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BY THE U.S. GENERAL ACCOUNTING OFFICE

**Report To The
Secretary Of Energy**

**Expanding The Pacific Northwest/Southwest
Intertie--Benefits And Impediments**

The Pacific Northwest and California are joined by three high-voltage transmission lines (intertie) which allow for an exchange of electricity between the two regions. The regions benefit from the exchange of power because of the difference in the costs of generating electricity--the Northwest uses relatively low-cost hydropower, while California relies on higher cost oil and gas-fired generation.

In 1980, GAO recommended that the intertie be expanded because California could save about 4 million barrels of oil per year while the Northwest could earn additional revenues from the sale of surplus energy. Since GAO's earlier report, little expansion has occurred although the amount of surplus energy available from the Northwest to California has greatly increased. Because of the benefits to be derived, GAO makes specific recommendations aimed at facilitating expansion of the intertie.



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ABBREVIATIONS

a.c.	alternating current
d.c.	direct current
DOE	Department of Energy
ERA	Economic Regulatory Administration, Department of Energy
FERC	Federal Energy Regulatory Commission
GAO	General Accounting Office
KV	kilovolt
kWh	kilowatt-hour
MW	megawatt
OEE	Office of Energy Emergencies, Department of Energy
PG&E	Pacific Gas and Electric Company
SCE	Southern California Edison
SDG&E	San Diego Gas and Electric
SMUD	Sacramento Utility District

GLOSSARY

Alternating current (a.c.)	An electric current that reverses its direction regularly and continually.
Alternating current line	Transmission line using a.c. Its main features are that it is subject to continual flow reversal, designed for shorter distance transmission, is more economical to tap, and has higher line losses than direct current.
Capacity	Maximum power output, expressed in kilowatts or megawatts. Equivalent terms: peak capability, peak generation, firm peakload, and carrying capability. In transmission, it is the maximum load a transmission line is capable of carrying.
Direct current (d.c.)	An electric current flowing in one direction.
Direct current line	Transmission line using d.c. Its main features are that the magnitude and direction of power flow are controllable at all times, terminals for d.c./a.c. conversion are very expensive, making it uneconomical to tap; and line losses lower than a.c.
Energy	The ability to do work; the average power production over a stated interval of time; expressed in kilowatt-hours, average kilowatts, or average megawatts. Equivalent terms: energy capability, average generation, and firm-energy-load-carrying capability.
Firm energy	Energy intended to be available at all times during the period covered by a commitment, even under adverse conditions, except for reason of certain uncontrollable forces or service provisions.
Kilowatt-hour (kWh)	A basic unit of electric energy which equals 1 kilowatt of power applied for 1 hour.
Megawatt (MW)	The electrical unit of power which equals 1,000,000 watts, or 1,000 kilowatts.

Mill

A monetary unit equaling one-tenth of a cent (\$0.001).

Nonfirm energy

Energy which can be interrupted by the supplying party at any time for any reason.

Peaking capacity

That part of a system's equipment which is operated only during the hours of highest demand.

Surplus power

Power that is in excess of the needs of the producing system. For the subject region, surplus power would be exported to serve markets in adjacent areas. Power here is a generic term for either energy, capacity, or both.





UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-206690

The Honorable Donald P. Hodel
The Secretary of Energy

Dear Mr. Secretary:

This report addresses the factors affecting expansion of the intertie between California and the Pacific Northwest. The report is a follow-up to a 1980 report and expands on our prior recommendation that Bonneville should continue to be a facilitator in the intertie negotiations and needs to play a key role in addressing the impediments of its development. Recommendations to you are found on page 19.

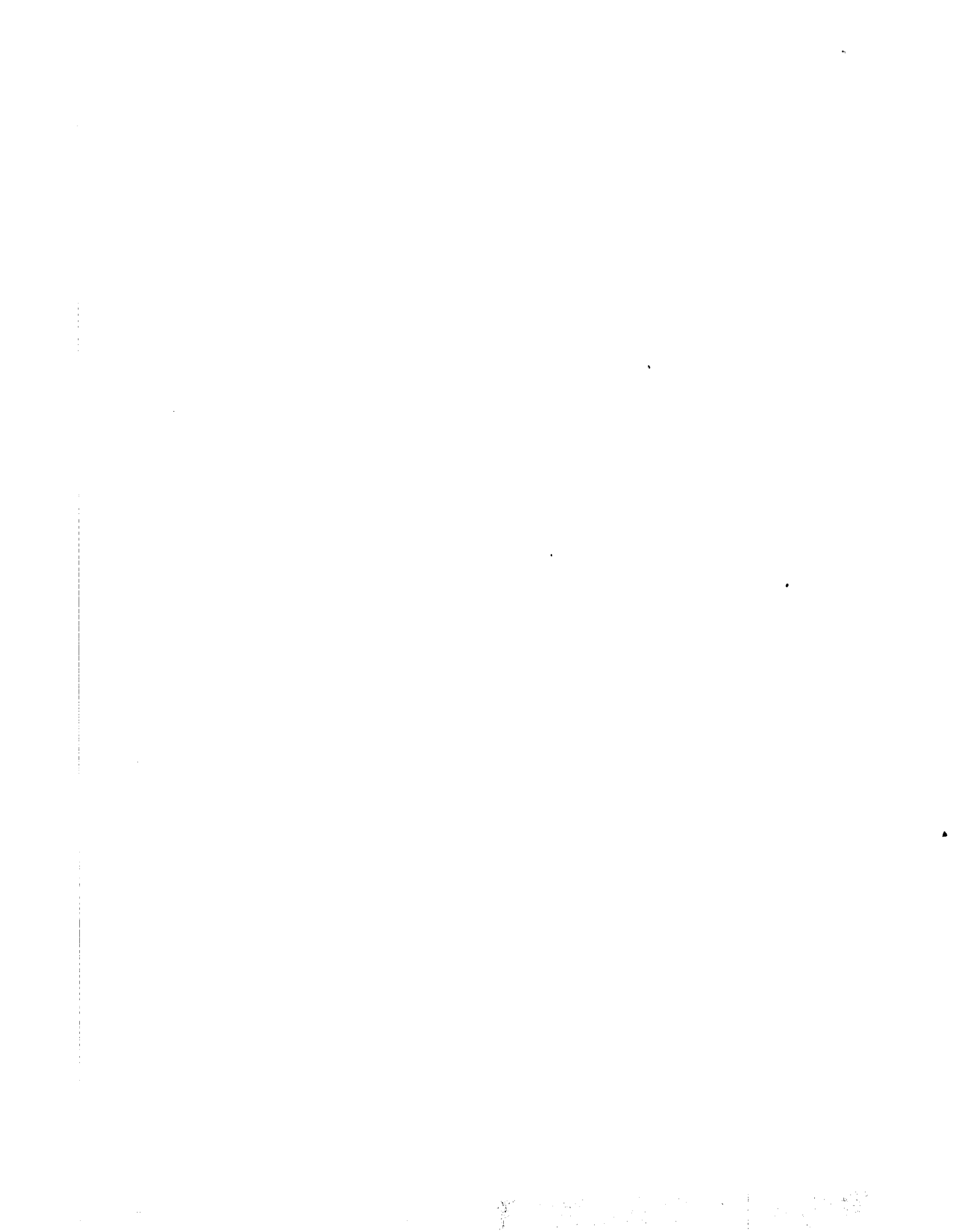
As you know, 31 U.S.C. §720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are also sending copies of this report to the Administrator, Bonneville Power Administration, and the Director, Office of Management and Budget.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "J. Dexter Peach".

