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Power Transmission and Distribution

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Siemens to deliver new HVDC technology for low-loss power supply via submarine cable to San Francisco

Siemens Power Transmission and Distribution (PTD) has secured an order to construct a roughly 88-km (53-mile) undersea high voltage direct current (HVDC) transmission link between San Francisco´s City Center electrical power grid and a substation near Pittsburg, California. The order was placed by Trans Bay Cable LLC, based in San Francisco, and a wholly-owned subsidiary of the project developer Babcock & Brown. Siemens´ share of the total order volume amounts to more than USD 150 million. From March 2010, the HVDC Plus system will transmit up to 400 megawatts at a DC voltage of +/- 200-kV and is the first order for Siemens using its innovative HVDC Plus technology. The main advantages of the new HVDC Plus link are the increased network security and reliability due to network upgrade and reduced system losses.

Today, the major electrical supply for the City of San Francisco is coming from the south side of the San Francisco peninsula. The city relies mainly on AC grids which run along the lower part of the bay – with the new HVDC Plus interconnection link power flows directly in the center of San Francisco. In addition to enabling a straight path for energy from the East Bay, the Trans Bay project will decrease the overall transmission grid congestion in that area, increase overall security and reliability of the electrical system.

After commissioning in 2010, the HVDC transmission line will help to meet the City of San Francisco’s future electrical demand and is designed to be an energy-efficient,

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cost-effective solution addressing San Francisco's need for additional transmission capacity. Furthermore, it will reduce the need to build additional new power plants in the City of San Francisco, decrease transmission grid congestion in the East Bay and it will increase the overall security and reliability of the electrical system.

The project will be implemented by a consortium of Siemens and Milan-based Prysmian Energy Cables and Systems. As consortium leader, Siemens was awarded a turnkey contract that comprises the converter stations for the HVDC Plus system, including engineering, design, manufacturing, installation and commissioning of the transmission system. The company will deliver all high voltage components including transformers, converter submodules, converter reactors and breakers and is responsible for the control and protection, civil works and building systems. Furthermore Siemens fulfills all major requirements, which have to be considered for the electrical components as well as for all buildings for a highly seismic zone like San Francisco. The HVDC Plus solution utilizes a minimum amount of space – crucial for converter sites in urban areas – and minimizes environmental impact such as visual implication, audible noise and transport during construction. The consortium partner Prysmian will provide the submarine power cables that will be installed in the San Francisco Bay.

The Trans Bay Cable Project will be the premier installation of Siemens' new HVDC technology, HVDC Plus (Power Link Universal System), an advance in HVDC transmission systems that opens new fields in proven HVDC technology. And with the implementation of voltage-sourced converters (VSC), HVDC Plus is the preferred solution in space-constrained installations. It is ideal for the connection of remote offshore platforms and wind farms to the onshore grid as well as for high-density areas such as San Francisco. HVDC PLUS enhances the performance of the transmission grid, improves reliability and reduces maintenance and assembly requirements.

The heart of the HVDC Plus converter stations is the IGBT (Insulated Gate Bipolar Transistor) based converter where the conversion from AC to DC transmission and reversed takes place. In contrast to line-commutated converter technology, the HVDC Plus system operates with power semiconductors which have turn-on and turn-off capability. The system makes use of the advantages offered by mulilevel voltage-

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sourced converter technology, which allows connection to very low power systems as well as supplying passive systems, and active and reactive power can be set independently. The capability of very rapid intervention in the power converter for control and protection purposes makes the system highly dynamic, significant for system faults and malfunctions in three-phase systems.

The **Siemens Power Transmission and Distribution Group (PTD)**, headquartered in Erlangen, Germany, is one of the leading global players in its market sector. As a product supplier, system integrator, solution designer and service provider, Siemens PTD ensures - for utilities and industry alike - the efficient and reliable transmission of electrical energy from the power plant to the consumer. With a worldwide workforce of about 27,500 and operations in more than 100 countries, PTD had sales of 6.5 billion euros in fiscal 2006. Further information at www.siemens.com/ptd.

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Caption:

The “Trans Bay” HVDC project will transmit up to 400 megawatts at a DC voltage of 200-kV and is the first order for Siemens using its innovative HVDC Plus technology. From March 2010, 400 MW of power will flow through the roughly 88-km (53-mile) long cable connection from Pittsburg in California to the City of San Francisco. The main advantages of the new HVDC Plus link are the increased network security and reliability due to network upgrade and reduced system losses.

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