



What is a 'Grid Development Plan'?

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It's all about making the electricity grid fit for the demands of the future

Some people produce electricity, other people use it. Although this sounds pretty simple, a lot of detailed planning is required to make things work in practice. Our electricity is being generated from ever greater shares of renewable energy. This makes it essential for us to plan and adapt our electricity system in a far-sighted way so that consumers continue to receive a secure supply of electricity and the grid does not exceed its upper capacity limits. More and more of our electricity is being produced from wind energy in the north and east of Germany, while the large, industrial consumers are located in the south and west. We therefore need to expand our transmission grid. This is why the four largest grid operators 50Hertz, Amprion, TenneT and TransnetBW have created Grid Development Plans mapping out exactly where they think the present legislation for new power lines or for the expansion of existing ones does not go far enough, and additional action is needed.

Forecasts for up to 2035

Germany has one Grid Development Plan for its electricity grid onshore, and another that sets out the work that needs to be undertaken to connect offshore wind power installations in the North and the Baltic Seas up to the grid. In both cases, network operators describe the measures that they think are needed to adapt, expand and modernise the grid in order to ensure that Germany's electricity supply remains secure. These plans currently run up to 2035. The grid operators develop their Grid Development Plans based on what is set out in the Energy Industry Act. But how are they able to plan so far into the future?

Grid development plans based on supply-and-demand scenarios and market models

The supply-and-demand scenarios that form the basis of the Grid Development Plans bring together forecasts for electricity generation and those for future consumption. They set out the volumes of electricity that will most likely have to be transported across the German grid, going forward. The grid operators use these data projections to simulate the future electricity market. This involves breaking down projected figures into the different regions in order to identify how much capacity each crosspoint has available when electricity from all sources of energy – both conventional power plants and renewables-based installations – is flowing through the grid. Another model is then used to calculate how much electricity will be exchanged between the different regions. This allows the 'transmission requirements' to be determined – in other words, how much electricity the grid needs to be able to transport during peak periods. With these projected figures on hand, the transmission system operators (TSOs) then look at the existing grid infrastructure and the expansion work that is planned. Will this work be enough or must Germany take further action beyond this? The response of the TSOs to this question is then set out in the Grid Development Plans.

Opportunities for the general public to have their say

At the start of the year, the transmission system operators invited the public to submit their comments on the first drafts of the Grid Development Plans. More than 2,000 people and organisations responded. The revised proposals were passed on to the Bundesnetzagentur (Federal Network Agency) in May, which is responsible for assessing the plans. According to the current status of the assessments, the Bundesnetzagentur considers 90 of the 160 measures proposed by the

transmission system operators in the current version of the Grid Development Plan to be necessary. A total of 70 measures are classified 'unable to be approved' at present.

FURTHER INFORMATION

[\[→ Grids and grid expansion\]](#)

[\[→ Information on the Grid Development Plans from the Bundesnetzagentur \(Federal Network Agency\)\]](#)

An oil that can handle extreme temperatures

Researchers from the German Aerospace Center (DLR) are currently testing a new silicone oil in sunny Andalusia. The oil is to serve as a heat transfer fluid able to raise the efficiency of solar-thermal power plants. The Federal Ministry for Economic Affairs and Energy is providing funding for the project.



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The operating temperatures used in solar-thermal power plants span an extremely broad range, from over 400 degrees Celsius by day to below-zero temperatures at night. At the Plataforma Solar de Almería's PROMETEO testing facility in Andalusia, southern Spain, parabolic mirrors are used to direct sunlight to tubes filled with a heat transfer fluid. The solar energy is then converted into electrical current based on the use of heat exchangers and steam turbines. The higher the temperature of the heat transfer medium, the more efficiently a solar thermal power plant can operate.

Temperature raised to 425 degrees Celsius

Within the SITEF project, researchers from the Institute for Solar Research, which belongs to the German Aerospace Center, are now testing the viability of using the new silicone oil in solar thermal power plants. The oil, known as HELISOL[®], was developed by Wacker Chemie AG. Its ability to operate at temperatures of up to 400 degrees Celsius has already been proven. At the installation in Andalusia, the test temperature is now being raised to 425 degrees Celsius, with test operations at this higher temperature to last for several months.

The heat transfer mediums that are currently used at parabolic trough power plants consist of a mixture of biphenyl and diphenyl oxide (BP/DPO). This organic oil mixture can be used at temperatures of up to 400 degrees Celsius, but solidifies when it falls below twelve degrees Celsius. Such a low cooling tolerance temperature means complex heating systems must be used which are expensive to operate.

No hazardous substances like benzol produced

Under laboratory conditions, the new silicone oil has even been able to withstand being heated to a temperature of 425 degrees Celsius, without decomposing. A heat tolerance of this magnitude could increase the efficiency of the power station and increase the current yield. Even in the lower temperature range, the silicone oil is more flexible than the BP/DPO mixture. Its solidification point is about minus 55 degrees Celsius, which would mean that no heating systems would be required to prevent the heat transfer fluid from solidifying. And there are also further advantages. The silicone oil being tested ages more slowly and forms much less hydrogen than conventional heat transfer media. No hazardous substances like benzol are produced in the process, helping to ensure that the power plants can be operated sustainably and even more safely. This makes it possible for solar thermal power plants to be used at other sites that hitherto been unsuitable.

German companies global leaders in solar thermal power plant technology

The Federal Ministry for Economic Affairs and Energy is providing funding of around €850,000 for this research project. Due to a lack of direct sunlight, the German climate is not suited to the commercial operation of solar thermal power plants. However, German firms and research establishments are global leaders in this field of technology, meaning there a high level of potential for exports. A large proportion of solar thermal power plants around the world use key components developed in Germany.

FURTHER INFORMATION

[\[→ German Aerospace Center press information on SITEF\]](#)

[\[→ Solar-thermal power plants\]](#)

Quote of the week



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"I am delighted that around 90 percent of the projects that were awarded funding in the second round of auctions for ground-mounted photovoltaic installations have actually been realised. This shows that holding auctions and achieving a high rate of realisation are not a contradiction in terms."

Rainer Baake, State Secretary at the Federal Ministry for Economic Affairs and Energy ([go to press release](#))

Germany and California: Bilateral energy conference in October

Policymakers for energy, business people and representatives of think tanks from German and the US state of California will come together in Sacramento this October to discuss a range of different topics linked to the energy transition. The California-Germany Bilateral Energy Conference 2017 is jointly organised by the Federal Ministry for Economic Affairs and Energy and the California Energy Commission and will take place from 19-20 October.

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