The Pacific Northwest-Pacific Southwest Intertie

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Pacific Northwest-Pacific Southwest Intertie Project

Power. One does not often stop to think about where the electrical energy to perform daily tasks originates. Flick a switch and the lights go on. Put a piece of bread in the toaster and push the lever down, in thirty seconds toast pops out, provided of course that the toaster is plugged in. However, when the power does not work, one immediately notices. Driving home, suddenly all of the traffic lights go dead, what is normally a busily moving intersection becomes a four way stop, snarling traffic for miles around. Finally after battling traffic and the newly created four way stops one arrives home only to discover that the garage door will not open because the power has gone out in this area too. The lack of something, in this case electrical energy or power, normally taken for granted wreaks havoc with the daily routine of life.

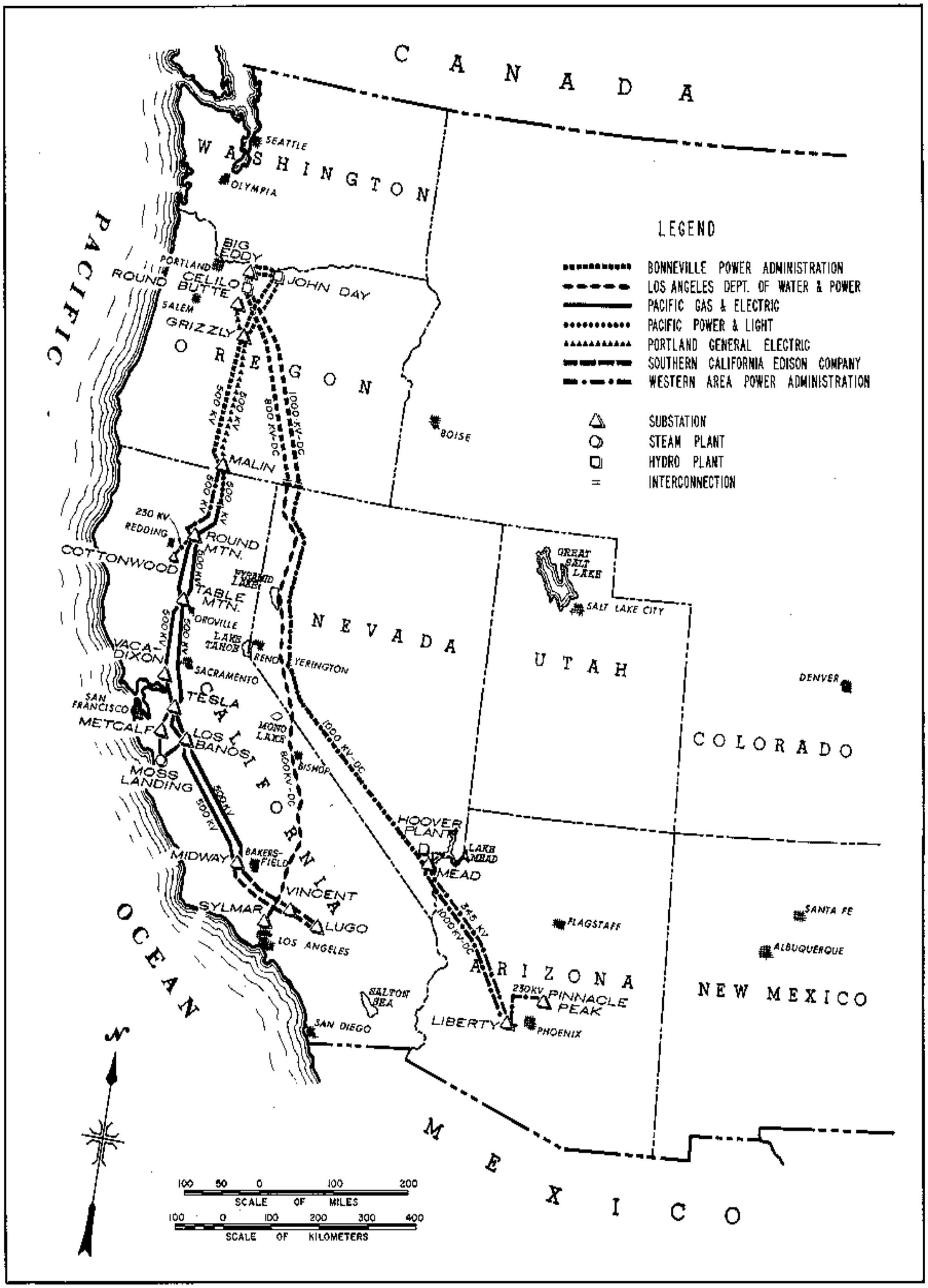
To alleviate some of the havoc created by a lack of electrical energy as well as to benefit the power users economically, a plan to interconnect the Pacific Northwest and the Pacific Southwest was developed beginning in 1949. The interconnection of these two regions would alleviate an existing seasonal excess capacity of energy by transferring energy between the two areas. When use of power increased in the summer in the Southwest because of increased air conditioning to deal with the heat, the surplus energy available in the Northwest could be transferred south to meet the higher demand. The reverse could be implemented in the winter months when power use increased in the Northwest due to heating needs and decreased in the Southwest.

