

The Art of Large-Scale Project Management

Germany's third-largest energy provider has embarked on an ambitious project to upgrade its 380/220-kV and 110-kV network. For the first time, the grid owner EnBW Transportnetze AG as responsible transmission company and EnBW Regional AG as responsible distribution company have transferred much of the project organization responsibility to an outside party. The project is managed by a common project management.

By Rhea Wessel

Modernizing a high-voltage network spread across 200 kilometers requires top-notch engineers, deep technical understanding, and the best possible technology. Modernizing that network without any loss of electricity for millions of customers requires something additional: large-scale project management skills.

In most cases, network operators manage such critical projects in-house, given all the possibilities for hiccups. A failed transformer at one end of the network could mean a drop in service for a business at the other end. The EnBW grid companies in southern Germany, however, have ordered a

significant portion of their network modernization work. They contracted Siemens to upgrade their network by engineering, constructing, erecting, commissioning converting or expanding 14 substations. To make this happen efficiently, Siemens was asked to play the leading role in project conception, planning, procurement and administration; in installation and construction; in regulatory and worker safety compliance; and in demolition and waste removal. Called U380 and started in 2006, the 10-year project is one of the most ambitious of its time. EnBW Transportnetze AG, the transmission system

operator of EnBW Energie Baden-Württemberg AG (EnBW), is moving most of its transmission load from the 220-kV level to the 380-kV level while upgrading the 380-kV and in close cooperation with the EnBW Regional AG the 110-kV networks. The U380 project, worth 170 million euros, is part of a broader set of investments in the EnBW network valued at 1 billion euros within five years.

As EnBW Transportnetze AG is the primary electric grid system operator in the state of Baden-Württemberg, its grids link important economic centers. World-class companies are attached, including the automaker Daimler AG and software company SAP.

Meeting New Demands for Energy Transmission

The goal of the modernization is to ensure power delivery and cut costs by

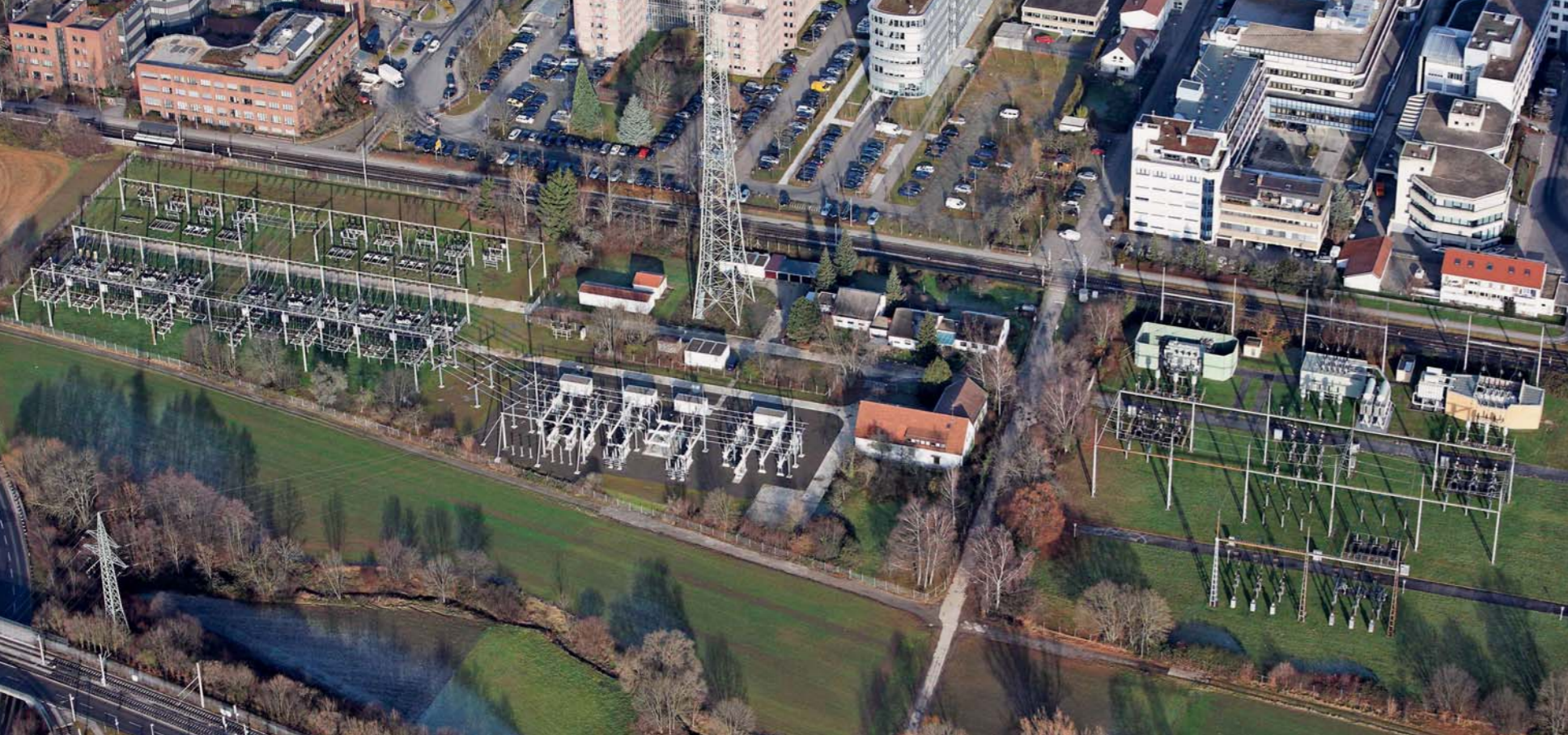
Photos: Siemens/EnBW



“Our network capacity will match the new demands of the national and European energy markets.”