J. Dexter Peach
Director



D I G E S T

Three high-voltage transmission lines (an intertie) interconnect the electric generating systems in the Pacific Northwest and California, which allow for an exchange of electricity between the two regions. In 1964, after several years of study, debate, and negotiation, the Congress authorized the federal government to participate with public and private utilities to develop the intertie. The Department of Energy's Bonneville Power Administration and Western Area Power Administration, the principal agencies involved, funded about 26 percent of the cost of the intertie because the power to be transmitted over the intertie would be predominantly hydropower generated at federal dams and marketed by Bonneville, and some power would be purchased by Western. With the completion of the intertie in 1970, the predominantly hydroelectric generating system of the Northwest was interconnected with the predominantly oil- and gas-fired thermal generating system of California. This intertie also made Canadian power available through the Northwest into California.

Because of the different types of electric generation in the Pacific Northwest and California, both regions have benefited from the intertie. By the late 1970's, California had saved billions of dollars in fuel costs while Pacific Northwest utilities, including Bonneville, had earned about a billion dollars in revenues from the sale of surplus Northwest power. In addition, the nation as a whole has benefited from transactions over the intertie because as California predominantly purchases hydropower, it displaces oil- and gas-fired generation, which lessens the nation's dependence on foreign countries for fuel sources. (See p. 1.)

Because of the variability of the amount of water in any given year, the Pacific Northwest plans and builds powerplants on a critical water planning basis which assumes that the hydroelectric system will produce no more energy than it did during the worst drought on record. The amount of energy generated under the critical water criteria is called "firm energy." When water flows are greater than critical, "nonfirm" energy is available. If the nonfirm energy

cannot be marketed in the Northwest, it becomes surplus to the Northwest, and available for export over the intertie. (See p. 2.)

PROGRESS SLOW
ON INTERTIE EXPANSION

In 1980, GAO issued a report which found that additional power available in the Northwest could displace oil and gas consumption in California. At that time, the Pacific Northwest was forecasting power deficits. Even with these deficits, GAO found that enough nonfirm surplus energy would be available in the spring and summer months to warrant expanding the intertie and provide benefits to ratepayers of both regions. GAO concluded that California could save about 4 million barrels of oil per year while the Northwest could earn additional revenues from the sale of nonfirm surplus energy. GAO therefore recommended that the Secretary of Energy take a more active role in facilitating two intertie expansion proposals: (1) upgrading the existing direct current (d.c.) line and (2) building a third alternating current (a.c.) line.

In 1983, as part of a continuing effort to assess the intertie situation, GAO conducted a followup review to determine the status of the recommendations in its 1980 report; identify and examine specific factors affecting expansion of the intertie between California and the Pacific Northwest; and determine, what, if anything, the federal government could do to accelerate intertie expansion. GAO found that the projected power deficits for the Northwest had changed to a projected surplus and that in addition to nonfirm surplus energy, firm surplus energy, which can be relied upon on a consistent basis, is also available to California. Therefore, the benefits GAO found in 1980 have greatly increased because firm surplus energy over and above the Northwest's needs is now available to be marketed to California. (See p. 3.)

Although no agreements have been reached for constructing additional intertie capacity to handle the surplus, the existing d.c. line is being upgraded by 400 megawatts to transmit more power. This upgrade is being financed by Bonneville and southern California utilities. In addition, Bonneville has initiated studies and met with interested California utilities concerning the potential for marketing surplus

power over various other intertie expansion alternatives, all of which are considered economically feasible. Interested parties in both regions and Canada have also met to share information. Although utilities in the Northwest and California agree that a major intertie addition would be beneficial, several problems are hampering individual utility decisions to proceed with development.

UNCERTAINTY OF NORTHWEST SURPLUS AND COST

One problem centers on how much firm surplus will be available. Although recent forecasts are projecting a surplus for the Northwest, uncertainty still exists as to how much firm surplus will be available to market outside the region after 1990, which would be the earliest date when another transmission line could be built. The amount of firm surplus is a key variable in deciding which intertie expansion is most feasible. Contributing to this uncertainty is the question of how accurate are the forecasts--the Northwest projections went from a deficit to a surplus over a short period of time. In addition, questions surround whether the nuclear powerplants now being constructed in the Pacific Northwest will be finished as scheduled and how much conservation potential will be developed. Adding to the uncertainty is surplus Canadian power. Although Canada is forecasting surpluses through the end of the century, it is not clear how much of that power will be available for export through the Northwest and at what price.

Similarly, the cost of Northwest power is uncertain. Bonneville has implemented several price formulas over the last few years, but no long-term contract or rate formula agreeable to both California and the Northwest has been developed.

California utilities are reluctant to risk hundreds of millions of dollars for a line under these types of uncertainties because it is not clear to them what their returns will be. (See pp. 11 to 13.)

NORTHWEST PREFERENCE PROVISIONS AFFECT SURPLUS EXPORTS

Another problem concerns legal restrictions which are designed to protect Bonneville's regional customers. These restrictions apply to

the sale of power outside the region. The Pacific Northwest Electric Power Planning and Conservation Act incorporates limitations contained in the Northwest Preference Act. Intended in part to ensure that the Northwest had first call on Bonneville power, these regional preference limitations allow only surplus power to be sold by Bonneville for use outside the region. They also require Bonneville to include call-back provisions in any contract for the sale of surplus for use outside the region. The call-back provisions allow Bonneville to cease deliveries and, in some cases, request the return of energy whenever Bonneville cannot meet the current or future power requirements of a regional customer.

These regional preference limitations inhibit California utilities in expanding the intertie. The call-back provisions especially increase the financial risk of investing in intertie expansion since long-term surplus power deliveries would not be guaranteed. The call-back provision also reduces the value of Bonneville's firm surplus power and, consequently, the rates Bonneville can expect to negotiate with California. (See pp. 13 to 14.)

ACCESS PROBLEMS INHIBIT INTERTIE EXPANSION

Many of California's public utilities, which would like to purchase power from the Northwest, have been unable to obtain access onto and off of the intertie from the private utilities which control it. These California public utilities filed a dispute in 1972 with the Federal Power Commission (now the Federal Energy Regulatory Commission) claiming the private utilities have entered into anti-competitive practices. After collecting considerable data from both parties, the Commission began hearings in mid-1979, which lasted about 2 years. Currently, the case is waiting a decision by the administrative law judge, after which time the full Commission will rule on it.

Private utilities are keenly aware of the federal preference provisions of the Bonneville Project Act, which provide priority in the sale of federal power to public utilities. The private utilities are concerned that if more public utilities gain access to the line, some of the existing benefits of lower cost power currently shared by the private utilities will be lost to

the public utilities. Power generated from federal projects is generally at a much lower cost than power generated from alternative sources because it is essentially hydro-based. As a result, both private and public utilities want to obtain contracts for these resources. This was a very controversial issue in the development of the existing intertie and was settled only after debate, negotiation, and federal involvement. (See pp. 14 to 17.)

CONCLUSIONS

The intertie provides benefits to the Northwest, California, and the nation as a whole. The Northwest benefits from the sale of excess federally generated hydropower, while California benefits by purchasing low-cost hydropower which displaces oil- and gas-fired generation. In addition, the nation benefits from a reduction of oil used to generate electricity, thereby reducing oil imports.

GAO reviewed the intertie situation in 1980 and found that even though the Northwest was projecting power deficits, enough nonfirm surplus energy was available in the spring and summer to warrant intertie expansion. Today, current forecasts for the Northwest show that in addition to nonfirm surplus energy, firm surplus energy is also available for sale outside the region. This greatly enhances the benefits to intertie expansion envisioned earlier. Even if agreements cannot be reached for firm power sales, intertie expansion can still be justified on the economics of the surplus power. However, utilities are hesitant to expand the intertie because of uncertainties on the size of the firm surplus and its cost, the potential regional restrictions on the sale of power outside the region, and the access to the power.