The Pacific Northwest-Pacific Southwest Intertie system was originally conceived as a multiple power line system including several substations. As originally planned, the Intertie was to be comprised of several shorter alternating current transmission lines running from Oregon to

California as well as two longer direct current transmission lines, one running from The Dalles, Oregon, to Los Angeles, California, and the second from just outside Phoenix, Arizona, to The Dalles, Oregon. Substations were to be located in the following areas: two just outside of Phoenix; one in southern Nevada, near Las Vegas; three in the Los Angeles area; one near Bakersfield, California; four near San Francisco; two in northern California; and three in the vicinity of the Dalles, Oregon. Due to a reduction in funding, and regional political pressures, the Intertie system was never completed as designed. As a result of the 1977, Department of Energy Organization Act, the Intertie system was transferred to the Western Area Power Administration from the Bureau of Reclamation.

Project Location

The Intertie system is geographically located within Oregon, California, Nevada, and Arizona. The Intertie connects private, state, and Federal power systems, including the largest federal hydropower system in America, the Bonneville Power Administration, (BPA), which markets power generated by the Army Corps of Engineers and the Bureau of Reclamation, the largest municipal system (the Los Angeles Department of Water and Power), and the largest group of private systems in the West, the California Power Pool, (comprised of the Pacific Gas and Electric Company, the Southern California Edison Company, and the San Diego


CANADA
WASHINGTON
OREGON
NEVADA
UTAH
COLORADO
CALIFORNIA
ARIZONA
NEW MEXICO
MEXICO
PACIFIC OCEAN
LEGEND
BONNEVILLE POWER ADMINISTRATION
LOS ANGELES DEPT. OF WATER & POWER
PACIFIC GAS & ELECTRIC
PACIFIC POWER & LIGHT
PORTLAND GENERAL ELECTRIC
SOUTHERN CALIFORNIA EDISON COMPANY
WESTERN AREA POWER ADMINISTRATION
SUBSTATION
STEAM PLANT
HYDRO PLANT
INTERCONNECTION
SEATTLE
OLYMPIA
PORTLAND
SALEM
BIG EDDY
CELILO
ROUND BUTTE
JOHN DAY
GRIZZLY
BOISE
500 KV
1000 KV-DC
800 KV-DC
MALIN
230 KV
REDDING
ROUND MTN.
COTTONWOOD
TABLE MTN.
OROVILLE
LAKE TAHOE
RENO
YERINGTON
VACA-DIXON
SACRAMENTO
SAN FRANCISCO
TESLA
METCALF
LOS BANOS
MOSS LANDING
MONO LAKE
BISHOP
GREAT SALT LAKE
SALT LAKE CITY
DENVER
HOOVER PLANT
LAKE MEAD
MEAD
345 KV
MIDWAY
BAKERSFIELD
VINCENT
SYLMAR
LUGO
LOS ANGELES
FLAGSTAFF
SANTA FE
ALBUQUERQUE
SALTON SEA
SAN DIEGO
LIBERTY
PINNACLE PEAK
PHOENIX
SCALE OF MILES
SCALE OF KILOMETERS

Gas and Electric Company).[1] The hydroelectric powerplants within the system generate power which is subsequently distributed to eleven states, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.[2]

The largest, single, electrical transmission program ever undertaken in the United States, the Intertie, if completed, would have directly and indirectly interconnected the major federal, public, and private electrical systems in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The Intertie has allowed some interconnection between federal, publically owned non-federal, and privately owned electric utility systems, permitting exchange of resources to satisfy loads and fuller utilization of generating capacity. Customers of many small electric cooperatives, municipal systems, and other public agencies have received benefit from the Intertie.

