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TASK FORCE RECOMMENDS CONSTRUCTION OF DIRECT-CURRENT POWER INTERTIE ON PACIFIC COAST

Secretary of Interior Stewart L. Udall today released a report of a special Interior department "Task Force" recommending construction "at the earliest practicable time" of an extra-high voltage ~~(EVH)~~ EHV direct-current interconnection between the Pacific Northwest and the Pacific Southwest.

The report also laid heavy emphasis on the "exciting promise" stemming from research on new techniques of long distance direct current (d-c) power transmission. Such transmission, Secretary Udall said, may play a great role in stimulating new industrial developments in West Virginia, Pennsylvania, North Dakota, Montana and Alaska.

Secretary Udall emphasized that the proposed Pacific coast intertie would be a "two-way street," benefitting both the Pacific Northwest and Pacific Southwest regions greatly; that the transmission facilities would be self-liquidating; and that the direct=current EHV technique "is a dramatic and workable approach that will pay tremendous dividends in moving large blocks of power long distances."

Over the life of the suggested direct-current intertie, Udall said, the tangible dollar benefits to the combined regions each year would be at least double the annual cost of the intertie facilities. Furthermore, he said, power systems in both regions would be in a position to increase their load-carrying

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capabilities with no additional generating plant investments. One EHV line would increase the load-carrying capabilities in the Pacific Northwest by 200,000 kilowatts, he added.

The interconnection proposed by the Task Force would be nearly 1,000 miles long and would serve four principal uses, on which an economic value has been placed:

1. To send power back and forth to help each region meet its peak loads (California has a summer peak and the Northwest a winter peak). This diversity alone would permit the two regions to save more in new generating plant investment than the cost of the EHV lines.
2. To enable the Pacific Northwest to sell between $9 million and $15 million per year of surplus secondary power for a number of years. This power would be used to displace steam-generated power in California.
3. To "firm up 200,000 to 400,000 kilowatts of Pacific Northwest secondary power, for use in the Pacific Northwest, by moving a relatively small amount of off-peak California steam power to the north.
4. To provide a market for surplus hydroelectric peaking capacity of the great dams of the Pacific Northwest, thereby postponing construction of thermal peaking capacity plans in the Pacific Southwest.

The proposed Pacific coast interconnection could be in operation by 1966 and would have a capacity of 650,000 to 2,500,000 kilowatts, depending on how many California utilities participate and whether Canada decides to sell any of its share of Columbia river treaty power in the United States.

Under terms of a treaty now pending, Canada will be entitled initially to about 1,300,000 kilowatts of capacity and 760,000 kilowatts of average energy produced at federal and non-federal Columbia river downstream dams in the United States. Because the Columbia river power treaty remains unratified by Canada, the Task Force said it could not determine what power, if any, might be available for the intertie and under what terms it might be offered.

"The Task Force recognizes that the availability in the United States of the Canadian 'downstream benefits' is a matter for internal Canadian determination," the report says. "In the present unsettled state of affairs, the Task Force could, therefore, complete its report only by ~~asking~~ making alternative assumptions: that Canadian power will be transmitted to California, and that it will not.

"However, it is desired to emphasize that these assumptions are made only for study purposes and no prediction is intended, nor is there any intention to usurp Canada's basic decisions."

The report by the Task Force, nine months in the making, strongly recommends that the interconnection line--or lines--use direct-current (d-c) transmission. The report says that d-c transmission, for many years the dream of power experts as a means for moving large blocks of power economically over long distances, now is technically feasible and more economical than alternating current (a-c) for the distance involved and the quantities of power envisioned. However, a-c transmission for the intertie also was found feasible.

The Task Force said that the intertie should be a "common-carrier" line--inviting participation of all utilities, prior to design of the line, and making surplus capacity available at all times to all utilities under standard contracts at uniform prices.

In addition to the extra high voltage lines described in the report, the Task Force said it also would be economic to build a short 230-kilovolt (Kv) alternating-current interconnection between the Pacific Gas and Electric Company in northern California and the Pacific Northwest.

The Task Force recommended to Secretary Udall that the Administration request the coming session of Congress for appropriations to design and plan an EHV common-carrier interconnection between the Pacific Northwest and the Pacific Southwest.

