



Sylmar Converter Station Modernization Project

The Los Angeles Department of Water and Power (LADWP)—in conjunction with Southern California Edison and the Cities of Burbank, Glendale and Pasadena—has modernized the Sylmar Converter Station to increase the reliability of electricity supply in the Greater Los Angeles area. The Sylmar modernization project upgraded the 3,100- megawatt high-voltage direct current (HVDC) converter station at the Southern terminus of the Pacific DC Intertie. The Intertie transmits direct current (DC) power over an 846-mile transmission line, carrying high-quality energy between the Pacific Northwest and Southern California.



Project Description

The \$118.1 million Sylmar Modernization Project involved refurbishing the 3,100-megawatt, high-voltage direct current (HVDC) transmission system to upgrade outdated technology as well as to consolidate the facility into one location on the east side of the 5 Freeway. Benefits of the project include:

- Improving reliability and availability in transmitting hydropower and renewable energy from the Pacific Northwest to Los Angeles
- Ensuring that customers continue to benefit from transmitting power south in the summer and north in the winter
- Reducing operation and maintenance costs
- Eliminating the use of hazardous material (mercury)
- Incorporating lessons learned from major earthquakes.

New technology and innovations have more than doubled the life of this vital north-south energy corridor. State-of-the-art HVDC converter transformers and thyristor valves convert power from direct current (DC) to alternating current (AC) or vice versa. The thyristors are semi-conductor devices, acting as lightning-speed, fully automated switches, that turn on or off the three-phase AC power and thereby forming DC power. The thyristor valves have replaced the original mercury arc valve converters that required more maintenance and large quantities of mercury to operate.

The project was completed on budget and eight days ahead of schedule. Contractor ABB, Inc., working with LADWP, designed, manufactured and installed the system. Costs were controlled by replacing some equipment and re-using existing equipment where appropriate. The existing converter building was also used.

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Background

When power is transmitted over long distances, HVDC is preferred over AC power because the electrical line losses are smaller with HVDC. The cost of building a DC transmission line is also much less than an AC line for a comparable length. The Sylmar Converter Station is the southern end of the Pacific DC Intertie that carries power between the Celilo converter station, located near the Columbia River at the Oregon-Washington border and Sylmar. Either station can convert AC into DC and send it on its way with much less line losses to the other station, where it is converted back to AC for distribution to the local power grid. Typically, power is shipped north in the winter (when Northwest hydropower is less available) and south in the summer (when Southern California needs more energy due to heat waves).

Originally built in 1970, the Sylmar Converter Station was expanded into two facilities (Sylmar West and East) in the mid-1980s to handle a larger energy load. Due to age as well as damage sustained during the Northridge earthquake, the Sylmar Converter Station partners (LADWP, Southern California Edison, and the cities of Glendale, Burbank and Pasadena) agreed to consolidate the equipment into a new 500 +/--kilovolt (kV), 3,100-megawatt converter at the Sylmar East facility. Capacity at the Sylmar East facility was expanded from 1,100 megawatts to carry the entire station load of 3,100 megawatts.

Milestones

- 1967 – Groundbreaking is held to mark start of construction on the \$44 million Sylmar High Voltage Direct Current Converter and Switching Station.
- 1970 – Sylmar HVDC Converter Station and the Pacific Intertie DC System (the Celilo-Sylmar transmission line) is dedicated and placed into operation.
- 1985—Sylmar Converter Station upgrade project is dedicated, increasing transmission capacity from 1,600 megawatts at +/-400 kV to 2,000 megawatts at +/- 500 kV, making it the largest DC line in North America.
- 1989 – A second expansion of Sylmar Converter Station is completed, and the Pacific Intertie DC System transmission rating is increased from 2,000 megawatts to 3,100 megawatts in both north and south directions.
- 2003 – The Celilo Converter Station is upgraded to maintain the transfer capacity at 3,100 megawatts.
- December 23, 2004 – Sylmar Modernization Project is available for commercial operation. The facility is rebuilt as a single bipolar converter station for 3,100 megawatts.
- March 24, 2005 – The upgraded Sylmar Converter Station is rededicated.

For more information, please visit www.ladwp.com.