There are hundreds of miles of transmission lines and seven substations in the existing Intertie system. Currently, the system is jointly controlled; BPA controls the portion of the project located in Oregon while Western controls the rest of the Intertie system.[3]

Historic Setting

"This capsule history of the struggle for the Intertie makes no attempt to record the drama, the elements of controversy which on many occasions nearly scuttled the program, the give-and-take negotiations, the long hours of work by many people, or the leadership of the President, the Secretary, and many members of Congress which led to the eventual agreement."[4]

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1. Floyd E. Dominy, "A New Power Giant Materializes on the West Coast," *Reclamation Era*, 51 (August 1965): 63.
2. United States Department of the Interior, Bureau of Reclamation, *Repayment of Reclamation Projects*, Washington: U.S. Government Printing Office, 1972, 354.
3. United States Department of Interior, Water and Power Resources Service, *Project Data* (Denver: U.S. Government Printing Office, 1981), 739-44.
4. U.S. Department of the Interior, Bureau of Reclamation, "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, Nevada-California," Vol I, 1964, 11, in Record Group 115, Records of the

(continued...)

Initial investigations for an intertie system began as early as 1935, when the Pacific Northwest Regional Planning Commission issued a report on "The Columbia Basin" which envisioned the eventual interconnection of power resources in the Far West. In 1949 Reclamation conducted the first detailed investigation of a possible intertie between the Bonneville system and the Central Valley Project (CVP) of California. This investigation found that a 230,000 volt, 217-mile interconnection between Roseburg, Oregon, and the switchyard at Shasta Dam, closing the gap which separated the two systems, was economically feasible and desirable. A Federal Power Commission study in 1953, reaffirmed the economic advantages of a strong intertie between the two regions, comprised of either one or two 230,000-volt interconnections. However, the project remained in proposal stage. Soon after the Federal Power Commission study confirmed the value of an intertie system, the Bonneville Yamsay-Klamath Falls line was sold to the California-Oregon Power Company (Copco), preventing the Bonneville system from reaching the California border as originally planned and forestalling any attempts to intertie CVP and the Bonneville system. Meanwhile, BPA's surplus of secondary energy continued to go unused, causing financial security to begin slipping.

In April of 1959 Secretary of the Interior Fred Seaton directed BPA and Reclamation to study the California Intertie to dispose of surplus secondary energy. Meanwhile, in 1959 and 1960, Pacific Gas and Electric Company (PG&E) proposed a 230,000-volt interconnection. This proposal was deferred by the Senate Interior Committee, pending passage of legislation assuring each region that their power consumers would have first priority for the federal hydroelectric power generated in their respective areas.

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4. (...continued)
Bureau of Reclamation, Denver Colorado, National Archives and Records Administration: Rocky Mountain Region; hereafter cited as RG 115.

In 1961 President John F. Kennedy directed Secretary of the Interior Stewart Udall to investigate the feasibility of an Pacific Northwest-Pacific Southwest Intertie system. Subsequently, on March 10, 1961, Secretary Udall appointed a Special Task Force, headed by BPA's administrator, Charles Luce, to report on the possibilities of connecting BPA and Reclamation's Central Valley Project. In December 1961 the Special Task Force reported that "an extra-high voltage inter-connection between the two regions should be constructed at the earliest practicable time."[5]

The present Intertie system emanated from President Kennedy's message to Congress on natural resources on February 23, 1961. Kennedy declared, "Finally, I have directed the Secretary of the Interior [Stewart Udall] to develop plans for the early interconnection of areas served by that Department's marketing agencies with adequate common carrier transmission lines; to plan for further national cooperative pooling of electric power, both public and private; and to enlarge such pooling as now exists."[6] This message to Congress resulted in the creation of and report by Udall's Special Task Force which enthusiastically supported an intertie project.