The current intertie situation is similar to the period before agreements were reached to build the existing intertie. Problems at that time required involvement and negotiations between parties from both regions and the federal government. Negotiations have begun between the Northwest and California, but not much progress has been made. Because of the available benefits, the utilities in these regions should have incentives to move ahead with negotiations for development of an additional intertie. (See p. 18.)

RECOMMENDATIONS TO THE
SECRETARY OF ENERGY

GAO believes the best mechanism for developing an additional intertie would be through parties in both regions negotiating an agreement and then financing its development. GAO realizes that utilities in both regions have discussed intertie expansion, and certainly more negotiations will need to occur to address impediments to development. The federal government has a strong presence in the Pacific Northwest (Bonneville) which could aid in addressing these impediments. Clearly, Bonneville has been, and should continue to be, a facilitator in the intertie negotiations and needs to play a key role in addressing the impediments.

The Secretary of Energy should direct the Administrator of Bonneville to determine, after consulting with the Northwest utilities, how much surplus power is available in the Northwest for marketing to California, how long the surplus power will be available, and how the power will be priced. As part of this, the Administrator needs to consult with the Canadian provincial governments to determine how much Canadian power might be available for export through the Northwest to California and at what price. Concerning the legislative impediments, the Administrator needs to determine whether they can be addressed in the negotiation process. If not, the Administrator should evaluate whether legislative changes would be appropriate to facilitate successful conclusion of the negotiations.

Because of the potential benefits both regions could derive from intertie expansion, the long construction lead-time, and because negotiations have taken place but no agreements reached, it may be beneficial for a time limit to be placed on Bonneville's negotiations. For example, if no agreements have been reached after 1 year, the Secretary of Energy should direct the Administrator to seek congressional approval for the two federal power-marketing agencies in these regions, Bonneville in the Northwest and Western in California, to analyze and then develop the most cost-effective intertie addition or additions. (See p. 19.)

AGENCY COMMENTS

A draft of this report was provided to the Department of Energy for comment. The Department

provided official oral comments on September 26, 1983, and in a separate meeting with Bonneville on September 21, 1983. Overall comments were that the report depicted very thoroughly the current situation relative to expanding the intertie and a good overview of the history of the development of the existing intertie. No disagreement was expressed regarding the recommendations. Comments were also given to provide updated material, which was used where appropriate. (See p. 20.)

CHAPTER 1

INTRODUCTION

Three high-voltage transmission lines (intertie) interconnect the electric-generating systems in the Pacific Northwest with those of California. The Pacific Northwest/Southwest intertie consists of two alternating current (a.c.) lines and one direct current (d.c.) line with a combined capacity of about 4,400 megawatts (MW). These lines were jointly developed by public and private interests. The Department of Energy's (DOE's) Bonneville Power Administration (Bonneville) and Western Area Power Administration (Western)¹ funded about 26 percent of these lines and several public and private utilities funded the remainder. The existing intertie was constructed after much controversy over who would fund its development and also who would get the power. Negotiations took place over several years and culminated in 1964 when the Congress approved appropriations for federal participation in the intertie.

The intertie was completed in 1970, after a 6-year construction period, to market the surplus power that was available in the Northwest and allow for seasonal power transactions between the two regions. The intertie also made Canadian power available through the Northwest and into California. Energy sales to California over the intertie have provided major economic benefits to both regions as well as the nation. The energy delivered by these lines--over 200 billion kilowatt hours (kWh) so far--has saved California billions of dollars that otherwise would have been paid to fuel oil- and gas-fired powerplants and has earned the Northwest utilities--including Bonneville--over \$1 billion, primarily from hydropower generation in the spring and summer in excess of Northwest electricity needs. Moreover, the intertie has allowed the nation to save the equivalent of one-third of a billion barrels of oil.

The method of power generation in the two regions is the basic reason these exchanges have occurred. The energy that can be produced in a predominately hydroelectric system, as exists in the Northwest, varies widely from year-to-year, depending on the amount of precipitation. If sufficient storage were available, the excess water from a good water year could be stored for use in a poor water year. However, the Northwest's Columbia River

¹Bonneville markets electricity in Oregon, Idaho, Washington, and in parts of Montana, Wyoming, and Nevada. Western markets power in 15 western, southwestern, and central states outside the Northwest. The specific area served by Western is California in the report.

System² can store only about 25 percent of the annual water run-off. As a result, the Northwest, to a great extent, generates electricity from water as it is available.

Because the hydroelectric generation is so variable from year-to-year, the Northwest plans and builds powerplants on a "critical water planning" basis, which assumes that the hydroelectric system will produce no more energy than it did during the worst actual conditions of the 102 years for which records are available. Energy produced under the critical water concept is called "firm energy." When water flows are greater than critical, excess energy called "nonfirm" energy is available in the Northwest. For example, in an average water year, approximately 3,300 MW of nonfirm energy is available. If this additional energy is unusable within the Northwest, it becomes surplus and available for sale to California over the intertie.

Sales to California over the intertie have been constrained because of limited intertie capacity, thereby wasting potential energy. For example, over a 6-year period (1975-80), the Northwest spilled water that could have generated more than 44 billion kWh of energy. From February through June 1982 (a very wet year), almost 12 billion kWh of energy was lost through water spills. Much of this energy could have been marketed had intertie capacity been available.

In contrast to the Northwest, California relies heavily on oil- or gas-fired generation to produce electricity. In 1982, about 50 percent of California's electric generation was oil- or gas-fired. The difference in power production costs between the two regions, coupled with the unique qualities of the predominantly hydro-generation system in the Northwest, provide an opportunity for both regions to benefit from energy exchanges. This opportunity is further enhanced because the two regions experience their maximum electricity demand at different times of the year; California is a summer peaking area, while the Northwest's demand peaks in the winter.

In September 1980, we reported on the potential for additional oil savings from greater intertie capacity between the Pacific Northwest and California.³ During that review, the Northwest was projecting severe power deficits; still, we found that both regions could share savings of over \$30 million per year

²The Columbia River System consists of 20 federal hydroelectric projects constructed and operated by the U.S. Army Corps of Engineers, 9 federal hydroelectric projects constructed and operated by the U.S. Bureau of Reclamation, and Bonneville transmission facilities.

³Oil Savings from Greater Intertie Capacity Between the Pacific Northwest and California (EMD-80-100, Sept. 24, 1980).

after allowing for cost recovery. We concluded that enough non-firm power was available to justify upgrading the existing d.c. line and building an additional a.c. line. These changes would add about 1,900 MW to the existing intertie system and displace additional oil in California. Although the power was nonfirm, sufficient amounts would be available predominantly in the spring and summer, when water flows are high and Northwest regional demand is low, to save an annual average of over 4 million barrels of oil. Because of the benefits to be realized in terms of Northwest revenues and oil savings in California, we recommended that DOE take a more active role in efforts to facilitate further intertie development.

Since our last report, conditions in the Northwest have changed dramatically. While at that time the Northwest was predicting power deficits and only had nonfirm power to offer, it is now projecting power surpluses and has firm power for sale over and above the needs of the Northwest on a firm basis. Whereby the power previously available in the Northwest was surplus only in good water years and sold on a short-term, as available basis, conditions in the Northwest have created firm surplus power, or power that could be relied upon and sold on a consistent longer term basis. Firm surplus power, if available long enough into the future, could bring Northwest utilities greater revenues and allow California utilities to defer some capital expenditures in planned powerplant additions. Current forecasts for the Northwest show that firm surplus energy is available for sale outside the region.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of our review were to (1) determine the status of the recommendations in our 1980 report, (2) identify and examine specific factors affecting expansion of the intertie between California and the Pacific Northwest, and (3) determine what, if anything, the federal government could do to accelerate intertie expansion. This review was performed in accordance with generally accepted government auditing standards and was completed in June 1983.

