Federal Ministry for Economic Affairs and Energy

Energiewende direkt

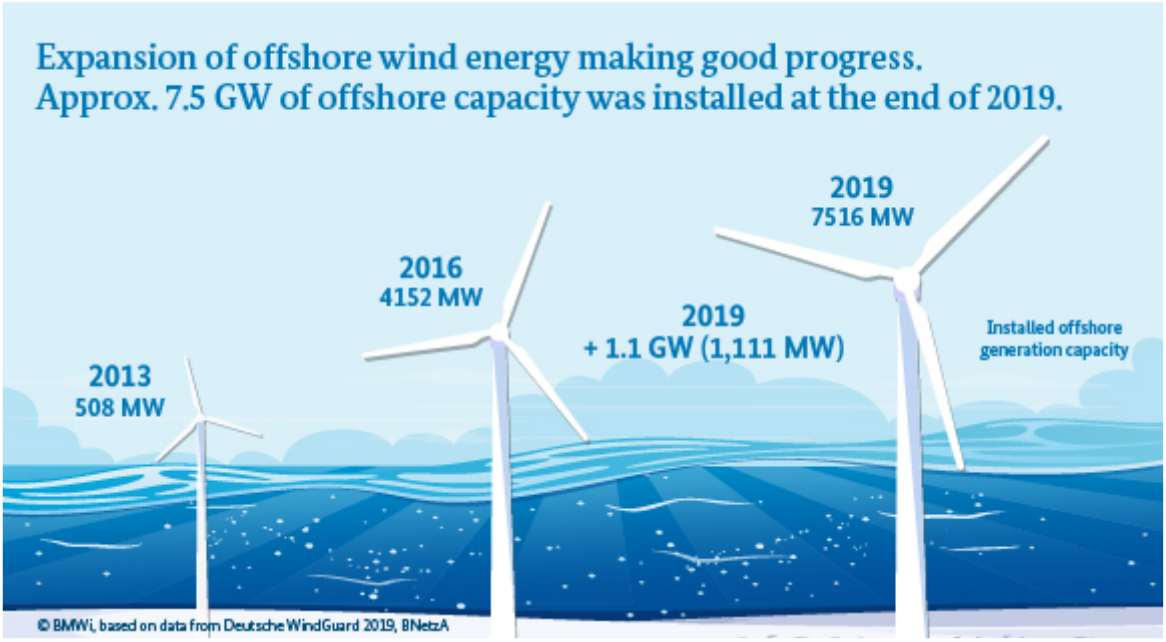
26 Feb 2020

Industrial sector a more flexible partner in the energy transition

By 2030, renewable energy is to cover 65% of German electricity consumption - more flexible energy consumption by German industry can improve grid stability: Companies

More and more wind being harvested at sea

Wind energy generated at sea is becoming increasingly important. The installed capacity has risen considerably over the last few years. This is shown by a study by Deutsche WindGuard into the expansion of offshore wind energy in Germany in 2019.



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More than 160 new offshore wind energy installations have been working off our coasts since last year, delivering clean power to Germany. They have over 1,111 megawatts (MW) of installed capacity, giving a further boost to offshore wind energy.

As recently as 2013, the amount of installed offshore capacity stood at 508 MW, so the rise since then has been steep. The development shows that electricity from offshore wind energy is becoming more and more important for the energy transition. By 2016, offshore capacity had already risen to 4,152 MW, and the figure for 2019 was 7,516 MW.

Experts are happy with the new-build of roughly 1.1 gigawatts (GW) in installed capacity: it was in line with their expectations. This means that most of the 7.7 GW of offshore capacity which is allowed to be connected to the grid in 2020 according to the Energy Industry Act has been installed. Some of the installations were still under construction or had yet to feed any electricity into the grid at the end of 2019.

From 2022, further projects which were given the go-ahead in 2017 and 2018 will come on stream. In its Climate Action Programme, the Federal Government has decided to raise the current expansion target of 15 GW of offshore wind energy to 20 GW by 2030.

Overall, this meant that more favourable weather conditions in Germany in 2019 saw wind energy generate more electricity than any other source of energy in Germany's energy mix for the first time. It displaced lignite from the top spot in Germany's ranking of electricity generation sources.

FURTHER INFORMATION

[→ Deutsche WindGuard study 'Status des Offshore-Windenergieausbaus in Deutschland, Jahr 2019' (Status of offshore wind energy expansion in Germany, 2019) (in German only)

What is a grid booster?