The Task Force said the Department's recommendations on legislation designed to assure permanent priority to each region to power generated by a respective region's streams should be submitted to Congress at the earliest practicable date. Congress then could consider any necessary legislation before being asked to appropriate construction funds for EHV lines.

Conferences also should be arranged immediately to determine the interest of all the utilities, publicly and privately owned, of the two regions, the Task Force said.

The state of California and several public bodies in the state--Los Angeles, Sacramento, Pasadena, Burbank, and Glendale, have expressed interest in participating in an intertie. The Task Force pointed out that it has been unable to determine the extent of interest among private utilities, but that a single EHV intertie between the Pacific Northwest and the California public agencies is feasible. Participation by private utilities would justify construction of a second EHV line.

At the same time, Secretary Udall said Task Force research on new techniques of long-distance d-c transmission holds an "exciting promise" for industrial development throughout the United States, specifically in West Virginia

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Pennsylvania, North Dakota, Montana, and Alaska.

The Task Force said d-c transmission may make it economically feasible to:

1. Revitalize the depressed coal areas of West Virginia and Pennsylvania by using coal deposits to generate at-the-mine power which could be carried over d-c systems to load centers such as New York, Philadelphia, and Boston at costs below those associated with a-c systems.
2. Develop the vast lignite fields in North Dakota and Montana to produce mine-mouth power for transmission to the Northwest and to middle west load centers, such as Chicago and Detroit.
3. Develop Alaska's 19,000,000 kilowatts of hydroelectric potential, including the gigantic Rampart project on the Yukon river, which would have an installed capacity of 4,760,000 kilowatts, or more than double Grand Coulee dam, and transmit this power 1,800 miles to the Pacific Northwest.

The intertie report was prepared by a five-man task force headed by Charles F. Luce, Bonneville Power Administrator, and functioning under the supervision of Kenneth Holum, Assistant Secretary of the Interior for water and power. Other members of the Task Force, all appointed by Secretary Udall, were Milton A. Chase, general engineer, office of the assistant secretary for water and power, Washington, D. C., Morgan D. Dubrow, assistant and chief engineering research advisor to Secretary Holum, Washington, D. C.; Hugh P. Dugan, regional director, Bureau of Reclamation, Sacramento, California; and Bernard Goldhammer, power manager, Bonneville power administration, Portland, Oregon.

In transmitting the report to Secretary Udall, Assistant Secretary Holum stated he will develop detailed recommendations regarding new policy and

procedural matters in the near future. He also commended the Task Force for "an outstanding job" and said the report "may well become a landmark in the planning of power systems for the future."

The Task Force report recommends that the initial interconnection for EHV lines extend from Columbia river hydroelectric plants to Los Angeles and have a delivered capacity of at least 650,000 to 900,000 kilowatts. The report suggests that this interconnection be a direct-current line of plus 375 kv, minus 375 kv, with terminals at The Dalles dam, on the Columbia river; Tracy, California; and Los Angeles. (The "plus" and "minus" here indicate polarity.)

If the contract prices by manufacturers of d-c equipment substantially exceed the cost estimates such manufacturers have given the Task Force, or if technologic improvements or price changes in a-c transmission substantially reduce its unit costs, the Task Force said there could be one or more 500 kv a-c transmission lines. The Task Force also considered the use of 345 kv a-c lines, but found them to be less economical.

The recommendation for the initial intertie assumes that only California public agencies would use the interconnection with the Northwest. This is known as Plan I-A.

If private utilities of California participate in the intertie, the Task Force recommended there be two d-c lines (Plan II-A) or two 500 kv a-c lines, or three 345 kv a-c lines, in that order of preference. These lines would have a capacity of from 1,350,000 to 1,800,000 kilowatts.

If both private and public utilities of California participate and, in addition, if Canada decides to sell a substantial amount of its share of Columbia river treaty power in the United States, the Task Force recommended, first, three d-c lines (Plan III-A) or, second, three 500 kv a-c lines. These lines would have a capacity of about 2,500,000 kilowatts.

Under the first--and smallest--of the d-c transmission plans, which would cost an estimated $136 million, there is sufficient capacity to serve diverse peak loads to save $180 million in plant investment in the two regions, the report says. Under the second d-c transmission plan, requiring participation of both public and private utilities in California, the cost of the intertie is estimated at $227 million and the plant investment savings through diversity would be $350 million.