In January of 1962 the budget message of the president included a request for funds for the design and construction of an extra-high voltage intertie between CVP and the Bonneville system, prompting Congress to provide $300,000 for continuing studies. Concurrently, regional protective legislation was introduced in Congress. The Senate passed the legislation, however, it stalled in the House Interior Committee. The bill was reintroduced in 1963, and funds were requested to begin construction on the Intertie lines. In November Congress appropriated seven million dollars for construction, pending approval of the regional protective legislation. By this

5. "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, Nevada-California," Vol I, 1964, 11, RG 115.
6. Dominy, 66.

time, the bill had passed both Houses but in different forms, which needed to be reconciled in Conference Committee.[7]

Project Authorization

On June 24, 1964, nearly thirty years after the original idea for an intertie, Secretary Udall submitted the Intertie proposal to Congress. Amendments were made on July 21 and 27 creating the final proposal for the current Pacific Northwest-Pacific Southwest Intertie. Congress approved the plan August 14, 1964, while at the same time appropriating funds to begin construction on the federal portions. That same day, the Senate-House Conference Committee reached an agreement on the regional protection legislation. Passage of the bill followed a week later paving the way for the final authorization of the Pacific Northwest-Pacific Southwest Intertie on August 31, 1964, (Public Law 88-552).[8]

Construction History

In actuality the Intertie is merely a complicated network of transmission lines, transmission towers, switchyards, and substations. Four major transmission lines and several shorter interconnecting lines comprise the complete Intertie; these lines extend from Vancouver, British Columbia, through Seattle, Washington, to Phoenix, Arizona, and include points in California and Nevada. If constructed, two of the extra high voltage (EVH) lines would have transmitted direct current (d-c), determined to be the most efficient form in which to transmit electrical energy.

The lines that comprise the Intertie system are rather complicated, so reference to the map provided with the project location section may be helpful. In general Intertie lines extend from

7. *Project Data*, 741, 743; "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, Nevada-California," Vol I, 1964, 11-2, RG 115.
8. *Project Data*, 741, 743; "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, Nevada-California," Vol I, 1964, 11-2, RG 115.

the Columbia River south to southern California and east to Phoenix, Arizona.

- If built, one 800-kilovolt (kV) d-c line, approximately 845-miles long would have interconnected the northern converter station at Celilo Substation in northern Oregon, with the Sylmar Terminal Station near Los Angeles, California via Nevada and a converter station located at Mead Substation, Nevada.
- Two 500-kV alternating current (a-c) transmission lines extend from the John Day Substation on the Columbia River near The Dalles, Oregon, to the Lugo Substation in Southern California near Los Angeles. These two lines run via Round Mountain Substation and the Central Valley of California.
- A 230-kV a-c transmission line, about 34 miles long, runs from the Round Mountain Substation to the Cottonwood Substation, both located in northern California.
- A 345-kV a-c line runs from the Mead Substation, Nevada, near Hoover Dam to the Liberty Substation near Phoenix, Arizona.
- A separate 230-kV a-c line connects Liberty Substation to Pinnacle Peak Substation, north of Phoenix.
- A separate double circuit line runs from Liberty Substation, near Phoenix, Arizona, to the Salt River Project's Estrella Substation; a double circuit line merely means that there are two transmission lines (circuits) being supported on the same transmission tower.
- The Salt River Project constructed a second 230-kV a-c line from Estrella Substation to Pinnacle Peak Substation.

In recent years, Mead Substation has become a major hub for Western. Built as part of the original Intertie, Mead has become a major interconnection for a number of projects, including Parker-Davis Project, Boulder Canyon Project (Hoover Dam), the original Intertie, and the new Intertie. The following lines are part of the Intertie system and all extend from Mead Substation.

