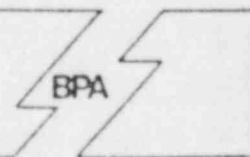


# Analysis of Resource Alternatives

Bonneville Power Administration  
U.S. Department of Energy



April 19, 1982

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## ANALYSIS OF RESOURCE ALTERNATIVES

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### SUMMARY

This paper presents the details of a decision which will have a significant impact on the future of the Pacific Northwest. Circumstances which are largely economic have placed in jeopardy major regional energy programs, the financial health of many of the region's electric utilities, and possibly the region's fiscal credibility. The incomes and employment of thousands of the region's citizens are being impacted by these circumstances.

The decision announced in this paper was made following extensive analysis of complex power financing and supply issues. There was wide consultation with regional leaders, concerned individuals, and experts inside and outside the region. The final decision was based upon the judgment of the Bonneville Power Administration (BPA), which is charged with the responsibility of providing electrical energy to the region on a "prudent and businesslike" basis.

The decision BPA has been addressing is what its recommendation should be to the Washington Public Power Supply System (Supply System) on future financing alternatives for the Supply System's projects #1, #2, and #3. Because of the need for additional financing in May 1982 to continue construction of these plants, decisions must be made immediately to provide as much certainty as possible about the future of these projects. The managers of the financing group which markets the Supply System's construction bonds for the projects have advised BPA that existing circumstances could make the next bond sale, scheduled for May 1982, more difficult and perhaps more expensive than past sales. The costs of these plants, as a result of long-term contracts called net-billing agreements, became the ultimate responsibility of BPA and its customers several years ago. The status and scheduling of these plants, therefore, inescapably affect every person and every consumer of electricity in the region.

In reaching a decision on the scheduling of resources needed in the region, a number of realities other than economics must be addressed. Not the least of these is the State of Washington Initiative 394 which signals a serious voter concern. BPA respects this concern and understands that the decision it makes regarding the Supply System projects, and other energy facilities, must be in the best interests of BPA's ultimate constituents--the ratepayers throughout the Pacific Northwest.

Actions taken now must provide sufficient flexibility for the region to respond to future load/resource imbalances and changes in power marketing conditions. Because of the enormous regional investment in the three Supply System projects, means must be found to realize the maximum value of these important regional assets.

In all of the analyses BPA performed, it was apparent that the on-schedule completion of WNP #2 is a critical event in the region from the standpoint of both power production and the economic benefits of the revenues it will produce. The advanced stage of completion of the project (it is about 90 percent complete), the large capital investment (more than \$2 billion already committed), and the near-term availability of the power and revenues (about 22 months away) make the early completion and operation of WNP #2 an economic imperative for the region.

On the basis of these analyses, BPA has concluded that from the viewpoint of need-for-power, economics, and financing, it will be feasible to extend the construction schedule of WNP #1 for a period of up to 5 years. Near-term funding options appear to be adequate to continue WNP #2 and WNP #3 on their current schedules and extend construction of WNP #1. A forecasted near-term power surplus supports extension of the WNP #1 construction schedule by up to 5 years. Construction can be restarted earlier if circumstances dictate.

Given the uncertainties involved, no one element of the BPA analyses is, by itself, persuasive. What is persuasive is the reinforcing consistency with which all factors--load/resource uncertainties, resource economics, and financial planning--point to the same conclusion. It is a matter of business prudence that BPA reduce its financial risk and not leverage itself further by incurring additional debt to support surplus capability.

Considering the interests of the ratepayers and the region as a whole, continuing WNP #2 and #3 on current schedules and extending the construction of WNP #1 best preserves and protects the economic and financial integrity of BPA and the region. It has fewer disadvantages and more advantages than any of the other options, and provides flexibility for the region in meeting future load/resource balances and in responding to rapid changes and contingencies.

