

PACIFIC NORTHWEST – PACIFIC SOUTHWEST INTERTIE

The Bureau of Reclamation had an important role in the planning and early development of the Pacific Northwest-Pacific Southwest Intertie. It is the largest single electrical transmission program ever undertaken in the United States.

The intertie system, when fully installed, directly and indirectly interconnect the major Federal, public, and private electrical systems in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The transmission system will extend from Vancouver, British Columbia, through Seattle, Washington, to Phoenix, Arizona, and include points in California and Nevada.

By integrating Federal, publicly owned non-Federal, and privately owned electric utility systems, the intertie will permit exchange of loads and fuller utilization of generating capacity. The system will indirectly benefit the customers of many small electric cooperatives, municipal systems, and other public agencies.

On October 1, 1977, in conformance with Public Law 95-91 (the Department of Energy Organization Act of August 4, 1977), the power marketing function, including the construction, operation, and maintenance of transmission lines and attendant facilities of the Bureau of Reclamation, was transferred to the Department of Energy. As a result, the Bureau of Reclamation is no longer involved in the Pacific Northwest-Pacific Southwest Intertie.

Plan

Four major transmission lines and several shorter interconnecting lines comprise the full intertie. Two of the extra high voltage (EHV) lines will transmit electrical direct current. The constructed 800-kilovolt (kV) line interconnects the northern converter station at Celilo, Oregon, with the Sylmar Terminal Station near Los Angeles, California. This line was energized in 1968. A proposed 1,000-kV transmission line will interconnect the Celilo Converter Station with a southern converter station near Phoenix, Arizona.

The two constructed 500-kV alternating current transmission lines were placed in service in late 1960 that now extend from the John Day Substation on the Columbia River near The Dalles, Oregon, to the Lugo Substation in southern California.

A smaller voltage electrical line and associated facilities were constructed from the Mead Substation near Hoover Dam to the Liberty Substation near Phoenix, with a connecting high voltage line to Pinnacle Peak Substation north of Phoenix. These facilities were placed in service in 1968.

In 1967 contracts were awarded for construction of the Mead Substation and installation of two terminals. Surveys and right-of-way acquisitions were completed for The Dalles-Hoover Intertie. In 1969, construction of this intertie was postponed.

Task forces were appointed in 1975 to evaluate future needs for the Northwest-Southwest Intertie. These task forces concluded that an EHV transmission system between the Pacific Northwest and Pacific Southwest would be most effective with a 500-kV overhead high voltage transmission line. The task forces further concluded that the best location for the northern terminal would be the Celilo Converter Station in Oregon and that the location for the southern terminal should be in the Phoenix area. The recommended 1,054-mile-long transmission line would have a rating of 1,000-kV.

UNIT DESCRIPTIONS AND FACILITIES

Celilo-Sylmar, 800-kV Transmission Line

This line runs about 845 miles from the Celilo Converter Station, the northern terminal of the NW-SW Intertie on the Columbia River near The Dalles, Oregon, via Nevada to the Sylmar Station. In 1970 this overhead transmission line had an operating voltage of 800 kV and a power rating of 1,440 megawatts (MW) and was constructed and placed in service.

Celilo-Phoenix, 1,000-kV Transmission Line

The Celilo Converter Station is the northern terminal of this proposed 1,000-kV (± 500 kV), 1,440 megawatt system. The Liberty Substation near Phoenix is being considered, along with two other potential sites, as the southern terminal. This high-voltage transmission line was formerly known as The Dalles-Hoover or Celilo Mead Transmission Line.

John Day-Lugo, 500-kV Transmission Line

These two 500-kV 1,000-MW capacity transmission lines extend from the John Day Substation near The Dalles on the Columbia River, via Round Mountain Substation and the Central Valley of California to Lugo Substation near Los Angeles.

The 500-kV lines were constructed by a combination of Federal and private power companies over a period of about 6 years. The Bureau of Reclamation constructed the section of the second line from the Oregon-California border to Round Mountain Substation. This section was energized in 1968. The Bureau of Reclamation section of the 500-kV transmission line was constructed on single circuit steel towers with two 1780-kcmil ACSR conductors per phase. The total length of this section is about 94 miles.