- Southern California Edison Company built one 230-kV a-c transmission lines from Hoover Dam to Mead Substation and then from Mead to Eldorado Substation in southern Nevada.
- The Western Area Power Administration's (WAPA or Western) 230-kV a-c transmission line runs from Hoover Dam to Mead and from Mead to Basic Substation. (This line was constructed by Reclamation as a part of the Parker-Davis Project.)
- The Nevada Power Company built a 230-kV a-c transmission line extending from Mead to the Decatur Substation in Southern Nevada, on the western side of Las Vegas.
- The Metropolitan Water District built two 230-kV a-c transmission lines extending from Hoover Dam to Mead and from Mead to Camino Substation in Southern California near the California, Nevada, Arizona border.
- The Los Angeles Department of Water and Power (DWP) constructed a 230-kV a-c transmission line from Hoover Dam to Mead Substation. This line then exits Mead at 287.5 kV a-c en route to Victorville Switchyard in Southern California.
- Recently, Western constructed a 500-kV a-c line from Mead to Perkins Switchyard near Phoenix, Arizona.
- Western also recently constructed a 500-kV a-c line from Mead to the Market

Place Switchyard near the McCullogh Switchyard located in Eldorado Valley, southern Nevada.

- A 1000-kV d-c line between the Dalles and Hoover was originally planned as a part of the Intertie, however in 1969, construction was postponed indefinitely and the direct line intertying Oregon and Arizona has not been built.[9]

Preconstruction History

Before actual construction on the Intertie could begin, Reclamation had to research the transmission of extra-high voltage electric power. In order to design and plan the Intertie, Reclamation created aspects of power systems in miniature. The miniature system allowed Reclamation engineers to determine the functional characteristics of the alternating-current system before construction even began. In conjunction with the miniature a-c system a direct-current model of the circuitry of the Intertie was built and the compatibility of the two systems tested. "As the name implies, direct-current is a steady flow of current in one direction only. Alternating-current is basically a current of electricity which reverses (or alternates) its direction of flow at established intervals." In the United States, alternating current is used in long distance transmission systems and systems delivering electricity to users.

The transmission distances encountered with the Intertie were two to three times greater than those previously experienced. Because of greater distances, the existing technology had to be expanded while at the same time ensuring that the new direct-current lines would be compatible with the existing and new alternating-current system.

Direct-current technology was not new to engineers in the early 1960s. The technology had been around for many years prior to the plans to develop the Intertie. "In 1905, Dr. C. P.

9. *Project Data*, 739-44.

Steinmetz, then of the General Electric Company, developed mercury rectifiers to supply street lighting in Schenectady, New York. That company's 17-mile long direct-current transmission line from Mechanicville, to Schenectady, New York, operated from 1936 to 1945." Though d-c was once the established means of delivering and using electric power, technical difficulties limited its use. The major factor limiting the use of d-c was that it could not be readily changed from one voltage to another in order to meet the consumer's needs and requirements. Alternating-current, on the other hand, could be increased or decreased through the use of relatively inexpensive transformers. The commercial and industrial use of electricity began long ago switching over to alternating-current largely for this reason. Interestingly enough, "among the last holdovers were low-voltage direct-current distribution systems serving the trolley cars and buses then in operation."[10]

Though it appeared that the use of d-c was limited, Reclamation undertook a number of technical studies to increase the available knowledge of d-c and obtain firsthand experience with its use, particularly for very high voltage. The Intertie, based on Reclamation research, combined the best features of the a-c and d-c systems.

The major advantage to using a d-c system was the use of earth return. In a d-c system the earth acts as the negative, or ground, while the lines on the transmission tower act as the positive. By using an earth return a d-c system could carry half capacity between terminals when one of the conductors was out of operation, either for maintenance or by malfunction. The use of earth return was not practical with alternating-current.