With the first d-c plan, about 3 billion kilowatt-hours of surplus secondary power per year from the Northwest could be marketed in California in the early years of the intertie for about $9 million per year. This is equivalent to the total annual consumption of electricity in Pittsburgh, Pa.

Under the second d-c plan, more than 5 billion kilowatt-hours of Northwest surplus secondary power per year could be marketed for about $15 million. This, the Task Force said, is equivalent to the total energy now used each year by the City of Los Angeles.

The report says the amount of Northwest surplus secondary power would decline gradually until by 1985 there would be only about $1 million worth per year available for sale outside the region.

The first d-c plan also would permit sufficient off-peak thermal energy from the Southwest to be sent northward to "firm up" 200,000 kilowatts of the Northwest's secondary energy for use in the Northwest. The second d-c plan could "firm up" 400,000 kilowatts of Northwest secondary. Until 1977 or 1978, the value to the Northwest of this firmed-up power would exceed the cost of importing thermally generated electricity. Thereafter, the report said, it will be as economical for the Northwest to provide its own thermally generated power.

Under the first d-c plan, some 400,000 kilowatts of surplus Northwest peaking capacity would be sold annually in California by 1970, and under the second

plan, nearly 1,000,000 kilowatts of peaking capacity.

The Northwest already has a substantial surplus of peaking capacity, and an additional 7,500,000 kilowatts of peaking capacity can be installed at Northwest dams for an annual cost of $5 to $8 per kilowatt, the Task Force estimated. It would cost $12 to $15 annually per kilowatt to get additional peaking capacity in the Southwest, the report says.

Under the first d-c plan, estimated annual costs of approximately $6 million would be offset by evaluated yearly benefits of over $16 million. Under the second d-c plan, the annual costs are estimated to be less than $10 million, with annual evaluated benefits of over $33 million.

In addition to the four principal uses on which an economic value has been placed, the Task Force report lists five other important functions that the extra high voltage common-carrier intertie could perform, but assigned no dollar value to these functions. They are:

1. To reduce generating reserves by pooling the generating resources of the two regions. Each region now must maintain reserves to protect against unscheduled failures. If the regions were interconnected, proportionately smaller reserves could provide the same protection against outages.

2. To permit, through emergency exchanges, the use of the most economic steam generation.

3. To make possible the construction of large steam generating units. (This, the Task Force said, is because a larger, more efficient steam plant up to 1,000,000 kilowatts could be installed in one region and the surplus made available to the other region until the plant's full generation is required for loads in the plant's own area; at such time, another large unit could be installed in the other area with the reverse of the previous exchange and capacity. In this

manner, the need for building high-cost, low-capacity steam plants simultaneously in both areas can be avoided.

4. To promote the national defense.

5. To conserve exhaustible supplies of fissil fuels (such as oil and gas) by utilizing hydroelectric power more effectively.

The report says that the transmission plan involving only California public agencies would displace, by 1966, only 5 percent of the oil and gas used to generate electricity in that state, and by 1975 only 1 percent. The plan involving both California public and private agencies would displace 8 percent in 1966 and only 2 percent in 1975. The Task Force said these are significant amounts of fossil fuels, but because of the large annual growth in the use of oil and gas in the Pacific Southwest, either intertie would mean only a small decrease in the rate of growth in the quantity of oil and gas used to generate electricity in California.

The Task Force said that regardless who builds or participates in building the proposed intertie, certain basic criteria are necessary to protect the public interest.

First, the report said, the intertie must have proper design and sufficient capacity to do the job efficiently, and the cost of constructing and operating the lines must be kept to a minumum;

Second, the lines must be operated as common-carrier lines; that is, they should be operated for the maximum benefit of all electric utilities that desire to participate and should not be used for monopolistic purposes.

ADVANTAGES OF EXTRA-HIGH VOLTAGE DIRECT-CURRENT TRANSMISSION OF POWER EXPLAINED

In connection with the Task Force report announced today by Secretary of the Interior Stewart L. Udall recommending construction of an extra-high voltage (EHV) direct-current electrical intertie between the Pacific Northwest and the Pacific Southwest, the Department of the Interior provided this explanatory material concerning EHV direct-current power transmission:

Extra-high voltage power transmission lines are generally defined as those in excess of 230-kilovolt carrying capacity. The latter were fairly standard as the highest voltage transmission lines in the United States until the 1950's, when some construction of 345-kilovolt transmission lines was undertaken. There are upwards of 2,000 miles of 345-kilovolt transmission circuits (all alternating current) now operating in the United States.