#### OBJECTIVES

The principal objectives BPA used in performing the analyses and testing the decisions were:

1. To further the best interests of current and future ratepayers of the region.
2. To minimize the financial risks to, and maximize the fiscal integrity of, BPA and the region as a whole.
3. To preserve the region's economic ability to deliver the benefits of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act), including conservation and renewable resource development.
4. To bring greater certainty, stability, and predictability to rates and resource decisions.
5. To provide a maximum opportunity for the region's economy to recover and remain prosperous.

6. To identify the most effective strategy for marketing the bonds needed to finance the completion or preservation of the Supply System projects.
7. To maximize the region's flexibility to accommodate changing load and economic conditions.
8. To identify a choice which assures a healthy and positive construction environment within the Supply System in order that maximum efficiencies can be achieved.

#### LOAD/RESOURCE ANALYSIS

Recent demand forecasts, including BPA's preliminary forecast, show that the region, while needing additional electricity supplies in the 1990's, now faces possible surpluses of generating capacity in the 1980's. BPA's forecast shows annual average percentage load increases of .8, 1.7, and 2.5 percent as its low, base, and high case forecasts. Under the Regional Act, the Regional Power Planning Council has responsibility for forecasting future loads and resource requirements. It will be several months before the Regional Council can publish for comment its first load forecast which, in April 1983, will become a part of the official regional power plan. In this interim period BPA has been working closely with the Regional Council, and has reviewed the BPA preliminary forecast with the Council as well as other regional public and private utilities.

BPA also arranged to have its preliminary forecast independently reviewed by National Economic Research Associates (NERA), consulting economists from outside the region with an international reputation for expertise in electric energy demand forecasting. That firm suggested that the BPA range of load growth is too narrow and recommended that a higher range "would provide a more defensible guide to policy." A number of utility executives and experts believe it is prudent utility practice to plan resources to meet loads in the high portion of the forecasting range. Under these circumstances, and using the high range recommended, all three net-billed projects could prove to be needed on schedule. However, a driving element in the situation is that financial and other constraints preclude this option.

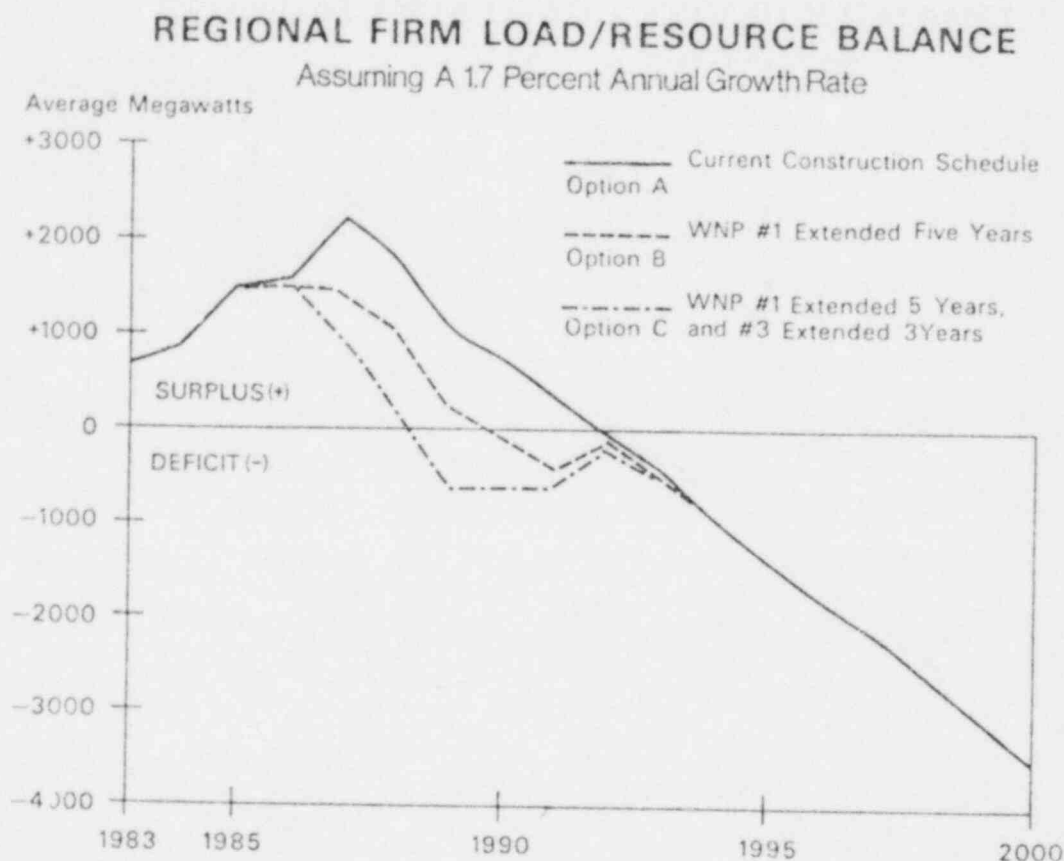
WNP #2 is currently scheduled to become commercially operational in February 1984, WNP #1 in June 1986, and WNP #3 in December 1986. Although numerous alternatives for revising the completion schedules were examined, in the following analysis only the three most likely options are depicted:

Option A - Continue the current schedule for completing all three plants.

Option B - Complete WNP #2 and #3 on schedule and extend completion of WNP #1 up to 5 years.

Option C - Complete WNP #2 on schedule and extend completion of WNP #1 up to 5 years and #3 up to 3 years.

The following chart shows the effect of these options on the load/resource balance:



This chart suggests the following:

1. Clearly, all three plants are needed by the region since there will be significant firm deficits in the early 1990's. The questions are "When are they needed?" and "Should construction of any of the plants be extended?"
2. Under the current construction schedule for the three net-billed plants, there will be some significant surpluses in the mid- and late 1980's.
3. If construction is extended on two projects, there will be some significant firm load deficits in the late 1980's and early 1990's.
4. If the loads turn out to be greater, as some of the forecasts indicate, then the point at which deficits occur is moved up in time. For example, the upper forecast of 2.5 percent combined with all three plants on schedule would show a deficit in 1987 instead of the 1990 shown on the chart.

## CONSERVATION AND RENEWABLE RESOURCES

The region's future power needs, forecasting uncertainties, and the desirability of having additional resources near-at-hand dictate that BPA's existing and announced conservation and small (under 5 average megawatts) renewable resources programs should continue to operate during the period of surplus. BPA considers these programs to be valuable, unfinished resources and will make an aggressive effort to complete them.

BPA has estimated that, at most, 450 average megawatts are achievable by 1990 in conservation and renewables in addition to the savings from programs already underway or included in BPA's preliminary forecast, at costs less than the incremental cost to complete and operate the Supply System projects.

The cost-effectiveness test for conservation and small renewables in this period will reflect the reduced value of the resources during the probable near-term surpluses.

BPA will continue to emphasize its residential conservation programs which have been offered to all regional utilities and which are underway in 96 utility service areas. The programs offer increased energy efficiency to qualifying households with electric space or water heat in these service areas at little or no cost to the homeowner.

Commitments to large renewable resources will be made on the basis of an extended planning horizon showing need for new power in the post-1990 period. BPA must continue to develop its policy, program, and organizational capability in renewables in order to be able to address this need effectively.

The principles of cost-effectiveness and the protection of the ratepayers' interest in assuring an adequate and reliable power supply will continue to be paramount in BPA's decisions and actions on conservation and renewable resources development.

## ECONOMIC ANALYSIS OF ALTERNATIVES FOR SUPPLY SYSTEM PROJECTS #1, #2, AND #3

BPA's economic analysis examined a large number of resource alternatives including the alternative of completing all three plants on schedule but not operating WNP #1 and #3 until they are needed. The analysis then focused on the economic impact of the alternatives on revenues from power sales, including the examination of the most likely outlook for marketing any excess power. BPA estimated the construction costs, operating costs, fuel costs, the costs which would be incurred if the plants stood idle waiting to serve, and financing costs.