In order to use the newly rediscovered technology of direct-current, Reclamation engineers had to design new towers for a direct-current line. Originally the tower designs were

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10. Emil V. Lindseth, "Researching the Intertie," *Reclamation Era*, 51 (August 1965): 69.

based on the use of two single wire conductors, with one overhead ground wire for lightning protection, and an anticipated spacing of 1,100 feet between towers. Design requirements were revised when engineers found that greater current-carrying capacity could be provided with the "bundle" conductor, seven strands of steel wire reinforcement in the center and a conductor covering of forty-five strands of aluminum wire. Using the bundle conductor, towers could be placed fifty-feet further apart, conserving construction time and money. These changes in turn called for a stronger tower to support the added load.[11]

From an engineering standpoint the use of direct-current was an important milestone in the field of electrical development. The significant aspect of the Intertie, at least in the eyes of engineers, was the use of high-voltage direct-current. Direct-current broke the distance barrier in transmission, making it possible to move large quantities of high-voltage power great distances at low cost. The efficient and economical bulk movement of large quantities of power to wherever it was needed opened the door to feasible power generation at isolated localities.[12]

The use of d-c was new to Reclamation engineers investigating its use as part of the Intertie, however Europe had been using d-c current since the invention of the mercury rectifier (converter) in 1905. Switzerland, Germany, Sweden, France, England, the U.S.S.R., New Zealand, Italy, Japan, Denmark and Canada all had made advances in the d-c system, and transmission lines which could then be adapted by Reclamation engineers working on the Intertie. Reclamation's primary contribution to the field of d-c transmission lines was demonstrating that d-c lines have multiple uses outside of just transporting power over long distances.[13]

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11. Ibid., 68-71.
12. Newcomb Bennett, "A New Era Of Power Transmission," *Reclamation Era*, 51 (August 1965): 72-5.
13. Thaddeus Mermel, "D-C Developments in Other Countries," *Reclamation Era*, 51 (August 1965): 86-9.

Construction by Other Participating Agencies

Construction of the Intertie was not carried out entirely by Reclamation. Each of the private, public, and federal agencies involved in the Intertie project constructed a prearranged portion. The BPA constructed the first 264.4-mile section of the 800-kV Celilo-Sylmar d-c Transmission Line. The Los Angeles Department of Water and Power constructed the 580.5-mile Nevada-California section. Construction on both of these portions of the Intertie began in 1966 and were completed and transferred to operation and maintenance status in 1969.

The BPA also constructed 267-miles of the 500-kV a-c line from John Day Substation, near the John Day Dam on the Columbia River via Round Mountain and California's Central Valley, to the Lugo Substation near Los Angeles; BPA constructed the portion of the line running from John Day Substation to the Oregon border. Reclamation constructed the 94-mile portion from the Oregon border to the Round Mountain Substation. The California Power Pool constructed the balance of the line, about 650 miles over a zig-zag route from Round Mountain south. "The Federal portions of this 500-kV a-c line and the 230-kV tap will provide an all Federal interconnection between the Federal Columbia River Power System [in Oregon] and the Federal Central Valley System in California."

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

Construction by Reclamation

Unlike most Reclamation projects the Intertie involved two separate regions, Region 2 and Region 3. Having facilities for the project in two separate regions meant that construction was coordinated out of two separate offices. In November 1964, Reclamation opened the Reno Transmission Lines Office. This office coordinated and supervised construction on the portion of the Intertie located in Region 2. In November 1966, Reclamation opened the Mead Construction Office to manage the southern, Region 3, portion of the Intertie project. In 1972 Region 2 became the Mid-Pacific Region and Region 3 became the Lower Colorado Region.

Region 2 (Mid-Pacific) Construction

Work began on the Mead Substation as well as on the Line from Mead Substation to the Oregon border in 1964. For surveys and collection of design data the line was divided into four sections: Mead Substation (Hoover)-Beatty; Beatty-Luning; Luning-Nightingale; and Nightingale-Oregon border. Surveys began on Section 1 in November 1964 by Merrick and Company of Denver, Colorado. By the end of 1965, contracts had been awarded and completed for design and survey work on all four sections of the line. Concurrently, in 1964, contracts were awarded for the testing of tangent suspension towers. Reclamation awarded the first contract to Societa Amonima Electricicazione SPA of Milan, Italy, while the Reynolds Metals Company received the second. Kaiser Aluminum and Chemical Company supplied the conductor for the Mead-Oregon border line while Reynolds Metals Company supplied conductor for the Liberty-Mead portion of the line.[14] In 1967 it was decided that all activity on the Oregon border-Mead

14. "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, Nevada-California," Vol I, 1-2; "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, Nevada-California," Vol II, 1964, 1-3, RG 115.

transmission line would be transferred to Region 3 for construction, effective July 1, 1968.[15]

In 1965 Reclamation awarded the contract for the Malin (Oregon border) to Round Mountain line to Power City Construction and Equipment Company and Meva Corporation on a joint bid. By the end of 1966, the contractors had virtually completed the clearing of right-of-way and had begun tower erection.[16] This line was energized in May 1968, and CVP received the first power from the Northwest in June 1968. Official transfer of the line from construction to operation and maintenance status occurred in July 1968.