However, there are no commercial direct-current lines operating in the Unites States. One direct-current line is in service in Sweden; one is just being completed under the English channel; two other d-c lines are under construction--one in New Zealand and one in Russia.

D-C transmission eliminates the technical limitations imposed by distance and magnitude of power transmitted by proven alternating-current practices. As the late J. D. Ross, first administrator of the Bonneville power administration, stated years ago: "The possibility of this new technique...staggers the imagination. Transmission of 1,000 to 2,000 miles becomes a comparatively simple problem."As for a-c transmission, Sweden has had several years' operating experience with 400-kilovolt circuits and is reported considering the possibility of superimposing a 650-kilovolt system in the future. Russia, some years ago,

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was reported to have planned 3,000 miles of 400-kilovolt circuits by 1960.

Extra-high voltage transmission systems are just what the name implies--systems to carry energy at higher voltages than the present 230-kilovolt systems. Ordinary high-voltage transmission systems are usually considered in terms of 69 kilovolts to 230 kilovolts.

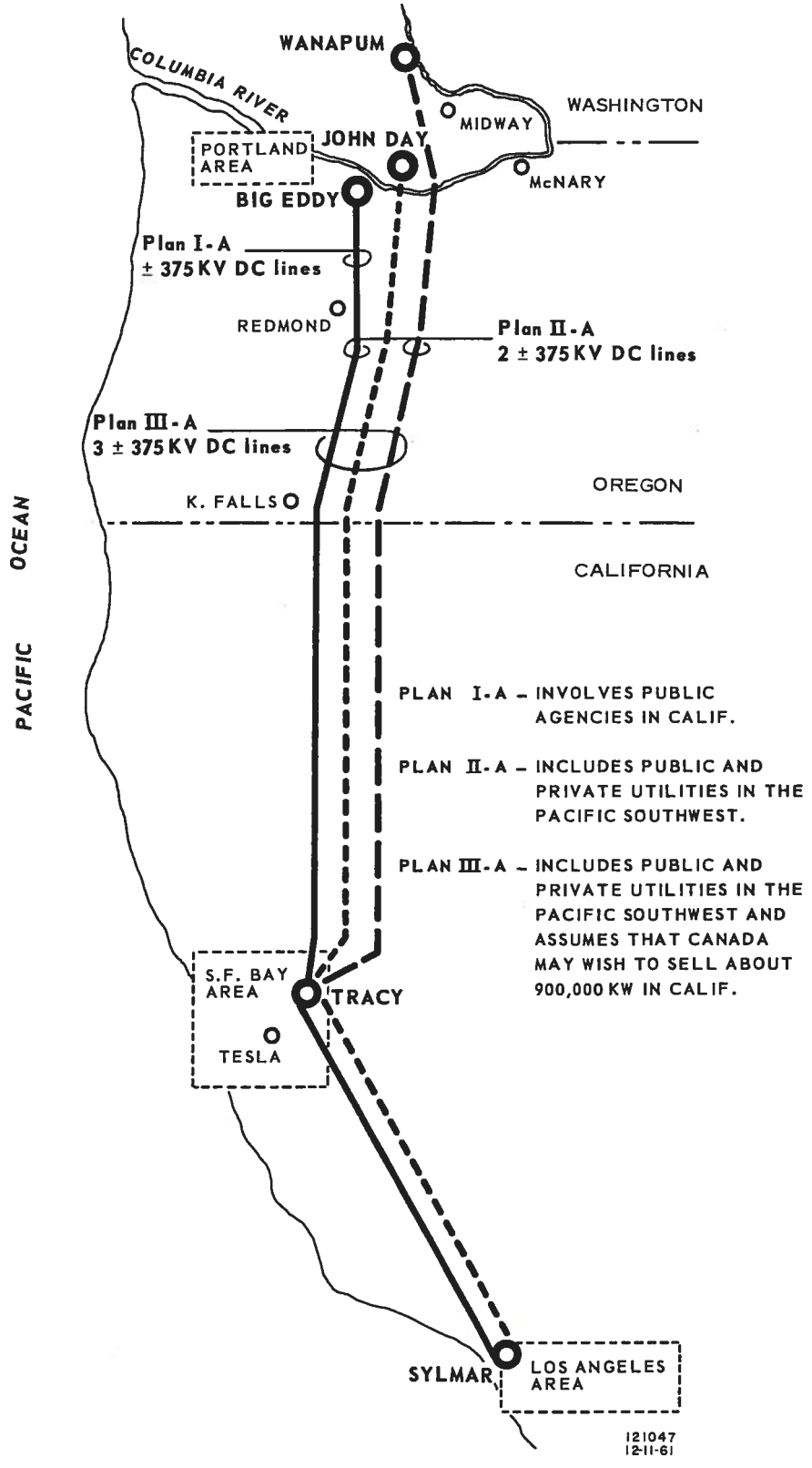
It is not economical to transport electrical energy long distances on low-voltage circuits because of line losses which result from conductor resistance and other characteristics common to the movement of electricity. For example: in the case of steam-generated electricity, it usually has been more economical to transport fuel to the load center, even at considerable expense, before converting it into electricity than to have the generating station at the fuel source and rely on transmission lines to carry the energy as electrical power.