To determine what progress had been made in expanding the intertie since our previous report, we interviewed officials of DOE's Economic Regulatory Administration (ERA) who should monitor progress on intertie development as we recommend. We interviewed officials of, and obtained documents from, Bonneville and Western to determine what their respective involvement in intertie expansion has been since our 1980 review. We also obtained the views of California electric utility company officials and officials from the California Public Utilities Commission and the California Energy Commission (the state's regulatory bodies) to determine what they had done since our 1980 review.

Because of the changed conditions in the Pacific Northwest since our last report and the resulting impacts of power availability for export out of the Northwest, we then reviewed what this means for further intertie expansion. We accomplished

this by interviewing Bonneville officials and representatives of several California utilities who could be parties to the intertie, the California Energy Commission, the California Public Utility Commission, and the Pacific Northwest Power Planning Council.

We accomplished the second and third objectives by interviewing the previously mentioned officials. We obtained and analyzed several documents from these sources concerning electricity supply, demand, and transmission issues in the Northwest and California. Additionally, we contacted legal staff of the Federal Energy Regulatory Commission (FERC) to discuss a complaint filed with them regarding access to the intertie by public utilities. We obtained hearing documents and briefs relating to this complaint and analyzed them to get an understanding of the issue of intertie access.

CHAPTER 2

STATUS OF EXPANSION ALTERNATIVES

In our September 1980 report, we examined the three proposals for line expansion being considered at the time: (1) upgrading the capacity of the existing d.c. line, (2) building a third a.c. line, and (3) building a second d.c. line. We concluded that the upgrading of the existing d.c. line, construction of the third a.c. line, and continued assessment of the economics of the second d.c. line were viable options strictly on the basis of nonfirm surplus energy. In that report, we recommended that the Secretary of Energy direct ERA to:

- monitor the progress of Bonneville's negotiations with California utilities to ensure that all feasible agreements were reached to upgrade the d.c. line and
- work with Bonneville and California utilities to facilitate development of the third a.c. line.

Additionally, we recommended that if, after a reasonable period of time, the above efforts proved unproductive, the Secretary should seek congressional authority which would allow Bonneville and Western to provide impetus for development. Concerning our recommendations to ERA, reorganizations and staff reductions at DOE have virtually eliminated ERA; hence, it has had almost no involvement with monitoring or coordinating progress on intertie development.

Actions have been taken by utilities in the two regions for upgrading the existing d.c. line by 400 MW. Furthermore, Bonneville has taken several actions relative to intertie expansion including: (1) initiation of a market study of electricity demand and supply for the Northwest and adjacent regions, (2) initiation of meetings with interested parties in California to discuss the various alternatives, and (3) a study of intertie expansion alternatives for exporting power. The intertie expansion alternatives are:

- upgrade the a.c. lines to 3,200 MW;
- upgrade the a.c. lines to 4,000 MW;
- build a third a.c. line;
- build a second d.c. line;
- change existing a.c. lines to d.c.; and
- build a line to move power in Montana through Idaho, Utah, and Nevada to California.

Bonneville's study shows that each of these options is economically feasible. However, to date, agreements have not been

reached by Bonneville and California utilities on any of these options although consideration is being given to upgrading the existing a.c. lines to 3,200 MW and, possibly, to 4,000 MW. At the time of our review, most of the discussion and detailed analysis surrounded the first through fourth options. Because the majority of available information centered on these four options, progress toward them and the expansion currently under way are discussed below.

UPGRADING THE EXISTING D.C. LINE

The existing d.c. line is an 800-KV line running through Oregon and Nevada into southern California. At the time of our last report, this line was rated at about 1,600 MW. Upgrading this line would provide an additional 400 MW of line capacity. Shortly after our report was issued, an agreement was reached between Bonneville and the California utilities to upgrade the line. Construction began in early 1982 and is scheduled for completion in 1985 at an estimated cost of about \$90 million. These costs are split between Bonneville (about \$40 million) and southern California utilities.

UPGRADING THE EXISTING A.C. SYSTEM

Upgrading the capacity of the existing intertie from 2,800 MW¹ to 3,200 MW and, possibly, to 4,000 MW is a major area of consideration for Pacific Gas and Electric Company (PG&E), the investor-owned utility owning the largest share of the existing intertie and operating the northern California portion. These options were not under consideration at the time of our 1980 review. The additional imported energy will be used to displace oil- and gas-fired generation in California. Additionally, it will allow the Northwest to export more power at an earlier date than any of the other options because an entire new line could not be completed until 1990.

Upgrading the existing a.c. system to 3,200 MW could be accomplished for about \$2 million. To achieve this will require equipment changes and additional operational refinements and agreements between affected utilities. Upgrading to 4,000 MW is estimated to cost between \$50 million and \$100 million. This undertaking would require extensive equipment additions as well as further operational refinements and agreements between affected utilities.

Upgrading the existing a.c. lines, however, has some disadvantages. For example, as a transmission line approaches its

¹Although the capacity of the a.c. line was increased from 2,500 to 2,800 MW through operating refinements, some utilities have expressed reliability concerns with operating the lines at this level. As a result, these lines are being operated at 2,500 MW until further operating agreements can be reached.

thermal capacity (the maximum amount of power it is capable of carrying), transmission losses increase substantially, thereby reducing the amount of power available at the delivery point. Additionally, upgrading the existing a.c. lines to 4,000 MW may reduce system reliability below acceptable standards. Simply stated, this means that the more heavily California depends on receiving existing Northwest power over the intertie system and the receipt of power from Arizona, the more critical any electrical disruption becomes. A December 1982 storm knocked out both the a.c. lines and several lower voltage transmission lines in California, which disrupted power deliveries for several utilities in the Southwest. This and other technical issues are currently being studied by various affected utilities in the western states.

Also, the a.c. high-voltage transmission network is hampered by "loop flow." Sometimes when power is scheduled to flow from the Northwest to California on the a.c. intertie, some of the power will not flow on the intertie, but rather will follow a circuitous path through other inland transmission lines in reaching California. Sometimes when power is scheduled from the Rocky Mountain area over the inland transmission lines, some of the power will not flow on the inland path, but rather follows a path over the a.c. intertie in reaching its destination. Loop flow results from the interconnected operation of the western transmission system, which reduces the effective carrying capacity of transmission lines. Those systems which carry increased electricity on their lines and experience a loop flow problem may suffer from higher transmission losses, possible degradation of system reliability, and reduced capabilities to schedule power to or from other systems. This problem does not affect the d.c. transmission systems.

CONSTRUCTING A THIRD 500-KV A.C. LINE

Constructing a third 500-KV a.c. line from the California-Oregon border to central California would provide an additional 1,500 to 1,800 MW of capacity to the existing intertie and cost about \$400 million. Our 1980 analysis showed that this option would result in an average annual increase of about 1.2 billion kWh of surplus energy sales to California.

Bonneville recently completed a 156-mile section of 500-KV a.c. line in southern Oregon. Although this segment was justified by Bonneville on the basis of improving system reliability for expanding loads in southern Oregon, it could also serve as the northern end of a third a.c. line. Progress on the California portion of the line has not moved as smoothly, however. While the California utilities have studied the feasibility of constructing the third a.c. line, conditions acceptable to all parties have not yet surfaced and, consequently, no decisions have been reached. In addition, preliminary DOE findings on the December 1982 storm (mentioned above) indicate that transmission line congestion just south of San Francisco was a major contributor to the severity of the outage. Therefore, reliability must be considered before

proceeding with this option. Another factor that has to be considered before developing an a.c. line is that rights-of-way would have to be obtained. According to utility officials, a third a.c. line could not be completed until 1991 or 1992.

