Xiangjiaba - Shanghai ±800 kV UHVDC transmission project
The world's largest transmission link with breakthrough technology

The Xiangjiaba – Shanghai route

The sending HVDC station at Fulong, in south-central China

Since July 2010, the State Grid Corporation of China transmits 6,400 MW power from the Xiangjiaba hydro power plant, located in the southwest of China, to Shanghai, China's leading industrial and commercial center, located over 1,900 km (1,180 miles) away. The link was taken into operation one year ahead of schedule and is the largest transmission link ever built.

Largest transmission link in the world

The Xiangjiaba - Shanghai transmission link represents a major breakthrough in the technology of electric power transmission in many aspects:

- The new system voltage ±800 kV is 33% higher than the voltage used for the Itaipu ±600 kV transmission in Brazil, until now the world's highest HVDC transmission voltage rating.
- The power rating, 6,400 MW, is more than double the power rating of the most powerful transmission in operation today.
- The overhead line length, 1,907 km, is the longest overhead transmission in the world, compared with 1,700 km for the Inga-Kolwezi HVDC transmission in Kongo-Kinshasa, until now the world's longest transmission line.
- The losses for this long line will be reduced to 7% compared with 10% if the line had been built with conventional 500 kV DC transmissions.
- The 800 kV voltage is formed by two 400 kV series connected 12-pulse converters.

Thorough development and preparations

To ensure operation at the increased voltage level, ABB invested in equipment development and a successful test facility was set-up at the STRI laboratory in Ludvika, Sweden already in 2006.

Due to the intensive testing and preparations in product development before tendering, the link could be taken into operation one year ahead of schedule, thus becoming the first UHVDC link in the world to be commissioned.

Amongst the preparations, new 6 inch diameter thyristors were developed to operate at a direct current of 4,000 A.

ABB - an extensive supplier to the project

As part of the turnkey project, ABB was responsible for overall system design and also supplied the main equipment. The scope of delivery included twentyeight high- and ultrahigh voltage converter transformers. Other key products delivered included air insulated and water cooled thyristor valves provided with newly developed 6-inch thyristors rated 8.5 kV, DC and AC (direct and alternating current) switchyard equipment and the newly developed DCC800 HVDC control system.

The system was taken into operation in July 2010, one year ahead of schedule, with a delivery time of only 30 months.

Data
Connection point Xiangjiaba: FuLong substation
Connection point Shanghai: FengXian substation
Ownership: State Grid Corporation of China
Start of project: December 2007
Commissioning year: July 2010
Transmission technology: UHVDC, Ultra High Voltage Direct Current
Transmission capacity: 6,400 MW, with 7,200 overload capacity
No. of poles: 2
DC voltage: ±800 kV
Length of overhead DC line: 1,907 km
AC voltage: 525 kV (both ends)
Main reason for choosing HVDC: Long distance and low losses
HVDC converter stations: Convert alternate current (AC) to direct current (DC) and on the other side DC to AC

More information can be found on: www.abb.com/hvdc

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