1990 RESOURCE PROGRAM

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Bonneville Power Administration

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1990 RESOURCE PROGRAM

OVERVIEW OF 1990 RESOURCE PROGRAM AND ACQUISITION APPROACHES FOR THE 1990's

This document is a summary providing an overview of the analysis, thought process, and conclusions of the Resource Program. This summary is accompanied by a Technical Report, under separate cover, that provides a more in-depth discussion of the information presented here. Another companion document published under separate cover, the Resource Program Public Comment Summary and BPA's Response, provides a detailed summary of public comments on the Draft 1990 Resource Program and BPA's response to those comments. For a thorough understanding of how BPA arrived at the following conclusions, all three documents should be consulted.

The 1990 Resource Program describes the actions Bonneville Power Administration (BPA) will take to develop new resources to meet the power requirements of its customers. The main focus is to determine what BPA should do in Fiscal Years (FY's) 1992 and 1993. This document presents Energy Resource budgets for these years. However, much care has been taken to define near-term actions aimed at meeting BPA's long-term resource needs. Consequently, proposed program actions are presented for FY's 1994 through 1997. In addition, the 1990 Resource Program addresses some resource-related policy issues.

Summary of Resource Program Actions

An aggressive, steadily increasing conservation program forms the foundation of the 1990 Resource Program and resource acquisitions for FY's 1992 and 1993. BPA's commitment to a steady ramp-up of the conservation program is key to achieving the least-cost approach to resource development, and to making the conservation resource deliverable in the long run. By itself, conservation can meet much of the likely range of load growth that BPA faces.

A diverse mix of generation resources in small increments is the second cornerstone of the 1990 Resource Program. These generation resources can meet the rest of the likely range of BPA resource needs. Finally, a Resource Contingency Plan prepares BPA to reliably meet load in the event that load growth exceeds the likely range.

More specifically, the Resource Program includes the following actions:

- Acquire between 30 and 35 average megawatts (aMW) per year of cost-effective conservation in all sectors. This commits BPA to a stable and steadily increasing conservation program for the period FY's 1992 through 1997, to a target of acquiring at least 200 aMW by 1997.

- Acquire at least 100 aMW from an "all sources" competitive acquisitions process; a separate 50 aMW of energy is targeted for billing credits.
- Implement 100 aMW of Federal hydro efficiency improvements.
- Undertake a geothermal research and development (R&D) pilot project in a joint venture with other utilities; BPA will acquire up to 30 aMW in this joint venture.
- As part of the Resource Contingency Plan, begin siting and licensing of two combined-cycle combustion turbines (CT's) with a total capacity of over 800 MW, or take equivalent actions which would similarly position BPA to respond to high load growth.

The other primary reasons why BPA has selected this combination of resource actions are:

- Manages Risk Appropriately. This set of resource actions includes capturing low-cost resources that would keep BPA in or near load/resource balance under the medium-high forecast. In addition, BPA will undertake low-cost actions short of acquisitions, such as the siting and licensing of CT's, to prepare BPA to meet the high load growth contingency reliably and efficiently. These actions impose minimal increased financial risk on BPA, and minimize the risk of large future system cost increases.
- Flexibility and Diversity. Significant actions on a wide range of new resource types will be taken, without irrevocably committing BPA to major investments until the need for such investments becomes clear.
- Reflects Existing and Potential Capability to Develop Resources. The resource acquisition budgets and MW targets in this Resource Program are based on a systematic assessment of what is realistically achievable. Information on the lead time needed to expand the delivery infrastructure, potential penetration rates of conservation programs in each sector, and information developed from the conservation and generation acquisition experience of others across the country was especially crucial to BPA's determination of realistically achievable resource acquisition targets. However, if market conditions change or the ability to acquire cost-effective conservation or generation resources becomes greater, BPA will adjust its efforts to capture additional resources.

- Budget and Rate Impacts are Within Bounds. Total capital and expense costs for the proposal, not including the large thermal budget and overheads, average \$160 million per year for FY's 1992 and 1993. Considering only these expenditures, this would translate into roughly a 0.4 mill/kWh increase in FY 1992 over the current average Priority Firm (PF) rate. This rough estimate of the implications of the proposal on PF rates does not consider other BPA expenditure needs and, therefore, should not be interpreted as BPA's estimate of future rates. BPA's judgment is that these expenditures and potential rate impacts are acceptable, in view of the load/resource outlook.

Comparison of Final 1990 Resource Program to Draft 1990 Resource Program

The final 1990 Resource Program plots a more aggressive, ambitious course for resource acquisitions in FY's 1992 and 1993 than the Draft 1990 Resource Program.