However, the higher the voltage of the transmission line, the less the line loss per unit of power transmitted. High-voltage systems designed for direct current, show an even higher efficiency than those carrying alternating current.

Extra-high voltage transmission circuits are much more expensive because they require higher towers, larger insulators, and heavier conductors, but when their greater capacity can be utilized efficiently, the total transmission cost per kilowatt is less than by using several circuits of lower voltage to move the same amount of power.

Thus, extra-high voltage transmission systems are economically feasible only when the capacity can be used for transmitting large blocks of power long distances from remote plants or for interconnection of large systems where there must be a means of moving large quantities of power back and forth as the needs arise. Direct current is especially suitable for high-voltage, long-distance transmission of large quantities of electricity.

ALTERNATIVE DIRECT CURRENT PLANS
PACIFIC NORTHWEST-PACIFIC SOUTHWEST
EXTRA HIGH VOLTAGE COMMON CARRIER INTERCONNECTION



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RELEASE A.M. DAILIES -

Wednesday, December 20, 1961

Bonneville Power Administrator Charles F. Luce said today that a California intertie could improve BPA's financial position by $6,000,000 to $15,000,000 per year over the 50-year payout period for transmission facilities, and thus help protect BPA's low rates.

He said a 750 kv direct current (d-c) line could produce profits of about $6,000,000 for BPA, and that two such lines should up BPA's net about $15,000,000 a year.

In addition, Luce said the small a-c intertie with Pacific Gas and Electric Company, recommended by the Task Force, would net BPA another $1,500,000 per year.

Depending on whether there are one or two d-c lines, he said the big intertie also would firm up 200,000 to 400,000 kilowatts of Northwest secondary power for BPA to sell here in the region as firm power.

Results of a special Interior Department Task Force study recommending the intertie were released simultaneously today in Washington by Secretary of the Interior Stewart L.Udall and in Portland by Luce, who headed the Task Force.

Luce reiterated that Bonneville does not propose to sell power to California customers until Congress has had a chance to act on regional preference legislation to assure power consumers of each region first call on all federal power produced therein.

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But, he said, an intertie is "such a good deal for the Northwest" that the protective legislation should be passed and an intertie constructed as quickly as possible. Without undue delay, Luce said, it could be in operation by 1966.

The Task Force strongly recommended that the intertie be a common carrier. This means, Luce said, that regardless who builds it, an intertie should have sufficient capacity to take care of the needs of the federal power marketing agencies and all the public and private utilities who desire to use it.

Luce said the potential net profit to BPA was estimated separately by his staff. The Task Force report dealt only with total benefits to both regions, which are more than double the cost.

Luce said the profit to BPA--beyond its share of the cost of transmission--would result from sales of surplus Northwest secondary power and peaking capacity, sales of increased firm power in the Northwest, and sales and exchanges of energy to take advantage of the diversity in peak loads between California and the Northwest.

In addition to being self-liquidating and producing a profit for BPA, Luce said the intertie would permit savings in plant investment in the two regions greater than the cost of the lines.

