

Decarbonizing transport – one of Germany's remaining conventional rail lines successfully electrified

One of the oldest railway lines in Germany, the "Südbahn", now running continuously with electricity.

The line was one of the very few two-track non-electrified main lines in Germany and has been connecting the entire Lake Constance region for more than 150 years, but also has a very high priority as a European transport axis with international connections to the Austrian Vorarlberg and the eastern Swiss region and beyond.

It was therefore included in the demand plan for the expansion of the federal railways as a priority and international project. Last but not least, the upgraded Südbahn also offers an impetus for environmentally friendly tourism and opportunities for a further modal shift to rail.

Where diesel locomotives used to run, they are now more environmentally friendly operated with electricity. Continuous electrification is a further step towards the complete electrification of the German rail network. The federal, state and DB have jointly invested a total of 370 million euros.

Challenge

The electrification of the German rail network protects the climate and the environment.

Almost two thirds of the federal rail network are electrified (as of 2022), thus equipped with an overhead contact line and thus suitable for the operation of e-locomotives or e-trolley .

Often, partially electrified lines can only be used with diesel locomotives, as a mixed operation is logistically and economically unsustainable.

Solution

GE Power Conversion with its consortium partner GE Grid Solutions were selected by Deutsche Bahn to build the rail power supply plant with two 15 MW rail converters (with control and protection as well as harmonic filter).

These have been reliably feeding the overhead line between Ulm and Lindau since the start of electric train operation in December 2021. End of August 2022, the trial operation was successfully completed followed by the final acceptance by DB at the end of September.

Background

Historically, the electric railway power grid in Germany is operated with alternating current of the frequency 16.7 Hz. The railway electricity system requires its own "world of electricity", which is designed exclusively for this frequency from the power plant via a high-voltage distribution grid to the substations. The railway's own 110 kV high-voltage grid with a length of around 7900 kilometers (DB Energie GmbH) connects power stations, and converter station.

The conventional answer to the requirement to convert from 50 Hz to 16.7 Hz were rotating machines. The modernization of converter stations is carried out with the help of power converters, which transition the process from a mechanical to an electronic one and thus ensure the supply of the overhead lines in the railway network with electrical energy - for sustainable electrification of the entire railway network

Looking at the future

The federal government had already set itself the goal of increasing the degree of electrification of the federal rail

GE's solutions contribute to reduced emissions, increased operating flexibility and movement towards the complete electrification of the German rail network.

grid from currently around 62 percent to 70 percent by 2025. GE is ready to support Deutsche Bahn in the electrification of the rail network and thus make an important contribution to the path towards climate-neutral passenger transport.

"More speed with the electrification makes sense not only for climate protection," says Dirk Flege, managing director of Allianz pro Schiene and continues "The shift to rail plays a key role in the transport sector since rail transport consumes 5,5 times less energy than road transport. The rail network's capacity must be expanded to shift more traffic to the rails in the future. The rapid electrification of more routes is also critical because it makes the rail network more flexible and thus more efficient."

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Test train drives on the newly electrified line in September 2022



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