Round Mountain-Cottonwood, 230-kV AC Transmission Line

This 230-kV transmission line, constructed by the Bureau of Reclamation, was energized in 1968. It is a single circuit steel tower line with 795-kcmil ACSR conductors and is about 34 miles long.

Mead-Liberty-Pinnacle Peak, 345-230-kV Transmission Line and Terminal Facilities

A 345-kV line and associated facilities were constructed from Mead Substation near Hoover Dam to Liberty Substation, and a 230-kV line was constructed from Liberty Substation to Pinnacle Peak Substation.

Under contract with the Salt River Project Agricultural Improvement and Power District, the Bureau of Reclamation constructed a double circuit line from Liberty Substation to the Salt River Project's Estrella Substation. This line was built in 1968 in connection with Liberty Substation. The contract also provided for the construction, by the Salt River Project, of a double circuit 230-kV line from Estrella to Pinnacle Peak Substation. This section was completed in 1968.

Interconnections with Mead Substation, in addition to other interconnections, include the Southern California Edison Company's four 220-kV transmission lines from Hoover Dam to Mead and from Eldorado to Mead; Western Area Power Administration's (WAPA's) 230-kV transmission line from Hoover Dam to Mead and its 230-kV transmission line from Mead to Basic Substation; Nevada Power Company's 230-kV transmission line from Mead to its Decatur Substation; and the Metropolitan Water District's four 230-kV transmission lines from Hoover Dam to Mead and from Mead to Camino.

OPERATING AGENCIES

The Celilo-Sylmar 800-kV Transmission Line is operated by the Bonneville Power Administration of the Department of Energy from the Celilo Converter Station to the Oregon-Nevada State line and by the city of Los Angeles from the Oregon border to Sylmar Station.

The John Day-Lugo 500-kV Transmission Line No. 2 is operated by BPA from John Day Substation to Round Butte interconnection. Portland General Electric operates the transmission line from Round Butte to the Oregon-California State line. The California Power Pool operates the remaining section of the line to Lugo Substation.

The #1 500-kV Transmission Line from the John Day Substation to Lugo Substation is operated by BPA from John Day to the Oregon border. The section from the Oregon border to Lugo is operated by the California Power Pool.

The Round Mountain-Cottonwood 230-kV Transmission Line is operated by WAPA, which also operates the Mead-Liberty 345-kV line and the 230-kV line from Liberty to Pinnacle Peak.

The proposed 1,000-kV Celilo-Phoenix Transmission Line will be constructed and operated by BPA from the Celilo Converter Station to the Oregon-Nevada State line, and WAPA will construct and operate the section of the transmission line from the Oregon border to its southern terminal near Phoenix, Arizona.

DEVELOPMENT

History

For many years there had been general agreement on the need for a vast new power tieline in the Far West. However, conflicts over controlling and sharing benefits delayed progress. The primary purpose of the Pacific Intertie was to coordinate operation of all utility systems in the area.

The intertie program is the culmination of, and the enlargement of, an idea first suggested in 1935, when the Pacific Northwest Regional Planning Commission, a Federal agency, issued a report which envisioned the eventual interconnection of the power resources.

In 1959-1960, a 230-kV interconnection was proposed by the Pacific Gas and Electric Company. However, the Senate Interior Committee requested deferral of the proposal pending enactment of legislation to assure each region that power consumers would have first call on Federal hydroelectric power generated in their respective regions. Legislation was enacted in August 1964 authorizing the Pacific Northwest-Pacific Southwest Intertie.

Investigations

The first investigation of a possible intertie between the Bonneville Power Administration (BPA) system and the Central Valley Project was released by the Bureau of Reclamation in 1949. The investigation found that a 217-mile interconnection between Roseburg, Oregon, and the switchyard at Shasta Dam was economically feasible and desirable. The intertie would close the 217-mile gap which at that time separated the two systems.