CONSTRUCTING A SECOND D.C. LINE

Building a second d.c. line of about 2,200 MW between the Northwest and the Southwest would require about 1,000 miles of new line construction and cost an estimated \$600 million to \$800 million. This line was originally authorized for federal construction in 1964 but was not built because the expense could not be justified. Although Bonneville and Western reexamined this proposal between 1975 and 1978, it was not under active study at the time of our 1980 report.

In 1982, Western and Bonneville again initiated a study of the second d.c. line. This study is currently underway and is being coordinated with efforts by Bonneville to clearly identify surplus energy resources available for export. Western has pointed out several advantages of this line: (1) a different route than a.c. line, (2) lower transmission losses, (3) no loop flow problems, and (4) a shorter construction time than a new a.c. line.

A second d.c. line would also provide the Northwest with access to coal and nuclear resources from the Southwest that could be used to supplement Northwest operations during low-water years. Since the two regions experience their greatest demand in different seasons, they should have power to exchange--the Northwest could send power south in the summer, and the Southwest could send power north in the winter. The Southwest, particularly southern California, would also benefit by replacing expensive oil- and gas-fired generation with the less expensive Northwest surplus power. The greatest drawback to the second d.c. line is its cost. A second d.c. line could not be completed until 1990.

CHAPTER 3

FACTORS AFFECTING INTERTIE EXPANSION

Information developed by Bonneville indicates that all intertie expansion alternatives thus far proposed are economically feasible. Bonneville's preliminary benefit analyses are based on the economic value of nonfirm energy. According to Bonneville, the economic value of firm surplus power would further enhance intertie expansion. Although the economics have greatly improved, several basic issues need to be resolved before California utilities can reach any agreements on intertie expansion. These issues include the future availability, duration, and price of Northwest power surpluses beyond 1990, the earliest date an additional intertie could be finished. This uncertainty is complicated by legal provisions of the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act), which may affect the sale of surplus power to California utilities. By incorporating provisions of the Bonneville Project Act and the Northwest Preference Act, the Northwest Power Act provides regional customers, as well as public bodies and cooperatives, with a preference for Bonneville power and thus may limit Bonneville's ability to enter long-term interregional power transactions. Further complicating intertie development in California are longstanding rivalries between private and public utilities regarding access rights to the intertie.

These uncertainties are not unlike those surrounding the agreements to construct the current intertie. In fact, it was only after much controversy, debate, and negotiations that decisions were made on constructing the existing intertie.

HISTORY OF CURRENT INTERTIE DEVELOPMENT

Completion of the existing intertie was the culmination of years of study, debate, negotiations, and compromise. Studies on the feasibility of constructing an intertie between the Northwest and California were conducted by the Bureau of Reclamation and Federal Power Commission between 1948 and 1953. Serious discussion about an intertie did not begin until 1958, when Pacific Gas and Electric Company, (PG&E) motivated by the prospect of obtaining hydroelectric power from the Northwest cheaper than its oil-fired generation, began discussions with Bonneville. Bonneville was experiencing power surpluses which it could not market in the region, so it had power to sell to California. By 1959, Bonneville and PG&E were ready to sign contracts; however, by this time public utilities in both regions were showing interest in an intertie.

In 1961, the President directed the Secretary of the Interior to develop plans for an intertie between federal power agencies. A task force was appointed, which was headed by the Administrator of Bonneville. The task force reported that one or more interties should be built between the regions. Although ownership and operation was not recommended, the task force said it could be all

federal, all nonfederal, or some combination. Private utilities became concerned over the prospect of federal ownership of the interties and federal preference legislation which would exclude private utilities from Bonneville power. Northwest interests were starting to become concerned about California's becoming dependent on Northwest power.

Between 1962 and 1964, these different and conflicting interests were intensively debated by the various parties involved and the Congress. The negotiated intertie plan which was approved in the summer of 1964 called for development of four lines by federal, public, and private utility participants. Shortly after the plan was approved, federal legislation (the Northwest Preference Act) was passed to protect the Northwest's rights to the power.

CHANGED NORTHWEST CONDITIONS HAVE
RESULTED IN MORE SURPLUS POWER

Northwest forecasts show a significant reduction in the demand and growth rate for electricity compared with what was forecasted 3 years ago. At that time, the Northwest was forecasting that it could have power deficits ranging from 2,000 to 4,000 average annual MW (17.5 billion to 35 billion kWh) through 1990. The recent forecast of the Pacific Northwest Power Planning Council indicates that power surpluses could be as high as 3,400 average annual MW (29.8 billion kWh) in 1987, declining to zero by the year 2001. This is based on demand growth of 0.7 percent and was made before a recent nuclear plant deferral. However, even when using a more recent forecast by Bonneville, which includes the plant deferral and a higher growth rate, a surplus still exists. Bonneville's August baseline forecast of 1.8 percent demand growth shows a current surplus of 1,500 MW declining to zero by 1989. These projections are based on critical, or drought, water conditions and do not factor in conservation resulting from specific programs or price increases. In addition, under average water conditions (an average of historical water years) another 3,300 average annual MW (29 billion kWh) of nonfirm energy would be available.

More power benefits also appear to be available from western Canada, more specifically, the provinces of Alberta and British Columbia, whose power generation is almost entirely hydroelectric. Canada's hydroelectric system has more storage capability than the Northwest's and has surpluses available for export in good water years that enhance the economics of intertie expansion. Furthermore, even with Canada's relatively high-demand growth forecast, it projects that surpluses will be available for sale under critical water conditions. Estimates from Alberta and British Columbia indicate that, on the basis of existing intertie capacity between western Canada and the Northwest, more than 4 billion kWh would be available for export under low-water conditions through 2002. Under average water conditions, more than 6 billion kWh would be available. Canada has not made clear how much of that surplus would be available for export through the Northwest and at what cost.

Because the Northwest now expects to have more power than it needs, most of the nonfirm energy that would have stayed in the region under the deficit forecast of 1980 will be available for export. These benefits have increased so dramatically that Bonneville now indicates that any one of the intertie expansion options discussed in chapter 2 is now economically feasible. Bonneville's preliminary study indicated that \$150 million annually could accrue from a 2,000-MW expansion. A recent analysis by the staff of the California Energy Commission suggests that \$500 million per year could be realized from 2,800 MW of intertie capacity expansion. These benefits result from the difference in the cost to generate electricity between the two regions, ranging from 15 to 60 mills per kWh, depending on the type of generation in the Northwest and the type of generation displaced (including new capacity) in California. Their analysis did not include the Canadian potential.

ECONOMIC STUDIES SHOW INTERTIE EXPANSION
ECONOMICALLY FEASIBLE, BUT UNCERTAINTIES
ARE HAMPERING DECISION

Although several studies have been done suggesting that a major intertie addition would be cost-effective, no study thus far has convinced the involved parties to build one. Additions to the intertie system must be funded by various electric utilities in the Northwest and California--to include participation by Bonneville and Western--which anticipate that they will earn enough money to pay for capital costs and, in the case of private utilities, gain a return on their investment. Before utilities are willing to invest hundreds of millions of dollars on an intertie, they must be assured that risks are at a minimum.

At this time, California utilities are concerned over several factors that increase the risk of investing in the intertie. These concerns include:

- not knowing how much surplus power will be available from the Northwest on a long-term basis (beyond 1990) and uncertainty on the policy to be used in the Northwest for the pricing of the power;
- not having secure power deliveries because of federal legislation that provides for a call-back provision on power sold outside the region; and
- private utilities not having assurance on power allocations because of federal legislation that provides preference in the allocation of federal power to public bodies and cooperatives and public utilities not having access to intertie capacity.

