SIEMENS

Newsletter

Power Transmission

Issue 10/10

HVDC/FACTS - Highlights

The 2,500 MW Mundra-Haryana Adani HVDC Project

Reliability and availability for India's Grid

Siemens Energy is to install a high-voltage direct-current (HVDC) transmission system with a capacity of 2,500 megawatts (MW) for the private investor Adani Power Limited (APL) in India.

Since India's economy grows continuously, the demand for energy has increased at an average of 3.6% per annum over the past 30 years and it became the world's 6th largest energy consumer.
Due to the power situation, Adani Power Ltd. has ambitious plans to generate around 10,000 MW of power by 2013. Its thermal power plants near Mundra will produce up to 4,620 MW. The private investor Adani Power Ltd. is also India's major importer of coal and operates the world's largest harbor terminal for imported coal. At the same time the Ahmedabad-based company is India's largest private energy trader.
With modern technology and minimum loss of energy, the Green initiative of APL is supported by the new HVDC link from Siemens.

Fig. 1: Siemens HVDC projects in India

Power Transmission by Siemens HVDC

In need of electrical energy, the region Haryana near New Delhi will be supplied in the future by Adani's thermal power plants in Mundra, which is located approximately one thousand kilometers away. Low-loss transmission over that distance is only possible with the planned HVDC system at a DC voltage level of 500 kV.


Fig. 2: Site view Mundra Substation

This flexible HVDC scheme from Siemens can be operated in bipolar mode and monopolar mode with ground return or metallic return. The HVDC interconnection scheme is capable of continuous operation at any reduced DC voltage level from 500 kV down to 350 kV (70%).
Siemens assumes overall responsibility for the project, including design of the entire HVDC system and supplies of all components.

The scope of work includes the turnkey execution of complete HVDC terminal stations at either end, i.e. at Mundra, Gujarat state or Mohindergarh, Haryana state, and associated electrode stations and repeater stations mid way.

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The major scope of delivery covers 500 kV converter transformers, thyristor valves, capacitors, AC/DC switchgear and other mechanical auxiliaries. Additionally, Siemens also undertakes marine and inland transportation, civil works, installation and commissioning of the entire HVDC transmission system.

Siemens capacitors: A story of success in parallel

The erection of the first equipment started beginning of April, 2010, and the installed high-voltage power capacitors were produced by the new Siemens factory in Brazil [Learn more about Siemens Power Capacitors: **Flyer** (330kB), **References** (100kB) and **Component presentation** (150kB)]. To assure its components, quality Siemens entered the market of power capacitors with a product fit for the most diversified applications, compliant with the most stringent technical and environmental requirement beginning of October 2009. This was confirmed mid-December, when Siemens' brand new power capacitor manufacturing facility in Jundiaí, Brazil, passed the ISO certification audit. Three ISO certificates attested the maturity of its quality, environmental and health & safety management systems.
During this time, the order for the Mundra-Haryana capacitors was placed. After successful testing, the capacitors were shipped in February 2010 and successively installed. Pole 1 of the ±500kV DC transmission scheme is planned to be put in operation February 2011 whereas pole 2 is supposed to follow in July 2011.

Fig. 3: Siemens filter

Siemens Converter Transformers: Established a record in India

Fig. 4: The most powerful HVDC transformer ever built in India

The converter transformer with a rating of 500 mega volt ampere (MVA) and a operating voltage of 500 kilovolts (kV) is the first of a total of eleven transformers that the Power Transmission Division is building in its Indian works for the high-voltage direct current (HVDC) transmission system of Adani Power Limited. The HVDC transformer is not only the first to leave the transformer works in Kalwa, it is also the biggest and most powerful HVDC transformer ever built in India.

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Siemens quality offers reliability and availability

Once installed the Siemens bipolar HVDC transmission system offers an energy availability of 97% which considers both forced and scheduled maintenance outages. In order to ensure the highest level of component and system reliability and availability with minimal downtimes, fast fault detection, effective repair and maintenance strategies, fault-tolerant control systems, redundancy, spare components and quality assurance are assured, as well as intensive off-side tests.

Summary

The Adani project in Mundra is the third HVDC system to be installed by Siemens in India proving Siemens' experience and quality standards. Low loss design was of central importance for technical and economical optimizations. Siemens provides all core components and ensures the highest quality standards in record time.