There are two primary differences between the final 1990 Resource Program and the Draft 1990 Resource Program. First, more conservation will be acquired in the final program--at least 32 aMW/year in the final vs. 25 aMW/year in the Draft. This decision is consistent with comments received on the Draft 1990 Resource Program--a majority of public comments support increasing the level of conservation acquisitions above the level identified in the Draft. In the final Resource Program BPA is budgeting to acquire cost-effective conservation to the level of the medium-high 1989 load forecast. Information from a preliminary draft of the 1990 load forecast indicates load growth in FY's 1992 and 1993 will be close to the medium-high level (i.e., the draft 1990 medium case is close to the 1989 medium-high in those years). In the Draft, BPA budgeted to acquire conservation at the medium 1989 load forecast. In addition, a major new industrial conservation program has been included in the final Resource Program. This program, which was not included in the Draft, should provide additional low cost conservation opportunities.

Second, resources developed through the billing credits test and all sources competitive acquisitions are considerably increased in the final Resource Program. In the final Resource Program BPA is budgeting for acquisitions of at least 50 aMW from billing credits resources, and at least 100 aMW from an all sources competitive acquisitions process. These acquisitions are an increase of 100 aMW from the Draft. These acquisitions were increased for three reasons: (a) the preliminary 1990 load forecast shows higher loads in the near-term indicating a greater need for resources; (b) BPA received a large number of comments suggesting that the 50 aMW test of the acquisition process proposed in the Draft was not a large enough test; and (c) many commenters support an early implementation of billing credits.

One additional noteworthy change has occurred since publication of the Draft 1990 Resource Program. Budgets for resource acquisitions in FY's 1990 and 1991 have been increased. BPA and many of those commenting on the Draft 1990 Resource Program share the concern that BPA's planned funding for FY's 1990 and 1991 was inadequate to prepare for the higher levels of spending

and acquisitions that need to occur in FY's 1992 and 1993 and beyond. BPA has responded by making significant changes in both the 1990 and 1991 budgets. In FY 1990 funding for enforcement of Model Conservation Standards (MCS) codes has been increased by nearly 90 percent. This is primarily a result of the passage of codes in Washington.

The new FY 1991 budget reflects an increase of approximately 60 percent in funding to cover MCS enforcement, an increase of 75 percent in commercial conservation programs, and initiation of a major new industrial program in FY 1991. Prior to these changes, resource acquisitions would have declined slightly from FY 1990 to FY 1991. These budget increases will greatly enhance the ability of these program areas to ramp-up to the ambitious levels of FY 1992 and beyond.

Acquisition Approaches in the 1990's

It is now clear that the Federal System will need additional resources in the 1990's. After a decade of developing its resource acquisition capabilities, there is a regionwide consensus that BPA needs to accelerate acquisitions of conservation and generation resources.

The resource acquisitions planned for the 1990's represent a substantial increase in the pace of acquiring conservation and generation by BPA. This ambitious level of acquisitions challenges BPA to seek creative, flexible, and intelligent use of a menu of acquisition approaches tailored to meet the objectives of BPA and its customer utilities. To meet increased resource needs, BPA will be evolving toward greater reliance on a more diverse mix of approaches than is currently being used. The familiar methods and programs BPA has used (primarily BPA-designed programs along with codes and standards) will need to be supplemented to meet growing needs. The need for new acquisition approaches is especially apparent for generation resources and for conservation in the commercial and industrial sectors.

A variety of acquisition approaches is important because this provides the flexibility to fully utilize the capabilities of the diverse utility and nonutility communities and efficiently acquire resources when needed. BPA examined a range of alternative acquisition approaches for meeting future resource needs. BPA's future efforts will focus on the following approaches:

- BPA centrally designed programs
- Codes and standards
- Billing credits
- All source competitive acquisitions
- Targeted acquisitions

BPA's goal is to have a relationship with its customers by the middle of the 1990's that is built on shared responsibility for developing cost-effective

resources. BPA will provide a stable market for utilities and others interested in developing conservation and generation resources. This market will be characterized by long-term purchases and risk sharing by placing responsibility with the party that can best control the particular risk.

Solicitations for resources will play an increasingly important role in the future. BPA will be soliciting for resources in two ways:

Open Solicitations. An open solicitation provides BPA with a means to compare and evaluate diverse resource options while providing resource developers with an opportunity to propose creative programs. Examples of an open solicitation include the all sources competitive acquisition and the billing credits test which BPA will be undertaking in 1990.