Availability and cost
of power uncertain

Considering the lead time required to develop additional interties, a significant factor affecting the feasibility of

intertie additions is the uncertainty regarding the availability of surplus power in the Pacific Northwest after 1990. California utilities have indicated interest in firm surplus purchases for a long period (at least 15 years). California utilities believe commitments of firm power for this duration are needed if they are to delay adding new generating plants. While recent forecasts indicate a surplus, and preliminary discussions have occurred between the two regions, both are hesitant at this time because of unknowns about future demand growth, whether generation expansions will be finished on schedule, whether conservation efforts will be successful in the Northwest, and the price at which the power will be available.

A recent forecast prepared by the Northwest Power Planning Council, established by the Northwest Power Act to provide a comprehensive plan and forecast for the region, estimated that annual demand growth would range from 0.7 percent to 2.5 percent--well below previous estimates. This range of forecasts indicates that firm surplus would be available through 2000 if the 0.7 percent figure is correct or 1988 if the 2.5 percent figure is correct. On the other hand, Bonneville's August 1983 forecast ranges from 1.3 to 2.6 percent, while the official utilities' forecast¹ is 2.2 percent. The range of these forecasts indicates the uncertainty of forecasting future demand within the region. California utilities could also be skeptical because they have seen the Northwest go from a large deficit projection only 3 years ago to a large surplus projection today.

The surplus projected by the Northwest could be contingent upon several factors. One factor is the completion and operation of three nuclear plants in the region. These plants have incurred slippages of several years and presently face financial pressures in addition to having to obtain operating permits from the Nuclear Regulatory Commission. The history and problems incurred by these plants continues to lead to questions concerning their capability to become operational on schedule. Another factor is the amount of conservation that will be achieved in the Northwest. The potential for conservation outlined in the Planning Councils' recently adopted plan shows up to 4,000 MW. The pace of development of this resource can significantly affect the amount of surplus.

Another factor affecting intertie additions is the uncertainty about future Northwest power rates. Power rates in the Northwest are generally much lower than they are in California, so there should be considerable potential to market additional surplus power at rates attractive to both regions. California wants to purchase surplus power from the Northwest at favorable prices which will benefit its ratepayers and which will cost less than planned alternatives. The Northwest wants to sell surplus power to California at prices that will benefit its ratepayers so that they do not bear the cost of the generating capacity already under

¹Forecast prepared by the Pacific Northwest Utilities Conference Committee.

construction. California is hesitant to expand the intertie without a long-term pricing policy. Specifically, California is afraid that completion of an additional transmission line could be followed by large increases in rates charged for surplus energy. This concern comes largely from the fact that since 1978 Bonneville has implemented several nonfirm energy pricing formulas, all of them challenged by California power officials. On the other hand, the Northwest will probably be hesitant to proceed with aggressive conservation and further generation expansion without securing a favorable market for the surplus. Hence, the pricing of the surplus will be central to the willingness of the Northwest to add resources ahead of its own loads for export and of California to expand the intertie.

Call-back provision on Northwest power leads to uncertainty

Under the Northwest Power Act, Bonneville is authorized to sell power which is surplus to its contractual obligations to serve regional customers. These surplus sales must be in accordance with not only the Northwest Power Act, but also the Northwest Preference Act (Public Law 88-552), the Bonneville Project Act, and the Federal Columbia River Transmission Act.

Section 9(c) of the Northwest Power Act provides that all Bonneville sales of power for use outside the region are subject to the limitations and conditions of the Northwest Preference Act. This act establishes that only surplus power--energy and peaking capacity--may be sold for use outside the region. The Bonneville Administrator can stop delivery of surplus energy by giving a maximum of 60-days notice to a customer when the surplus energy is needed by Bonneville to meet the current or future energy requirements of a regional customer. A surplus peaking capacity contract may be terminated upon no more than 5-years notice and may require the nonregional customer to return the energy necessary to supply the peaking capacity. These limitations are referred to as "call-back provisions" and provide the vehicle to assure regional preference to Bonneville power.

Northwest interests continue to be very adamant about their Northwest preference rights. They are apprehensive about entering long-term agreements for the sale of power outside the region that may endanger their future federal power supply or create new consumer dependencies in California. California utilities believe that the call-back provisions erode the value of the Northwest's firm surpluses and increase their risk in participation in major intertie additions.

One alternative that is being considered to overcome the call-back provisions would involve the sale of regional surplus energy, including surplus Bonneville energy, to a nonfederal entity in the Northwest. In turn, the entity would sell an

equivalent amount of power to California.² Under certain circumstances, such an arrangement may be challenged on the grounds that it constitutes a sale of Bonneville power for use outside the region which, under Section 9(c) of the Northwest Power Act, is subject to the 60-day call-back provision. The challenge may arise because the laws and their legislative history are inconclusive on such a transaction.

Federal preference and utility access to the intertie make expansion uncertain

The Northwest Power Act also applies the preference provisions of the Bonneville Project Act to all power sales. The Bonneville Project Act gives public bodies and cooperatives preference to federal power. Consequently, California public bodies and cooperatives have a priority claim to Bonneville surplus power over California private utilities. Also, the Bonneville Project Act provides that contracts for the sale of power to private utilities must contain a provision allowing Bonneville to cancel the contracts with a 5-year notice if the power is needed to supply public bodies and cooperatives.

California's electric system includes three large investor-owned (private) utilities, two large municipal utilities, two large water projects--one federal and one state--and about 40 smaller utilities (mostly publicly owned) of which only about a half dozen own generation facilities. About 80 percent of the retail electric customers are served by the private utilities, which also own and operate most of the generation and bulk transmission system. More than one-half the remaining customers are served by the two large municipal utilities, which also own generation and transmission facilities. The remaining customers are served by the 40 or more other utilities (mostly public) which have little or no generation or transmission facilities, and, therefore, must rely heavily on purchased power and transmission agreements with the private utilities and Western.

Federal power-marketing policies have played a substantial role in the distribution of federal hydroelectric power. Whenever federal funds are used to construct generating facilities, federal preference laws give public entities first priority in the sale of electricity from these projects. Power generated from these projects is generally at a much lower cost than power generated from alternative sources. The supply of federal resources is limited, however, and competition for these resources is tremendous.

In developing the existing intertie to the Northwest, federal power-marketing policies became a controversial issue between the

²Some utilities suggest this may also provide a way around the federal preference provisions of the Bonneville Project Act, which requires Bonneville to offer surplus power to California public utilities before California private utilities.

public and private utilities in California. Public utilities, aware of their preference rights to power generated at federal projects and marketed through Bonneville, wanted access to transmission facilities. Private utilities, aware of this situation, tried to avoid federal development of, and public access to, the line. After considerable negotiation, a compromise decision for development was reached. The development plan, which was approved by the Congress, provided for approximately a two-thirds private, one-third public utility split of the intertie capacity in California. (See table 1.)

In 1961, three major private utilities in California formed the California Power Pool. The integration of the extensive transmission facilities owned by the pool members provided a favorable basis for interchange of power among themselves and with the Northwest. During the negotiation and development of the intertie, several agreements and contracts were signed between the private, federal, state, and public participants providing for the conditions of ownership and operation of the lines. The private utilities, concerned about additional public access to possible excess capacity in the lines, secured agreements which effectively restricted intertie access by nonparticipants. These agreements also precluded outside participation in upgrading the capacity of existing lines. As this discussion indicates, the private utilities were very concerned about public utilities gaining more access to the intertie and, hence, power from the Northwest.