Dominion Construction Company and Hatfield Electric Company, joint contractors, began work on the Round Mountain-Cottonwood line early in 1968. The contractors completed the line in October. The line was energized in November 1968.[17]

Region 3 (Lower Colorado) Construction

In November 1966 Reclamation opened bids for the construction of the Liberty Substation and the Liberty-Estrella transmission line, at the Parker-Davis Project Headquarters, marking the start of construction in Region 3. Wismer & Becker of Sacramento, California received the contract for Schedules 1 and 2 and Power Line Erectors, Inc., received the contract for Schedule 3. Contractors were required to furnish and install gates in right-of-way fences, clear land and right-of-way; construct tower footings; furnish and erect steel towers, and string conductors and overhead ground wires complete with all accessories. Construction began on Schedule 1 in March 1966, Schedule 2 in April and on Schedule 3 in August. By October clearing operations on all three Schedules had been completed. Excavation and concrete

15. "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, Nevada-California," Vol IV, 1967, 1, RG 115.
16. "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, Nevada-California," Vol III, 1966, 2, RG 115.
17. "Annual Project History, Region 2, Pacific Northwest-Pacific Southwest Intertie, California-Nevada," Vol V, 1968, 2, RG 115.

placement for tower footings on the three Schedules began in April, August, and December respectively. Except for forty-nine towers spanning across the Colorado River, all concrete placement on Schedule 1 had been completed by year's end. Delivery of steel towers for Schedule 1 began in November and the contractor initiated erection in December.[18] Reclamation accepted all three Schedules as substantially complete in November 1967 and as complete in January 1968. Construction of the control center and service buildings began in October 1967; work was completed and accepted in August 1968.

In March 1967 groundbreaking ceremonies for the Mead Substation were held with various officials from federal, state, and local governments, plus representatives of private concerns in attendance. Prior to the groundbreaking Charles T. Parker Construction Company of Las Vegas, Nevada, received a contract for site grading, construction of an access road, and water supply line for the substation. All work under this contract was completed in July. Also in 1967 Reclamation accepted work on the Mead-Liberty transmission line as substantially complete and the line was energized in October 1968.[19]

A large portion of Reclamation's work on the transmission lines occurred in 1968. They were responsible for construction of the 34-mile, 230-kV line from Round Mountain Substation in California to Cottonwood Substation, which was energized in 1968. Reclamation also built the 238-mile, 345-kV line from Mead Substation near Hoover Dam to Liberty Substation. Reclamation placed the line in service in 1968. Also, in 1968, Reclamation constructed a 230-kV transmission line from Liberty Substation to Pinnacle Peak Substation.[20]

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18. "Annual Project History, Region 3, Pacific Northwest-Pacific Southwest Intertie, Arizona, Nevada, California," Vol II, 1964, 4, RG 115.
19. "Annual Project History, Region 3, Pacific Northwest-Pacific Southwest Intertie, Arizona-California-Nevada," Vol III, 1967, iv, v, 8-9, RG 115.
20. *Project Data*, 743.

