



Steady decline in capacity utilisation in the German electricity sector

June 6, 2019

Authors

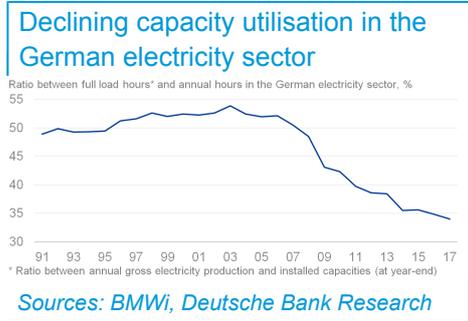
Josef Auer
+49(69)910-31878
josef.auer@db.com

Eric Heymann
+49(69)910-31730
eric.heyman@db.com

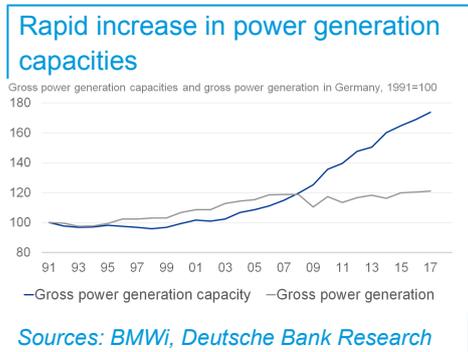
www.dbresearch.com

Deutsche Bank Research Management
Stefan Schneider

Capacity utilisation in the German electricity sector has steadily declined over the last few years and amounted only to 34% in 2017. Much of this downtrend is due to the development of renewable energy generation. Average capacity utilisation is particularly low at wind and photovoltaic power plants, which are dependent on the weather. At the same time, these plants benefit from extremely low marginal costs and priority feed-in conditions. This enables them to (temporarily) squeeze out other electricity providers, whose average capacity utilisation has declined as a consequence. There is a political preference for natural gas to compensate for the consequences of the exit from nuclear and coal power generation during the coming years. Nevertheless, there are some risks for operators and investors.



Capacity utilisation in the German electricity sector, measured as the number of full load hours in relation to total annual hours, has declined steadily over the last few years. Between 1991 and 1999, i.e. before the implementation of the Renewable Energy Act, it was just above 50% and tended to rise. It peaked in 2003, at 53.9%. Since then, capacity utilisation has dropped by about 20pp, to 34% in 2017.



This development is mostly due to the massive increase in power production capacities. Aggregate installed capacities rose by about 70% between 2003 and 2017, to 219 gigawatts (GW) by the end of 2017. This means that installed capacities exceed the German peak load of just above 80 GW by about 170%. During the same period, gross electricity output increased only by about 7%.

Not surprisingly, the lion's share of the added power generation capacities came from the renewables sector. Installed wind power capacities increased by more than 280% between 2003 and end-2017, and biomass plant capacities even jumped by 460%. Photovoltaic power plant capacities were up by almost a hundred times during this period.

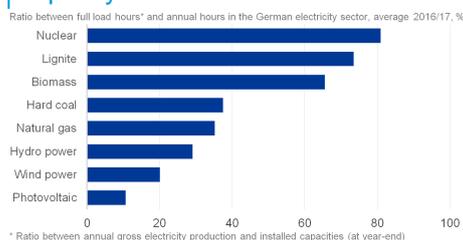
Turning to conventional energy sources, installed gas plant capacities rose by more than 40%, whereas nuclear capacities were halved. In 2011, the first nuclear power plants were taken off the grid after the Fukushima disaster. Lignite and hard coal power plant capacities remained roughly stable from 2003 until 2017.



Steady decline in capacity utilisation in the German electricity sector

Two factors weighing on capacity utilisation

Significant differences in terms of capacity utilisation



Sources: BMWi, Deutsche Bank Research

There are two reasons for the decline in capacity utilisation in the German electricity sector. First, average capacity utilisation at wind and photovoltaic plants is low due to their dependency on the weather. In fact, average capacity utilisation comes to just above 20% for wind power plants and only 11% for photovoltaic plants, respectively. During the winter (the “dark” months of the year), photovoltaic power plants make only a negligible contribution to the overall electricity generation. If the share of these energy sources in the total electricity mix rises, average capacity utilisation will necessarily decline.

Second, the marginal costs of the “new” renewable energies (wind and photovoltaic power) are extremely low, which is why, once installed, they can produce electricity more cheaply than any other source of energy. Low marginal costs and the priority feed-in guaranteed under the Renewable Energy Act ensure that any electricity generated from other sources is (temporarily) squeezed out. During the last few years, coal and gas power plants in particular were affected by this effect, as their marginal costs are comparatively high. In fact, their capacity utilisation has trended downwards over the last few years due to competition from renewables (merit order effect).

Biomass power plants can boast relatively high capacity utilisation rates compared to the “new” renewables. While biomass can basically be used to meet other types of energy requirements, such as heating or mobility, its use for energy production will run into limits, both at the regional and the global level. After all, it is necessary to produce food, too.

Declining capacity utilisation in the German power sector will ultimately lead to higher costs, both for the operators of individual plants and for the economy as a whole. Overcapacities are expensive after all. In addition, operators of traditional power plants have to spend more money on adjusting their plants’ output, which needs to be increased or reduced, depending on how much power from renewable sources is fed into the grid.

Changes to the electricity mix lead to numerous challenges

Quite apart from the decline in capacity utilisation, the German government’s plans to restructure the German electricity mix will lead to numerous challenges in the coming two decades. Nuclear power is to be abolished by the end of 2022 and coal power plants are to be taken completely off the grid by 2038. Significant capacities will need to be replaced. Simply hoping that Germany will be able to import more electricity would be a highly risky strategy, quite apart from transportation challenges. After all, Germany is not the only country which plans to abandon coal power generation; by 2030 at the latest, some of its neighbours, for example Denmark, the Netherlands and Austria, and other countries, such as Ireland, Italy, the UK, Finland and Portugal, intend to do so, too.