He said this results from diversity in peak loads. California has a summer peak and the Northwest a winter peak. By shipping power back and forth to meet peak loads in each region, Luce said California and the Northwest each can save $90,000,000 or a total of $180,000,000 in plant investment for peaking purposes, if one line is built. The single line would cost $136,000,000. If two lines are built, at a cost

of $226,000,000, Luce said savings in plant investment in each region would be $175,000,000, or $350,000,000 combined.

Luce said that while BPA's net profit of $6,000,000 to $15,000,000 will result principally, in the early years, from sales of surplus secondary energy, in the later years it will come from sales and exchange of capacity to take advantage of increasing of diversity in peak loads.

Luce said the reason Northwest sales of secondary power will decrease as the years pass is because increased storage and installation of steam plants in the Northwest will enable this region to convert its secondary into firm power.

While the Task Force strongly recommends d-c transmission, Luce said any one of eight transmission plans proposed in the report would pay its own way and still leave substantial profits for BPA, and resultant lower cost power for the Northwest.

He said the intertie, thus could be an "important factor" in maintaining BPA's rates. Each of the past four years BPA has operated in the red--$15,000,000 last year alone--and while the agency is still $38,000,000 ahead of schedule in repaying the Treasury for the federal investment in the Columbia River Power System, smaller deficits are predicted for the next few years and pressure is mounting for an increase in rates.

BPA rates are reviewed every five years by the Federal Power Commission. They have not changed since they were established in 1938. The next review is in 1964.

Luce explained that BPA has a large surplus of secondary power which cannot now be sold in the Northwest, but has a shortage of long-term firm power.

Firm power is power that can be generated and guaranteed for delivery day in and day out, year in and year out, under the lowest streamflows of record.

Secondary power is dependent upon streamflows above the lowest water year of record (1936-1937). The region has a lot of it most years, but BPA cannot guarantee its delivery when needed because of the possibility that the previous low streamflow might be repeated.

Luce said the firming up of 200,000 to 400,000 kilowatts of Northwest secondary would be accomplished by shipping a small average amount of California off-peak steam energy north to fill the gaps in years when Northwest streamflow was low. Luce said that in some years very little California steam would be required, in other years larger amounts, and in a critical water year an equivalent to the entire 200,000 or 400,000 kilowatts, during the storage drawdown period. But the average, in the early years, he said, would be only 23,000 kilowatts of California steam energy to firm up 400,000 kilowatts.

Luce said the practical limit for firming up Northwest secondary is 400,000 kilowatts because of economic and technical reasons.

The resultant additional 200,000 or 400,000 kilowatts of firm power for sale and use here in the Northwest could be marketed at BPA's existing rates, Luce said, with a profit to BPA above the cost of imported steam energy until about 1977 or 1978. After that time, he said, it would be as economical for the Pacific Northwest to provide its own steam to firm up secondary.

Luce also stressed that all the firmed-up secondary resulting from an intertie could be marketed here in the Northwest.

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While the Northwest cannot now use much of its surplus secondary because of lack of storage and steam plants, Luce said California utilities can use it for steam displacement, since most of California's electric energy is produced in steam plants which burn oil and gas.

The higher-cost California steam plants, Luce said, would be shut down while less expensive Northwest secondary was available, and started up again when it is unavailable, thus helping conserve exhaustible fossil fuels, slightly cutting power costs in California, and providing BPA with additional revenues.

Luce said that between $9,000,000 and $15,000,000 per year worth of secondary could be sold in California, depending on line capacity, in the early years of an intertie, declining to about $1,000,000 per year by 1985.

During the same early period, Luce said some $5,000,000 to $12,000,000 worth of Northwest surplus peaking capacity could be sold in California. Surplus peaking capacity also will decline with additional storage and steam generation in the Pacific Northwest.

Peaking capacity is ability to produce for short periods of time much larger quantities of power than can be generated around the clock. It requires more generators than there is water behind the generators to run them full time.

By generating more power than necessary for the Northwest's own requirements, Luce explained, power can be shipped over an intertie to meet California's peak loads. During off-peak hours, California steam energy would be shipped back to the Northwest for use here while

an amount of water is held back equivalent to that generated to supply the peaking requirements of the California loads.

Luce said this is called "selling peaking without energy". He said it means additional revenues to BPA without any loss of power to the region.