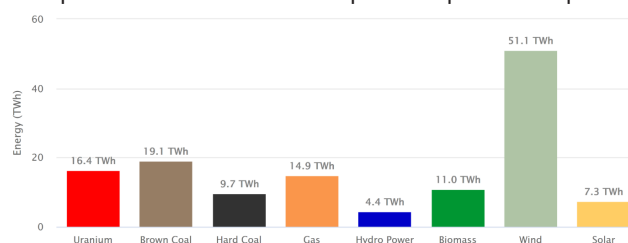


Figure 2: Net public electricity generation in the first quarter 2020
Source: Fraunhofer ISE; www.energy-charts.de/downloads.htm

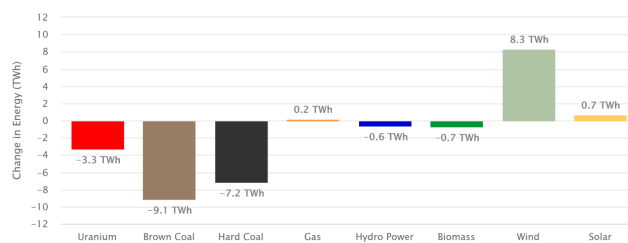


Figure 3: Absolute change in net electricity generation first quarter 2020 and comparison with first quarter 2019
Source: Fraunhofer ISE, www.energy-charts.de/downloads.htm

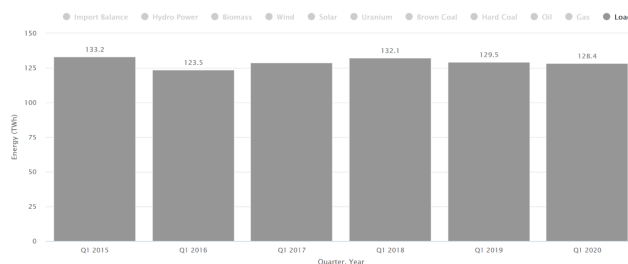


Figure 4: Load in first quarter 2015 – 2020. The load includes electricity consumption and grid losses, but not pumped electricity consumption and the conventional power plants' own consumption.
Source: Fraunhofer ISE; source: www.energy-charts.de/energy_de.htm?source=all-sources

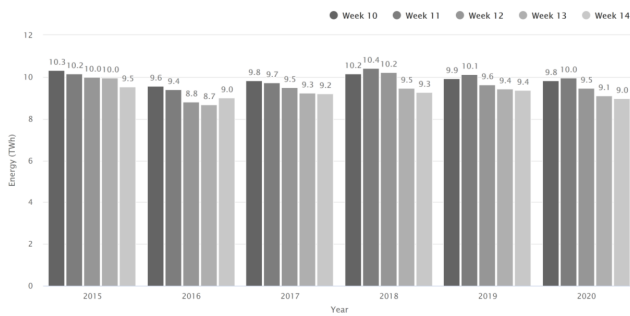


Figure 5: Load in calendar weeks 10 – 14; year 2015 – 2020.

Source: Fraunhofer ISE; source: www.energy-charts.de/energy_de.htm?source=all-sources

of the last years.

Even the weekly load of 2020 shows only small deviations from the loads in the previous years. Corona crisis started in week 12 in Germany. In week 14 the load decrease compared to 2019 is approx. 3%.

Germany's electricity trade balance with other countries shows that absolute exports have declined due to the higher CO₂ prices and the resulting lower profitability of coal-fired power plants compared to gas-fired power plants. This has also led to the fact that it was more economical for neighboring countries to

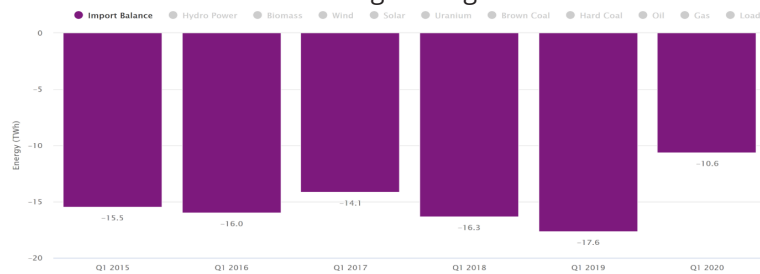


Figure 6: German electricity imports and exports in first quarter 2020 (physical flows). Positive values mean import, negative values mean export.

Source: B. Burger, Fraunhofer ISE; www.energy-charts.de/energy_de.htm

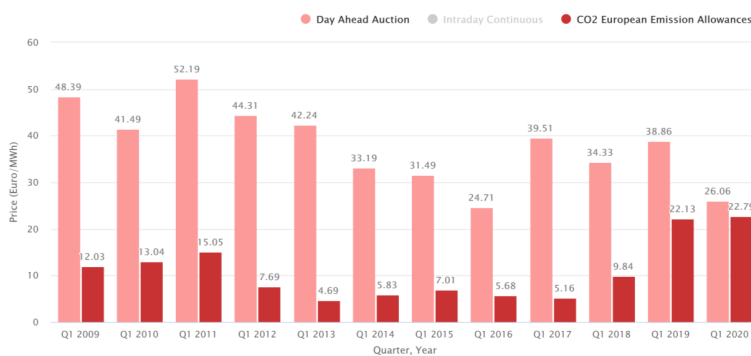


Figure 7: Volume-weighted day ahead spot price and price of CO₂ European Emission Allowances, both not adjusted for inflation.

Source: www.energy-charts.de/downloads.htm

use their own gas-fired power plants largely than to buy lignite-fired electricity from Germany.

Conclusion

So far, only minor effects of the Covid-19 crisis on the electricity market in Germany have been observed.

Due to the high share of wind energy, high CO₂ prices and low gas prices, there has been a significant reduction of coal-fired electricity in Germany. Thus, significant emission reductions are also expected.⁶ However, the emission reduction effects of the increase in renewable energies compared to coal power might dominate in comparison to possible Covid-19 effects in the transport sector.

However, in this short study only the electricity sector is considered, not other sectors such as buildings or transport. As CO₂ prices have fallen sharply because of the further Covid-19 crisis, the capacity utilization of coal-fired power plants in particular may change again in the further course of time. However, a significant reduction in electricity demand may also be expected as a result of the shutdown. The further effects will be observed with suspense.

Footnotes

¹ See Child et al (2019), Gerbaulet et al (2019), Kemfert (2019)

² Cf. EU Commission 2011.

³ Cf. UBA 2019

⁴ The expansion of renewable energies causes an increase in supply and thus a shift of the supply curve to the right, so that a price reduction occurs with unchanged demand, see ISI/ DIW/ GWS/ IZES 2011, p. 15, for more details also the contribution of Möst/ Müller/ Schubert.

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⁶ According to a first preliminary estimate, Agora Energiewende holds out the prospect of achieving the climate targets for 2020 Cf. Hein et al (2020) https://www.agora-energie-wende.de/fileadmin2/Projekte/2020/_ohne_Projekt/2020-03_Corona_Krise/178_A-EW_Corona-Drop_WEB.pdf

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