Targeted Solicitations. Targeted solicitations are directed to a specific set of conservation end-uses or generation technologies. In a targeted solicitation resource developers would not be competing against each other, but instead against established criteria or standards. Hence, if each proposal meets the established standards, all those responding to a solicitation could be selected. The specific approach in a targeted solicitation would be tailored to the nature of the resources being acquired. Targeted solicitations will be increasingly important for commercial and industrial acquisitions. These solicitations will be designed to match the abilities of BPA customers. However, not all utilities will be able to aggressively pursue commercial/industrial conservation efforts in this way, and BPA will provide assistance to those utilities as necessary.

BPA will make these future purchases from its customers to the maximum extent practical. BPA will look to its customers first since they share the obligation to meet load growth and because of the cooperative working relationships established over the last 10 years. However, other resource providers will be able to participate in the all sources competitive acquisition solicitation, the Geothermal Pilot Program, and the solicitation for resources in the Resource Contingency Plan.

GUIDANCE FROM THE NORTHWEST POWER PLANNING COUNCIL

The Northwest Power Planning Council (Council) is charged by the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act) with developing a long-range regional Power Plan. In the 1990 Resource Program BPA relies on the Council's 1986 Power Plan and 1989 Supplement to provide the long-range context within which BPA's own specific program and budget planning takes place. This Council guidance helps BPA prioritize its resource analysis, program development, budgets, and staffing over the near term. A primary purpose of the 1990 Resource Program is to explain how BPA translates the guidance provided by the Council into a specific set of near-term actions with associated budgets.

One theme of the Council's 1986 Power Plan and 1989 Supplement that is particularly prominent in this 1990 Resource Program is the importance of planning flexibly to meet uncertain future conditions. In addition, many of the issues addressed in the Power Plan and Supplement are proposed for further action in this Resource Program, such as development and testing of a competitive acquisition process, strategies to use the hydro system more effectively, and exploring a variety of other resource acquisition approaches.

The Council and BPA also have been working together to eliminate confusion over different planning assumptions and tools, and to enhance the existing resource planning capabilities of both organizations. These collaborative efforts have produced joint load forecasts, similar estimates of new resource supply, and a joint decision analysis model. These joint products are being used by both organizations in their current planning efforts. BPA has consulted closely with the Council and the Council staff to ensure as much consistency as possible between the 1990 Resource Program and the development of a new 1990 Power Plan. These consultations have been pivotal in the development of the final 1990 Resource Program. In particular, the Council has urged BPA to be more aggressive in acquiring conservation. With the changes in the final Resource Program, BPA and the Council agree that the appropriate balance has been reached between being more aggressive and being realistic about what can be achieved and at what pace.

PLANNING FOR UNCERTAINTY

If BPA were certain that actual loads would reflect the 1989 medium load forecast, ^{1/} and that the capability of the existing power system will not change, BPA would be assured that it was in load/resource balance until the turn of the century. Under the medium forecast BPA has between a zero and 400 aMW surplus throughout the century on BPA's approximately 8,350 aMW system. As Figure 1 shows, if BPA were planning for medium loads, BPA currently has sufficient resources to meet its needs through 2002 and little, if any, action would be necessary to meet load growth. However, if loads grow at the high load forecast rate and no new resources are added, BPA will have a firm energy deficit of over 750 aMW in 1992 that will rapidly increase to a deficit of over 1,500 aMW by 1996. Then again, if loads grow at the low forecast rate, BPA will have a large surplus for the next 20 years.

Obviously, BPA does not know the exact level of future loads. BPA faces nearly a 50 percent chance that existing resources will not be adequate to meet loads in the 1990's, and roughly a 10 percent chance of deficits of over 1,000 aMW in the mid-1990's. This situation challenges BPA to develop a Resource Program that provides assurance of meeting the potential deficits, without making large expenditures that later turn out to be unnecessary.

Recent load growth has reinforced the need to plan flexibly to meet this uncertainty. The load/resource balance shown here is based on BPA's most recent long-term load forecast, released in August 1989. Recently, the Pacific Northwest has enjoyed stronger economic and load growth than was assumed in this forecast. For example, BPA's public utility customer loads grew at a 3.3 percent rate over the 12 months ending March 1990. Although BPA expects that national and regional economic growth will slow and result in a slowing of load growth, this recent strength in the national and regional economies, along with information from a preliminary draft of the 1990 load forecast, suggest that in the near term BPA's loads will be close to the medium-high level in the 1989 forecast. To meet this challenge, BPA has drawn heavily on the Council's guidance on flexible planning for uncertainty.

^{1/} BPA has a contractual obligation to serve the load growth of the investor-owned utilities (IOU's) in the Pacific Northwest if the IOU's give BPA 7-years notice that they wish BPA to serve this load. Since no such request has been made, BPA's resource planning does not assume that BPA will be serving the load growth of the IOU's.