The net economic impacts of the three alternatives, when compared with the current schedules for completing and operating the three plants were found to be:

1. Completing all three plants on schedule but deferring the operation of WNP #1 and #3 (letting them sit idle) in the event of surplus would create



a net economic disadvantage of about \$128 million (compared with completing the plants on their current schedule, operating them and selling the surplus).

2. Constructing WNP #2 and #3 on schedule, but extending construction of WNP #1 up to 5 years would have an economic advantage of about \$212 million compared with bringing all the plants in on schedule (about \$340 million advantage over alternative 1).
3. Constructing WNP #2 on schedule, but extending construction of WNP #1 up to 5 years and #3 up to 3 years would also present a slight economic advantage of about \$20 million compared with completing all the plants on schedule (roughly \$200 million less advantage than option 2).

#### FINANCIAL ANALYSIS

In BPA's financial analysis, performed concurrently with the two analyses described previously, an equally large number of alternatives were examined. In order to fully assess the alternatives, BPA considered the following:

- a. The financing requirements for each plant.
- b. The revenue/rate impacts of the construction and operational alternatives.
- c. The limits of BPA's flexibility in financing the plants.
- d. The constraints of the financial markets (amounts that can be raised at reasonable interest rates).
- e. The impacts on the credit worthiness of BPA, the region's utilities, and states.
- f. The legal and political implications of the alternatives, including the possible impacts of Initiative 394.

Based on advice provided by underwriters (the people who market the bonds to individual investors) and financial advisors, it was determined that \$550 to \$650 million would be a reasonable amount for the bond offering this May. Therefore, BPA realistically has only two financing options available: (1) to fund WNP #2 to a level which will permit completion while continuing construction of one of the other two plants, or (2) to delay both other plants while applying all the proceeds of the bond sale toward completion of WNP #2.

Because the load/resource, resource economic, and financial analyses indicate the feasibility and prudence of continuing WNP #2 plus one other plant on their current schedules, a choice must be made between proceeding with WNP #1 or #3.

### CHOICE OF WNP #1 OR WNP #3

There are several valid arguments for selecting WNP #1 over WNP #3 for on-schedule completion. WNP #1 would be in commercial operation about 6 months earlier than WNP #3; the power would be about 9 mills per kWh cheaper (or about 10 percent); and WNP #1 is located on the Hanford, Washington, nuclear reservation, near WNP #2.

However, since WNP #1 is located on the Hanford reservation, it is near numerous DOE nuclear programs and a skilled nuclear labor force. When a startup is required, remobilization of the work force should occur more rapidly at the WNP #1 plant at Hanford than at Satsop, Washington, location of WNP #3. Such an edge might prove to be a significant economic advantage in view of the rapid changes which have occurred in regional load/resource balances. This could result in significant cost savings to regional ratepayers.

WNP #3's location is west of the Cascade Range and closer to the major Pacific Northwest load centers than WNP #1, resulting in shorter transmission distances. This reduces line losses and increases transmission reliability--an additional potential cost savings to regional ratepayers.

In terms of the total financing required to complete all of WNP #1 and the Supply System's 70-percent share of WNP #3, there is little to distinguish between the projects. Roughly \$1.5 billion in additional Supply System financing is required to complete each plant.

It is of significance that the capability of WNP #1 has been wholly assigned to BPA. WNP #3 is jointly owned by the Supply System and four investor-owned utilities (IOU's) with only 70 percent of its capability assigned to BPA. A decision to extend the construction schedule of WNP #3 would require the agreement of the other owners and it now appears they may need that power earlier than BPA. Additionally, the other owners will assist BPA in furnishing oversight to the Supply System.

Finally, extending construction on WNP #1 will result in a slightly lower BPA rate increase next October than if WNP #3 construction schedules were extended instead.