Rainer Joswig, Chief Technical Officer, EnBW Transportnetze AG

EnBW's 110-kV air-insulated switchgear in Wendlingen is replaced with highly integrated switchgear (HIS) from Siemens.



The compact gas-insulated switchgear solution HIS (center of picture) reduces the space required for the 110-kV switchgear at the Möhringen substation. The former air-insulated installations (left and right) will be demolished to create free space.

improving the capacity and performance of Germany's third-largest network. One of the German load centers is located in the southern part of the country, while an increasing amount is produced in wind parks on the north plains or in the future in offshore parks in the North and Baltic Sea. This shift in the location of power production away from where it is consumed creates a strong dependency on transmission networks, like the one Siemens is modernizing for EnBW. As Rainer Joswig, Chief Technical Officer at EnBW Transportnetze AG, says, "By transferring the load from the 220- to the 380-kV level, we are significantly reducing the scope and complexity of our network. Our network capacity will be better suited to the new demands of the national and European energy market." From the very beginning, EnBW took a progressive approach to the project. Instead of issuing a detailed call for offers, the company broadly described its goal in a functional tender and let

potential partners propose how they would meet the goal. Thomas Gößmann, Chief Technical Officer at EnBW Regional, called the innovative tender process a "Competition of Engineers." The competitors created offers based on their own concepts. EnBW received several offers and chose Siemens in May 2006. EnBW selected Siemens because it presented the superior concept, based on a variety of air- and gas-insulated switchgear, at a good price. In addition, EnBW was confident that Siemens could manage the complexity of the project and deliver within the limited time frame while staying in close communication with EnBW.

Poised for Success

Project teams from EnBW and Siemens kicked off their work together at the Gottlieb Daimler Stadium in Stuttgart in September 2006. Only a few months later, on January 20, 2007, the first milestone was reached at the substation in the city of Wiesloch. Siemens

energized a transformer bay and line connection to ensure continuous EnBW service for a new office complex in the city. The early success was a good indicator of what was to come. By early 2010, some 80 percent of the U380 project was complete and service wasn't dropped for a single minute. Apparently the project management structure that Siemens is using complements its technical expertise. The overall project manager, Heino Schmitt, leads 250 people. They include five subproject managers who oversee 14 project managers – each of whom are responsible for planning and making changes at the 14 different substations across the state. The project managers and their teams of engineers perform 51 different redesign projects at the 14 sites – while keeping the network running. "It's like performing open-heart surgery," says Schmitt. Indeed, each patient – the 14 substations – has its own peculiarities, since the network was expanded over time

Photos: Siemens/EnBW

based on the changing needs of EnBW's customers. Project managers work closely together to share experiences and plan for engineering, construction and installations. Siemens and Schmitt have learned a lot from the project, Schmitt says. One part of Schmitt's strategy is an intensive communication, for example to go out to the construction sites, walk around and listen to workers and site managers. "You've got to follow your gut reaction and sense in advance if something could go wrong," he explains. Schmitt, who is based in Erlangen, works closely with his counterpart Martin Oehring of EnBW, who is based in Stuttgart. Oehring is the lead project manager and owner's representative for EnBW, in charge of controlling and quality management. Oehring says EnBW has greatly increased its experience through the U380 project and will soon capture what it has learned in an internal report on best practices. For now, Oehring can say that one key to managing the project is standardiz-



"EnBW's innovative call for tenders left room for a creative 'Competition of Engineers'."

Thomas Gößmann, Chief Technical Officer, EnBW Regional AG

Glossary

- **High-Voltage Electric Transmission:** The transfer of electrical energy from the place it is produced to the substations close to where it will be consumed.
- **Substation:** The facility at which electricity is distributed and/or transformed from high or medium voltage to a lower voltage level, depending on the demands of the consumer; substations link transmission and distribution networks.
- **Air- and Gas-Insulated Switchgear:** Combination of electrical equipment which build a substation; air-insulated switchgear is set up outside, uses air for electrical insulation and requires substantial space; gas-insulated switchgear is installed in a building or outside, is more compact and uses pressurized gas inside a metal enclosure for electrical insulation.

For further glossary terms see: www.siemens.com/glossary

Further Information

www.siemens.com/energy
www.enbw.de

The Project at a Glance

Dates: 2006–2016

Goal: To ensure reliable power transmission and distribution in the German state of Baden-Württemberg by phasing out the 220-kV network and upgrading the 380-kV and 110-kV networks

Siemens customer: EnBW Transportnetze AG and EnBW Regional AG

Scope: Engineering, construction, erection, commissioning for conversion or expansion of 14 substations and integration of numerous overhead transmission lines across the state

Challenges: To implement all network changes without loss of power to a single customer; to prepare and file all regulatory materials with the appropriate authorities for 51 redesign projects at 14 substations

Deliverables: 14 transformers (300 MVA, 380/110 kV), 31 switching bays for 380 kV, and 68 switching bays for 110 kV (air- and gas-insulated switchgear)

Project value: 170 million euros