

Munich's SuperLink: World's first prototype of a High-voltage superconductor in operation

(10.10.2024) "Can you imagine using this technology to secure the electricity supply for a city like Munich? You should think about that." This dialog was the starting point in 2016 for the consideration of building a 110,000-volt superconductor for Munich - the SuperLink.

Together with the project partners NKT (Cologne), Theva (Ismaning), Linde (Munich), the Karlsruhe Institute of Technology and the University of Applied Sciences Südwestfalen, the grid operator SWM Infrastruktur has developed, tested and installed a superconductor in the Munich power grid. The research project is being funded on behalf of the German government by Project Management Jülich.

The prototype has now been successfully put into operation at SWM's main substation in Menzing - as the world's first high-voltage superconductor that contains all the components required for long-distance installation within a large city and over land.



Joint starting signal for the trial operation of the SuperLink (from left):

Prof. Robert Bach, FH Südwestfalen,
Helge-Uve Braun, SWM Technical Managing Director,
Michael Hjorth, NKT,
Ralf Egen, Project Management Jülich,
Dr. Werner Prusseit, Managing Director Theva, Anders Jensen NKT, Lukas Sidler, NKT, Klaus Ohlig, Linde

Photo: Vauel

Foundation for the power grids of the future

The technology is based on the fundamental research of the German physicist Dr. Johannes Georg Bednorz, who was awarded the Nobel Prize in Physics in 1987 together with the Swiss Karl Alexander Müller for the discovery of high-temperature superconductivity.

With superconductivity, large amounts of electrical energy can be transported almost without loss. The main challenges in the research project were the functionality of the superconductor, the cable connection technology, the cooling technology, the cooling circuit and the long-term stability of the cable technology.

The use of superconductors is a pioneering technical solution for the future energy grids of metropolitan areas. 37 years after the Nobel Prize, German companies are thus also positioning themselves at the top of the world in terms of implementation and underlining the reputation of Bavaria as a technology location.



Global interest and global demand

This technology is being researched in many countries. This is because, in addition to the requirements of the energy transition in Germany, there is a need for additional energy transport to metropolitan areas and industrial centers in all industrialized countries. Superconductors also improve the sustainability of the electricity supply. On the one hand, they can transport more electricity, which means lower lei

lines are necessary. On the other hand, line losses are eliminated, which leads to significantly improved efficiency and lower CO₂ emissions.

Future use in Munich's electricity grid The superconductor commissioned at SWM's main substation in Menzing is now being put through its paces in operation. If, as is to be expected, the prototype meets the requirements placed on it, the world's first commercial high-voltage superconductor is to be installed in Munich once the technical and economic conditions have been met.



This success is only possible because manufacturers, research, the federal government and the energy supply have worked together hand-in-hand in a targeted manner.

More information on the project can also be found in the SWM magazine:
www.swm.de/unternehmen/magazin/innovation/supraleiter

Quotes from the project partners

Helge-Uve Braun, SWM Technical Managing Director:

"We want to build a high-voltage line around 15 kilometers long, between our main substation in Menzing and the southern energy site in Sendling. This innovative line will make SWM Infrastruktur's electricity grid even more future-proof and its operation even more climate-friendly. This innovation will contribute to making electricity grids even more efficient, stable and climate-friendly far beyond Munich's city limits."



Anders Jensen, CTO of NKT:

"The SuperLink project is a groundbreaking innovation that will enable us to realize the potential of superconducting high-voltage cables with previously unrivaled transmission performance. We are delighted to be working with Stadtwerke München Infrastruktur and our other partners, who have made it possible to commission the test system. Supra-red cables offer the opportunity to sustainably expand the power grid in sensitive areas without the need for extensive earthworks. This be-



This significant demonstration project shows the potential of superconducting technology for more efficient access to renewable energy in metropolitan areas such as Munich."

Dr. Werner Prusseit, Managing Director THEVA



"The SuperLink cable is an innovative piece of operating equipment. that can significantly advance grid expansion and the energy transition. I am pleased that this is happening in Germany and that we can make our contribution with the superconductor."

Prof. Dr.-Ing. Robert Bach, South Westphalia University of Applied



"After the initial discussions on the innovative solution for this task by means of a superconducting cable route in 2016, SWM has driven forward this pioneering technology and its practical implementation with remarkable determination. This is an outstanding example of the innovative strength of grid operators in Germany and is attracting a great deal of attention worldwide."

Prof. Dr.-Ing. Mathias Noe, Karlsruhe Institute of Technology



"The start of prequalification for superconducting cables at the 110 kV voltage level in Munich marks a milestone. which impressively demonstrates the technical feasibility and operation in the real network."