In addition, electricity will be needed for new, ambitious purposes, which are likely to play a larger role in the future. If the number of electric cars rises,



Steady decline in capacity utilisation in the German electricity sector

demand for electricity will increase as well. In addition, (green) electricity will increasingly be used for heating. As usual in the energy sector, the pace of this transformation will depend on the regulatory framework (price for carbon emissions, subsidies or regulatory requirements).

Natural gas, as a source of energy during the transition, carries some risks for investors

The German government plans to increase the share of renewable energies in the electricity sector to 65% by 2030 – an ambitious goal. Policymakers prefer wind and photovoltaic power. However, the limits of these two sectors are already evident today, as are potential conflicts. In some areas, people are reluctant to accept onshore wind power parks in their vicinity. In addition, additional renewable capacities will squeeze out existing plants and reduce their profitability. However, these capacities are needed for times when the sun does not shine and the wind does not blow. This results in additional challenges:

- Due to relatively low marginal costs, lignite and nuclear energy remain the key base load producers with the highest capacity utilisation ratios. As these capacities are abandoned, they will need to be replaced. At the moment, new renewables are not yet fit to provide the base load.
- There is a political preference for natural gas to compensate for the consequences of the exit from nuclear and coal power generation during the coming years. Nevertheless, there are risks for both operators and investors. On the one hand, the capacity utilisation and, in turn, the profitability of gas power plants will rise once nuclear and coal-fired plants are taken off the grid. On the other, additional renewable energy capacities will weigh on the use of gas for power generation. It is not clear whether the resultant decline in capacity utilisation can be offset by (temporarily) higher electricity prices or whether the operators will get government subsidies for providing guaranteed capacity. In addition, any boost for gas plants might be dampened by a significant rise in carbon prices during the coming decade. Gas power plants are still in a better position than coal-fired plants in this respect (for as long as the latter are still on the grid), as their carbon intensity is lower.

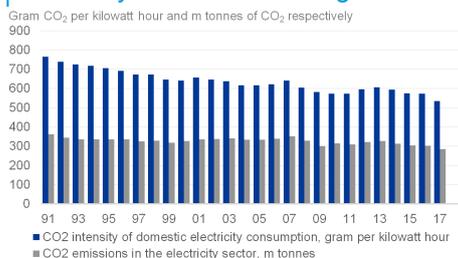
Further progress is obviously necessary. Offshore wind parks are still a relatively new endeavour, but show much better capacity utilisation rates than their onshore competitors; technological progress should make the construction of additional parks profitable. Small onshore wind plants might become useful alternatives for private households. In contrast, capacity utilisation is unlikely to rise much for photovoltaic plants – the number of sunshine hours is, after all, limited. Still, there is research into new materials/technologies and power storage solutions for households, which may lead to some progress. Solutions at the household level play only a minor role for the energy transition, however, seeing that households' electricity consumption amounts only to 5% of total German final energy consumption. In the future, not only nationwide, but also local grids should be better integrated in order to reduce long-distance power transports. However, this will cause some expense, too. At the moment, efforts



Steady decline in capacity utilisation in the German electricity sector

to reduce power consumption are not yet sufficient. There are opportunities at all levels of consumption. Electricity which is not consumed at all is, and will remain, the cheapest form of energy.

CO₂ intensity in the German electricity sector is declining



Source: German Environment Agency

Overall, the energy transition obviously leads to costs which are largely neglected in the public debate. It is certainly true that electricity generation costs and the subsidies required per kilowatt hour of renewable power have declined over the last few years. This is, of course, helpful. In addition, the increase in renewable capacities has helped considerably to reduce the carbon intensity of the German electricity mix of late. Nevertheless, this development leads to higher systemic costs, with declining capacity utilisation in the electricity sector being only one example.

Original in German published on June 5, 2019: "Kapazitätsauslastung im deutschen Stromsektor sinkt stetig"

© Copyright 2019. Deutsche Bank AG, Deutsche Bank Research, 60262 Frankfurt am Main, Germany. All rights reserved. When quoting please cite "Deutsche Bank Research".

The above information does not constitute the provision of investment, legal or tax advice. Any views expressed reflect the current views of the author, which do not necessarily correspond to the opinions of Deutsche Bank AG or its affiliates. Opinions expressed may change without notice. Opinions expressed may differ from views set out in other documents, including research, published by Deutsche Bank. The above information is provided for informational purposes only and without any obligation, whether contractual or otherwise. No warranty or representation is made as to the correctness, completeness and accuracy of the information given or the assessments made. In Germany this information is approved and/or communicated by Deutsche Bank AG Frankfurt, licensed to carry on banking business and to provide financial services under the supervision of the European Central Bank (ECB) and the German Federal Financial Supervisory Authority (BaFin). In the United Kingdom this information is approved and/or communicated by Deutsche Bank AG, London Branch, a member of the London Stock Exchange, authorized by UK's Prudential Regulation Authority (PRA) and subject to limited regulation by the UK's Financial Conduct Authority (FCA) (under number 150018) and by the PRA. This information is distributed in Hong Kong by Deutsche Bank AG, Hong Kong Branch, in Korea by Deutsche Securities Korea Co. and in Singapore by Deutsche Bank AG, Singapore Branch. In Japan this information is approved and/or distributed by Deutsche Securities Inc. In Australia, retail clients should obtain a copy of a Product Disclosure Statement (PDS) relating to any financial product referred to in this report and consider the PDS before making any decision about whether to acquire the product.