### RATE IMPACTS

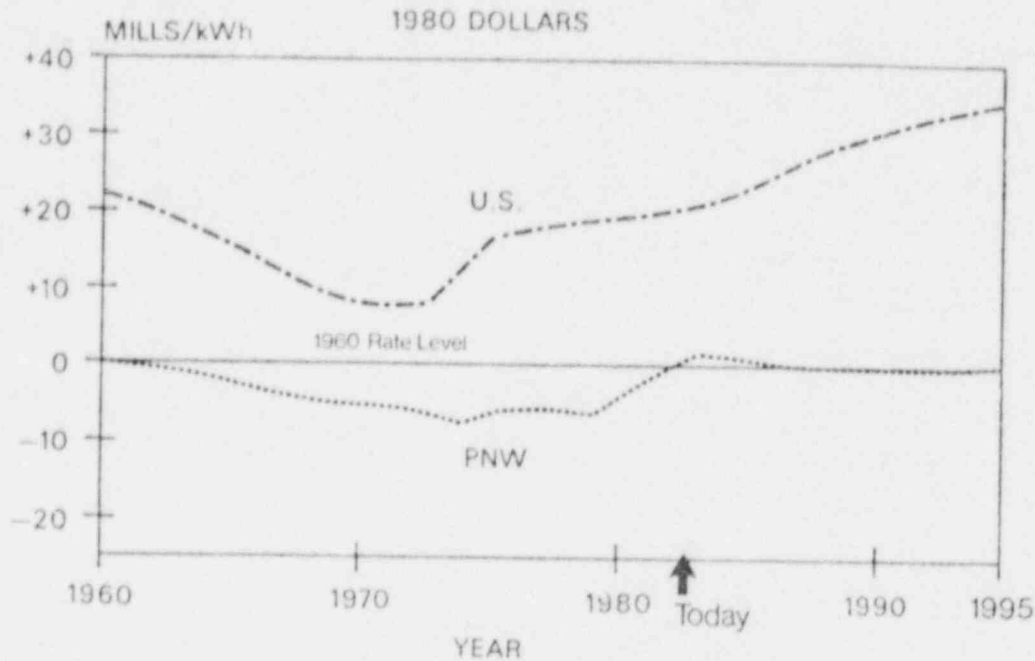
During a period when rates are rising rapidly, it is difficult to find cause for optimism. However, the future outlook is for stabilization of electricity rates in view of an estimated reduction in the need for expensive new resources. Also, the anticipated temporary resource surplus will allow the region to take advantage of time in anticipation of lower inflation and interest rates when it may meet its needs at reduced borrowing rates which will produce lower cost resources. Most importantly, the region will continue to enjoy electricity prices which, as a whole, are significantly lower than the national average, as shown on the chart on the following page.



## AVERAGE RETAIL ELECTRICITY RATES

IN COMPARISON TO 1960 PNW RATES

PNW vs. U.S.



In addition, the results of our economic analysis and our review of the debt service BPA would have to pay on bonds yet to be issued for the construction of the Supply System projects #1, #2, and #3, indicate that:

1. Failing to go forward with WNP #2 would result in increased power purchases and higher rates both in the near- and long-term.
2. Going forward with all three projects would result in the need for a higher rate increase planned for next October.
3. If we proceed with WNP #2 and #3 on current schedules and extend construction of WNP #1 for 5 years, 1983 rates will be reduced by about \$90 million.
4. Finally, while extending construction schedules for all three projects could result in a short-term decrease in rates, it would result in much higher rates in the mid- and long-term.

Consequently, proceeding with current construction on WNP #2 and WNP #3, and extending the construction for WNP #1 will benefit ratepayers in both the short- and long-term while providing power supply flexibility necessary to support the regional economy.

NOTE: THE BONNEVILLE POWER ADMINISTRATION WELCOMES QUESTIONS AND COMMENTS ON THE INFORMATION PROVIDED IN THIS PAPER.