What does our future electricity grid have in common with a spaceship and an electric guitar? It will be using boosters to increase its power. These boosts can help to prevent congestion in the grid and to save costs. Read on for an information booster.

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This is what it's all about: large battery storage units are to be able to help the grid within seconds when there is a problem. Placed at strategically favourable nodes in the grid, they can take up surplus electricity – and hand it back out. Pilot units are set to trial the concept.

In rock concerts, electric guitars use an amplifier, a booster, so that they can be heard by everyone at the back of the stadium. In space flight, a booster is an extra engine providing plenty of thrust. But what is a grid booster? The electricity grid is to be given a boost in future by large battery storage units.

Travelling long distances to reach every socket

This is needed because more and more electricity from renewable energy needs to be transported from the windy northern part of the country to the centres of demand in the south and west of Germany. At the same time, cross-border electricity trading is taking up more and more transmission system capacity. The transmission system is being constantly expanded and upgraded to enable it to cope with these increasing flows of electricity. Thousands of kilometres of new powerlines will be built over the next few years. In addition to this, the existing powerlines are to be utilised better via greater digitisation and the use of new technologies, enabling them to transport as much energy as possible. For this reason, the Bundesnetzagentur (BNetzA; Federal Network Agency, Regulatory Office for, inter alia, gas and electricity grids) approved two innovative pilot facilities for grid boosters in the Network Development Plan it confirmed at the end of December 2019. In the Network

Development Plan, the four German transmission system operators (TSOs) meet every two years to examine various scenarios and the implied need to expand the grid.

Grid booster test – on a grand scale

The two pilot facilities confirmed in the Network Development Plan in 2019 are to trial the grid booster concept on a grand scale: together, they have a capacity of 350 megawatts (MW). At 250 MW, the planned battery storage unit in Kupferzell, Baden-Württemberg, is to have twice the capacity of the battery storage unit completed by Tesla in Adelaide, Australia, in 2017 – and that unit's 100 MW had made it the largest in the world. The grid boosters won't be rolled out across the country until the end of the pilot phase. They first have to show what they're capable of. Their mission: they are to help make better use of existing powerlines in normal operations by intervening within seconds when faults in the grid occur. This means that, whilst grid boosters won't be able to replace the grid expansion needed even after 2030, they can be a flexible addition which could save the expense of costly redispatch measures. If the pilot facilities work well, other technical solutions will also be feasible rather than large-scale centralised storage units. For example, there could be lots of distributed storage units, or 'flexible loads'.

Rapid response unit: grid boosters only step in when there's a problem.

Here's how grid boosters work. For many years now, the transmission system operators have been finding that they need to intervene in the operation of the grid more and more frequently when particularly large amounts of energy are to be transported from north to south and some powerlines are at risk of being overloaded. When that happens, power-generating facilities ahead of the bottleneck are curtailed, whilst power stations behind the bottleneck increase their feed-in quantity by the same amount. These preventative redispatch measures are expensive. Grid boosters could cut the need for redispatch and the related costs.

They only intervene when a problem crops up, i.e. they deliver a reactive response. Technicians call it the n-1 case. When it happens, a quick response is needed. Unlike conventional power stations, grid boosters can jump in within a few seconds. They use controllable loads (e.g. a controllable consumer) ahead of the bottleneck in conjunction with an easily activated energy source (such as a big battery) behind the bottleneck. The controllable load takes up the electricity coming in ahead of the bottleneck which can't be transported any further. The battery supplies the consumers behind the bottleneck with energy after just a few seconds. In this way, the grid boosters can cover the period until conventional power stations can take over. At present, part of the transport capacity available in the transmission system is kept as a security reserve to cope with potential faults, and thus remains unutilised. The quick response time of the grid boosters could enable part of this reserve to be used to transport electricity.

The grid booster pilot scheme is being supported by the InnoSys 2030 research project. Grid operators, component manufacturers and scientists are spending three years studying innovative ways to control the grids – and one of these ways uses the grid boosters.

FURTHER INFORMATION

[→ An electricity grid for the energy transition
[→ Concluding paper - Electricity 2030

Quote of the week

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'The German energy transition has attracted some imitators: many more than we actually realise. And these imitators are so keen because they say that learning from the Germans means low unemployment, plenty of economic growth, good wages, good incomes along with clean energy and climate change mitigation.'

Peter Altmaier, Federal Minister for Economic Affairs and Energy, at the 2020 Handelsblatt Energy Summit.

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