Since agreements for the existing intertie were reached, several public utilities in California without access have expressed interest in gaining direct intertie access. Attempts on the part of the public utilities to gain access to the intertie and, hence, less expensive Northwest power, have generally been unsuccessful. Additionally, even if a separate line (such as the proposed third a.c. line) were built and public utilities participated, complex questions remain concerning how the public utilities, which may not have transmission capabilities between such a line and their service areas, would be able to realize the potential benefits. The major transmission lines connecting the intertie to the public utilities' service areas are owned and operated by the private utilities. Uncertainties concerning the availability of transmission services on these lines and the willingness of the private utilities to cooperate have created considerable controversy and legal disputes.

A key case in the intertie access dispute³ was filed by several California public utilities with the Federal Power Commission (now FERC) in 1972. The public utilities claim that, through the intertie agreements, the private utilities have entered into anticompetitive practices. Hearings on the case began in July 1979 and continued for about 2 years. FERC staff-proposed findings have generally supported the public utilities' claims

³FERC case number E-7777, commonly referred to as "Quad Seven."

Table 1

California Utility Rights to Intertie

<u>Utility</u>	<u>a.c. lines</u> <u>2,800 MW</u>	<u>d.c. line</u> <u>1,556 MW^a</u>	<u>Total</u>
<u>Private:^b</u>			
Pacific Gas and Electric Company	1,050	389	1,439
Southern California Edison Company	903	335	1,238
San Diego Gas and Electric Company	<u>147</u>	<u>54</u>	<u>201</u>
Total	<u>2,100^c</u>	<u>778</u>	<u>2,878</u>
<u>Public:</u>			
California Department of Water Resources	300		300
Western Area Power Administration	400 ^d		400
Los Angeles Department of Water and Power		622	622
Burbank		60	60
Glendale		60	60
Pasadena	<u>—</u>	<u>36</u>	<u>36</u>
Total	<u>700</u>	<u>778</u>	<u>1,478</u>
Total	<u>2,800</u>	<u>1,556</u>	<u>4,356</u>

^aThe upgrade to the d.c. line will be split 1/2 to the pool companies and 1/2 to Los Angeles and the three other public utilities on a ratio of 80 percent and 20 percent.

^bThe Pacific Intertie Agreement of 1966, an agreement among PG&E, SCE, and SDG&E (California Power Pool companies) sets forth their respective rights to the intertie. Their intertie capacity is split on a ratio of 50 percent, 43 percent, and 7 percent, respectively. According to the agreement, any unused capacity or upgrade of capacity on the a.c. lines is split accordingly. The pool companies also have 1/2 of the d.c. line.

^cA recent FERC ruling provided that the Sacramento Municipal Utility District (SMUD), a public utility, could retain its 200-MW allocation of the a.c. line, which SMUD had not used for several years. Its right has been contested by the pool companies.

^dWestern's share of the intertie is used to serve public preference customers in the northern California area.

Source: GAO compilation.

and suggest that intertie agreements should be rewritten to remove restrictions and provide public agencies proportionate access to the intertie. Reply briefs have been filed, and the case is now before the administrative law judge for initial decision. After the judge's decision, the case goes to the Commissioners for a final decision. Even with a final FERC decision, affected parties could appeal the case all the way to the U.S. Supreme Court. As a result, the case may not be finally decided for several years.

While federal power-marketing policies are not at issue in the case, California private utilities and their ratepayers could be adversely affected if they lose some of their existing intertie benefits to the public utilities. The private utilities are concerned that as public utilities gain more intertie capacity and greater access to the Northwest because of federal preference, public utilities will gain a favorable market advantage to available Bonneville power. Although some preliminary discussions have taken place concerning these issues, no agreements or settlements have been reached. In fact, misgivings between the private and public utilities have increased because of the possibility of increasing the capacity of the two a.c. lines which, under the existing intertie agreements, would exclude the public utilities. It appears that neither the public nor private utilities may be willing to compromise until the outcome of the case is known. Hence, the same public versus private utility rivalries which affected the development of the existing intertie are again a factor affecting future expansion.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

The intertie provides benefits to the Northwest, California, and the nation as a whole. The Northwest benefits from the sale of excess federally generated hydropower, while California benefits by purchasing low-cost hydropower which displaces more expensive oil- and gas-fired generation. In addition, the nation benefits from a reduction of oil used to generate electricity, thereby reducing oil imports.

We reported on the intertie situation in 1980 and found that even though the Northwest was then projecting power deficits, enough nonfirm surplus energy was available in the spring and summer to warrant intertie expansion. At that time, we estimated 4 million barrels of oil could be saved on an annual basis by building an additional intertie. Since then, recent forecasts for the Northwest show that in addition to nonfirm surplus energy, firm surplus energy is also available for sale outside the region, which greatly enhances the benefits to intertie expansion. Regardless of whether or not the Northwest and California can agree on firm power sales, intertie expansion continues to be justified now, even more than it was in 1980, on the basis of increased nonfirm energy.

While both regions agree that building an additional intertie line is beneficial, several problems are hampering decisions to proceed with development. These problems include not knowing how much surplus will be available, how long it will be available, and how it will be priced. In addition, California is concerned about the long-term availability of Northwest surplus power because of federal legislation that requires Bonneville to call back energy on short notice if needed for loads in the Northwest. Further complicating potential expansion are long-standing issues between private and public utilities concerning which will have control and access to the intertie and federal legislation that gives priority to public utilities in the sale of federal power.

Individual utilities which would have to take the risk in developing an additional intertie want to know how much surplus there is, how long it will last, and how much it will cost. These utilities are reluctant to spend hundreds of millions of dollars on intertie additions that could not become operational until 1990 without more specific information and agreement from the Northwest in these areas. Current demand forecasts for the Northwest range from 0.7 percent to 2.5 percent. The size of the surplus could vary on the basis of which end of the range materializes. The size and duration of the surplus depends upon factors such as timely powerplant additions and implementation of conservation programs. California, on the other hand, does not want to pursue intertie additions and purchase surplus energy without some favorable long-term pricing arrangements. The amount of Canadian

surplus that could be made available is also a major consideration that needs to be factored into intertie negotiations.

The Northwest Power Act, incorporating provisions of the Northwest Preference Act, raises additional questions about the ability of the Northwest to enter long-term power agreements with California. The act requires Bonneville to discontinue surplus energy and capacity sales with a 60-day or 5-year notice if needed for loads within the Northwest. The incorporation of the Northwest Preference Act into the Northwest Power Act reduces the certainty and value of the surplus power which California could otherwise use to defer future powerplant additions. It therefore reduces the incentive for California utilities to risk capital in building additional transmission lines to the Northwest.

Intertie expansion is further complicated because of disagreements between California private and public utilities over public preference to federal power resources and intertie access. California public utilities, which rely on purchased power, generally from California private utilities, would like access to Northwest power supplies. Except for the access provided through Western's share of the intertie, these public utilities have generally been unsuccessful in obtaining access either on or off the intertie to their load centers. California private utilities, which have considerable control over the intertie, are not anxious to provide additional capacity to the public utilities and possibly give up some of the benefits they now enjoy, as well as lose out on potential surpluses that appear available from Bonneville.

RECOMMENDATIONS TO THE SECRETARY OF ENERGY

We believe the best mechanism for developing an additional intertie would be through parties in both regions negotiating an agreement and then financing its development. We realize utilities in both regions have discussed intertie expansion, and certainly more negotiations will need to occur to address impediments to development. Through Bonneville, the federal government has a strong presence in the Northwest which could aid in addressing these impediments. Clearly, Bonneville has been and should continue to be a facilitator in the intertie negotiations and needs to play a key role in addressing the impediments.

The Secretary of Energy should direct the Administrator of Bonneville to determine, after consulting with Northwest utilities, how much Northwest surplus power is available for marketing to California, how long the surplus power will be available, and how the power will be priced. As part of this, the Administrator needs to consult with the Canadian provincial governments to determine how much Canadian power might be available for export through the Northwest to California and at what price. Concerning the legislative impediments, the Administrator needs to determine whether they can be addressed in the negotiation process. If not, the Administrator should evaluate whether legislative changes would be appropriate to facilitate successful conclusion of the negotiations.