In October 1968, the Mead-Liberty transmission line, the Liberty Substation, and the Liberty-Estrella transmission line were transferred from construction to operation and maintenance (O&M) status. In 1969, the Mead Substation facilities were released to O&M personnel for checkout and energizing. After the substation facilities were transferred to O&M status the Mead Construction Office in Boulder City, Nevada was officially closed and all future responsibilities for contract work assigned to the Southern Nevada Water Project Office.[21] The Southern Nevada Water Project office was subsequently closed on December 31, 1971.[22]

Post-Construction History

Due to several delays in the appropriation of funds by 1969, the proposed inservice date of the Dalles-Mead Intertie had been delayed forcing the involved entities to make other arrangements for a power supply. A news release of May 28, 1969, from the Office of the Secretary, the Assistant Secretary of the Interior for Water and Power Development James Smith reported construction of the Dalles-Mead d-c line was officially postponed.[23]

Delays in construction funding caused potential users' interest to wane. Finally, the d-c line, on which much preconstruction activity had been focused was postponed indefinitely. Consequently, the Intertie consisted entirely of a-c lines.[24]

From 1972 to 1977, the Parker-Davis Project office was administratively responsible for the Operation and Maintenance of the Intertie facilities serving Arizona and southern Nevada within the Lower Colorado Region.

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21. "Annual Project History, Region 3, Pacific Northwest-Pacific Southwest Intertie, Arizona-California-Nevada," Vol IV, 1968, v-x; "Annual Project History, Region 3, Pacific Northwest-Pacific Southwest Intertie, Arizona-California-Nevada," Vol V, 1969, v, RG 115.
22. "Annual Project History, Lower Colorado Region, Pacific Northwest-Pacific Southwest Intertie, Arizona-California-Nevada," Vol IX, 1973, v, RG 115.
23. "Annual Project History, Region 3, Pacific Northwest-Pacific Southwest Intertie, Arizona-California-Nevada," Vol V, 1969, 1, RG 115.
24. Western Area Power Administration, *Appendix to the 1996 Annual Report*, 1996, 100.

In August 1975 a review of the Intertie system was initiated and three task forces established. Based on the task forces' recommendations, it was determined that the Celilo-Phoenix area 1,000-kV portion of the Intertie was feasible. Before construction work could begin, the entire Intertie was transferred to Western Area Power Administration, a part of the Department of Energy. When the Intertie was transferred the Parker-Davis Project office became the Phoenix District Office of the Boulder City Area of Western.[25]

Project Benefits

Benefits of the Pacific Northwest-Pacific Southwest Intertie vary, however the primary benefits relate to the exchange of power between the two regions, the Pacific Northwest and the Mid-Pacific. The Intertie, if completed, would have permitted the Northwest and the Southwest regions to exchange summer-winter surplus peaking capacity in order to reduce capital expenditures for new generating capacity. The system also would have allowed for the sale of Northwest secondary energy to the Southwest. The Intertie would also have provided a means for conservation of significant amounts of fuel by use of surplus hydroelectric energy, as well as an increased efficiency in the operation of hydro and thermal resources.[26] Instead the Intertie allows for the interchange of power, only at a reduced level.

Power consumers receive the greatest benefits from the Intertie system. The construction of the additional power lines and the interconnection of the different hydroelectric systems has increased the availability, dependability, and stability of power as well as the means by which it is received. The Intertie has guaranteed power to customers who otherwise may not have always had a constant power supply.

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25. "Annual Project History, Lower Colorado Region, Pacific Northwest-Pacific Southwest Intertie, Arizona-California-Nevada," Vol VIII, 1972 vi; "Annual Project History, Lower Colorado Region, Pacific Northwest-Pacific Southwest Intertie, Arizona-California-Nevada," Vol XIII, 1977, 1, vi, RG 115.

26. *Project Data*, 744.

Conclusion

An Intertie system was conceived in the spirit of cooperation between the public and private power industry. The original plan called for the seasonal exchange of power between the Pacific Northwest and the Pacific Southwest, as well as public and private industry. Though its original plan changed as construction progressed, the Intertie remains a integral part of the hydropower network in the West. The Intertie interconnects many of the major hydropower agencies providing for the sharing of power when necessary. In addition, the Intertie comprises an integral part of the network of transmission lines managed by Western. Though the final Intertie is not as elaborate as the original proposal, its importance in the development of the hydropower industry cannot be overlooked.

About the Author

Toni Rae Linenberger, a Colorado native, received her B.A. in History from The Colorado College in Colorado Springs, Colorado in 1996. She is currently working on her Masters degree in Western American History, with an emphasis on water, at Utah State University in Logan, Utah, with an anticipated graduation date of June 1998.

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