In April 1959, the Secretary of the Interior was requested to direct BPA and the Bureau of Reclamation to make a study of the California Intertie for the disposal of surplus secondary energy. Interior's report of February 1960 indicated that the intertie was feasible. A request for further studies was made by the States of California and Washington.

The Secretary of the Interior's Special Task Force, in its report of December 15, 1961, recommended construction of the Pacific Northwest-Pacific Southwest Intertie and specified the features, use, and purpose of the development. A version of Senate Bill S1007, passed by the Congress in 1964, cleared the way for construction of the Pacific Northwest-Pacific Southwest Intertie and guaranteed the electric power consumers of the Northwest first call on electrical energy generated at Federal hydroelectric plants in that region. Reciprocal priority was given to the consumers in the Southwest.

In October 1964, a favorable feasibility report on The Dalles-Hoover DC intertie was submitted to the Appropriations Committees. The Bonneville Power Administration and the Bureau of Reclamation were directed to proceed with construction of the Federal portion of the intertie.

By 1969, as a result of several delays in appropriation of funds, the proposed in service date of The Dalles-Hoover Intertie had been delayed to the extent that the involved entities were forced to make other arrangements for a power supply. In May 1969, construction of the Hoover DC line was postponed.

As a result of a review initiated in August 1975, three task forces were established. Evaluation by the task forces found that the Celilo-Phoenix area 1,000-kV DC Intertie was feasible.

Authorization

The Pacific Northwest-Pacific Southwest Intertie was authorized by Public Law 88-552 (78 Stat. 756), dated August 31, 1964.

Construction

The first 264.4-mile section of the 800-kV Celilo-Sylmar DC Transmission Line was constructed by the Bonneville Power Administration. The 580.5-mile Nevada-California section was built by the city of Los Angeles. Construction was started in 1966 and transferred to operation and maintenance in 1969.

The 500-kV line from John Day Substation, near the John Day Dam on the Columbia River via Round Mountain Substation and California's Central Valley, to the Lugo Substation near Los Angeles was energized in the late 1960's. The 267-mile Oregon section was built by BPA. The 94-mile section from the Oregon border to Round Mountain was constructed by the Bureau of Reclamation. The balance of the line from Round Mountain south, about 650 miles over a zigzag route, was constructed by the California Power Pool, consisting of the Pacific Gas and Electric Company, the Southern California Edison Company, and the San Diego Gas and Electric Company. The Federal portions of this 500 kV line and the 230 kV tap will provide an all-Federal interconnection between the Federal Columbia River Power System and the Federal Central Valley System in California.

A second 500-kV line was constructed from John Day Substation to Indian Springs Tower in northern California, where it interconnects with a 500-kV line constructed by the California Power Pool. This line, completed in the late 1960's, extends to Lugo. The 88.4-mile portion from John Day to Grizzly Substation in Oregon was built by BPA. The 178.5-mile section from Grizzly to the Oregon border was built by the Portland General Electric Company. A 47-mile section from the Oregon border south to Round Mountain was built by the Pacific Power and Light Company. The balance, about 700 miles, was built by companies in the California Power Pool.

The 34-mile 230-kV transmission line from Round Mountain Substation in California to Cottonwood Substation was built by the Bureau of Reclamation. This transmission line was energized in 1968.

The 238-mile 345-kV line from Mead Substation, near Hoover Dam, to Liberty Substation was constructed by the Bureau of Reclamation and placed in service in 1968. Also, a 230-kV transmission line was constructed from Liberty Substation to Pinnacle Peak Substation in 1968.

Benefits

Benefits to be derived by the installation of the Northwest-Southwest Intertie will include (1) exchange of summer-winter surplus peaking capacity between the Northwest and the Southwest to reduce capital expenditures for new generating capacity, (2) sale of Northwest secondary energy to the Southwest, and (3) sale of Southwest energy to the Northwest to firm peaking hydroelectric sources during critical water years. The intertie also will provide a means for conservation of significant amounts of fuel by use of surplus hydroelectric energy, and on increased efficiency in the operation of hydro and thermal resources.

Facilities in Operation

Transmission Lines (Federal circuit miles) - 2,106.5 mi

Substations (Federal) - 7

Wally Pierce 2009