Because of the potential benefits that both regions could derive from intertie expansion, the long construction lead-time, and because negotiations have taken place over several years without agreements being reached, it may be beneficial for a time limit to be placed on Bonneville's negotiations. For example, if no agreements have been reached after 1 year, the Secretary of Energy should direct the Administrator to seek congressional approval for the two federal power-marketing agencies in these regions--Bonneville in the Northwest and Western in California--to analyze and then develop the most cost-effective intertie addition or additions.

AGENCY COMMENTS AND OUR EVALUATION

A draft of this report was provided to DOE for comment. Because of the short timeframe provided DOE to comment, we received official oral comments from the Department on September 26, 1983, and from Bonneville in a separate meeting on September 21, 1983. Overall comments from both DOE and Bonneville were that the draft report provided an excellent view of the history of the development of the existing intertie and a thorough explanation of the current situation relative to expanding the intertie. Neither Bonneville nor DOE disagreed with our recommendations. In fact, both parties offered comments that a shorter time period than 1 year be given for negotiations, after which Bonneville and Western should seek congressional approval to expand the intertie or that the Congress should begin considering the intertie situation as negotiations proceed over the next year.

DOE officials stated that the report should show the federal government as a consumer of electricity and, on the basis of this, the intertie should be expanded. DOE officials said that electricity costs are projected to rise significantly at their California facilities. These costs could be somewhat reduced with an additional intertie where Western could market the power to DOE facilities. The issue of the federal government as a consumer was not part of the scope of our work. We believe, however, that this issue be raised in any discussion with the Congress on Bonneville's and Western's participating in intertie expansion.

DOE officials also stated that although the draft report mentions the reduced role of ERA in the electric utility area, it does not mention that DOE's Office of Energy Emergencies (OEE) has the responsibility for monitoring reliability aspects of electric power system developments. According to a DOE official, OEE has studied the reliability aspects of the December 1982 outage. The draft report has been changed to reflect OEE's study of the outage. In addition, the Department provided some specific technical comments which were incorporated into the report where appropriate.

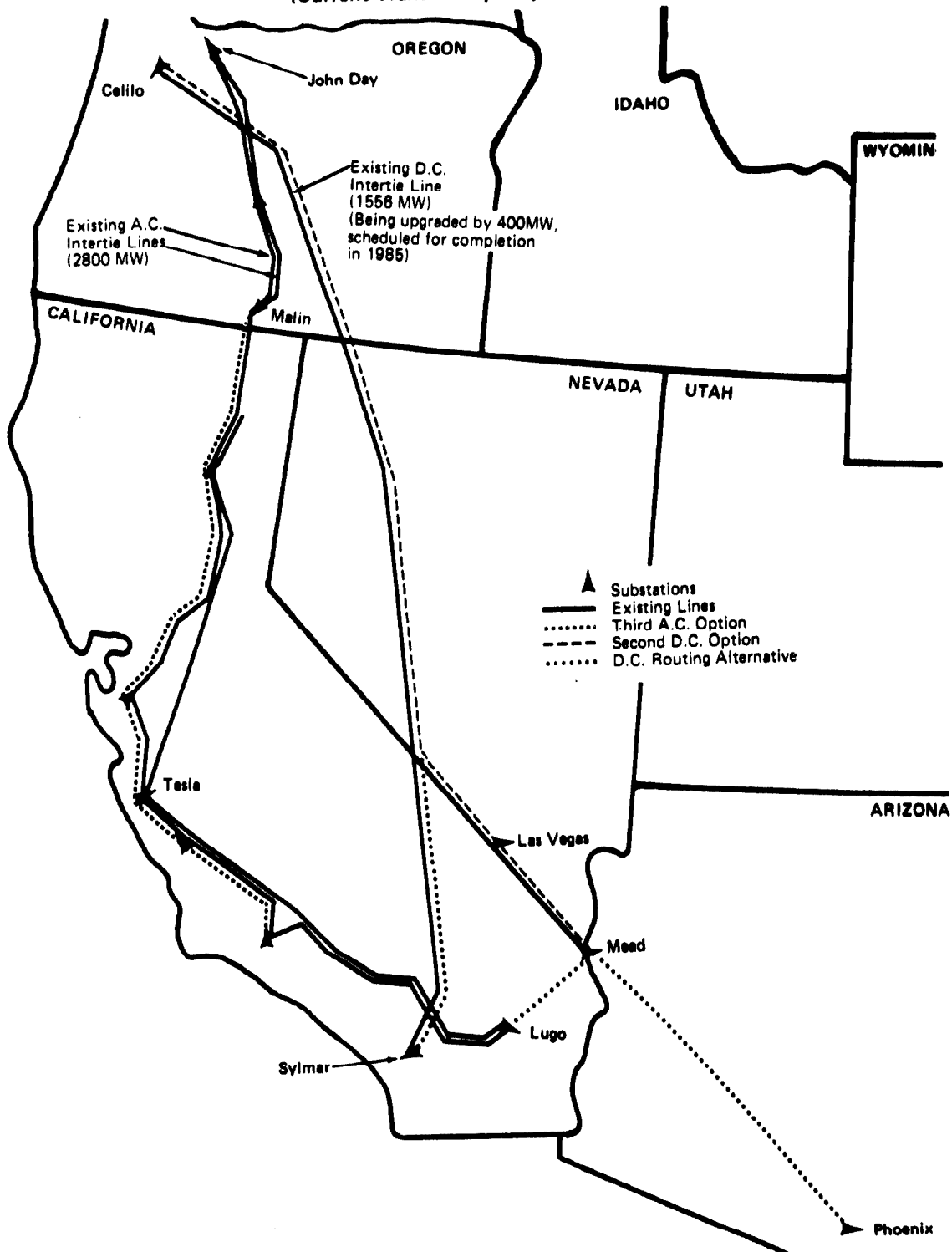
Bonneville officials offered specific comments to update some material in the report. The information provided resulted in changes where appropriate. Also, with respect to the current situation for expanding the intertie, Bonneville officials

expressed a need to reflect changes which have recently occurred relative to the amount of surplus in the Northwest and the feasibility of the six intertie expansion alternatives discussed in chapter 2. Bonneville, in August 1983, revised its load forecast, which shows new figures for the amount of surplus power available. The report has been changed to reflect Bonneville's new forecast.

With respect to the intertie expansion options, operational difficulties have been experienced in upgrading the existing a.c. intertie. The report has been changed to reflect these difficulties. In addition, the conversion of the a.c. lines to d.c. lines is no longer being seriously considered because of technical problems. A variation to building the second d.c. line is also being explored by Bonneville. This variation would require installing one-half the converters necessary for a new d.c. line early. By connecting these converters to the existing d.c. line, Bonneville believes it may be able to increase the capacity of the existing d.c. line to 3,000 MW by 1988. Bonneville's preliminary cost estimate for this variation is about \$200 million. Finally, more consideration is currently being given to the inland routes (Montana through Idaho, Utah, and Nevada to California) than when we conducted our review. In this regard, one a.c. option and one d.c. option are being studied. However, Bonneville has not provided details on these options; therefore, they are not discussed in the report.

Bonneville officials also pointed out that it was important to note that expanding the intertie is justified on the basis of nonfirm power alone. They stated that the report makes this point, but that we may want to consider highlighting it. We have adjusted the report where appropriate to more clearly reflect that intertie expansion can be justified solely on the basis of nonfirm power.

PACIFIC NORTHWEST-SOUTHWEST INTERTIE
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