FIGURE 1

FEDERAL FIRM ENERGY SURPLUSES/DEFICITS

20-Year Projection
Assuming No New Resource Acquisitions

Average Megawatts

DECISION FACTORS

BPA has identified eight decision factors that represent the wide range of concerns that influence BPA decisions on a Resource Program. These decision factors are the criteria against which alternative resource programs are evaluated. It is not possible to find one set of resource actions that ranks highest on all eight decision factors. Hence, difficult tradeoffs must be made among these decision factors. A description of these decision factors follows.

- Minimize the Present Value of Total System Costs. BPA seeks a Resource Program that results in the lowest long-run system costs. System costs include: costs of installing new conservation, generation, transmission and distribution facilities; operating cost; fuel costs; customer and consumer costs incurred for conservation measures; and quantifiable environmental costs. In other words, BPA seeks the least-cost approach to serving its customers' loads.
- Ensure That BPA Has The Ability To Meet High BPA Firm Loads in 1994 Through 2000, If Necessary. BPA's obligation to meet the loads of its customers is not limited to a particular load forecast. Prudent planning requires that BPA examine the reasonable actions it could take to prepare to meet higher than expected loads, especially in view of the potential for significant energy deficits in the mid-1990's.
- Minimize BPA Financial Risk. This factor focuses on the effect of alternative resource programs on BPA's ability to make its Treasury payment on time. It also addresses the effects of alternative resource programs on BPA's ability to meet its other financial goals.
- Minimize Near-Term Rate Impacts. An important BPA goal is to keep rates for BPA power low. This enables BPA to remain an attractive power provider to its customers and to contribute to the financial health of the Pacific Northwest economy. This factor addresses the effects of alternative resource programs on near-term rates.
- Minimize Long-Term Rate Impacts. The effects of alternative resource programs on long-term rates also are important to BPA's ability to remain an attractive power provider to its customers and to the health of the Pacific Northwest economy. This factor is listed separately because some alternative resource programs may result in a short-term rate increase to achieve a long-term rate decrease.
- Minimize Exposure to Economic Risks of Adjusting to Unplanned Changes in Load Growth, Resource Availability, And Costs. BPA wants to avoid two kinds of economic risks. The first is the risk of acquiring an expensive resource that later turns out not to be needed. The second

is the risk of being forced to acquire an expensive resource, because of a failure to capture lower-cost resources earlier when they were available, or because rapid load growth makes expensive resources the only "quick fix" available.

- Minimize Local And Global Environmental Impacts From 1992 Through 1993 Resource Actions. This decision factor focuses on nonquantifiable local and global environmental impacts of resource actions. Subsequent decisions on the acquisition of specific resources resulting from a Resource Program decision will include consideration of site-specific environmental impacts as well as compliance with other requirements of the National Environmental Policy Act (NEPA).
- Maximize Resource Deliverability in View of Social/Political Factors. Social/political influences are fundamental to whether a resource is achievable. BPA wants to avoid substantial expenditures of its and the region's efforts and financial resources on electricity resources that have a low probability of being achieved.

BPA solicited public comment on these decision factors and how they should be used in choosing among alternative strategies. The majority of public comments were supportive of these decision factors as balanced and comprehensive. The total system cost criterion received the most comment. While some commenters argued for increased emphasis on this decision factor, others suggested that minimizing near-term rate impacts was most important.

In deciding on the 1990 Resource Program, BPA carefully considered all of the public comment on decision factors. BPA has not established a priority ranking for these eight decision factors. BPA remains committed to a balanced and flexible approach in comparing resource alternatives.

RESOURCE SUPPLY

BPA is fortunate to have a wide variety of resources to choose from to meet future needs. Table 1 shows the supply of new resources estimated to be available to BPA, with their average levelized costs in mills per kWh. The levelized cost of a resource includes all direct costs of the resource over its effective life. Levelized costs are expressed in both real (inflation adjusted) and nominal dollars. ^{2/}

The resources listed in Table 1 are not in exact order of levelized cost. The order in Table 1 reflects the advantages some resources have, such as small unit size and short lead times, which are not reflected in their levelized costs.

As the Table shows, BPA expects to be able to meet nearly 3,000 aMW of load growth with a combination of conservation, cogeneration, environmentally sound new small hydro, system efficiency improvements, and better use of nonfirm hydropower from the existing system. In addition to the new resources shown in Table 1, BPA is exploring opportunities to arrange power exchanges and imports with other utilities that also could help meet BPA's future load growth. All of these resource opportunities make it very likely that BPA can meet its loads through the end of the century, and beyond, without resorting to the construction of large coal or nuclear plants. However, capturing these resource opportunities for the future will require some hard work over the next several years.

A note of caution also should be sounded about the resource supply estimates. BPA, the Council, and others are continually developing new information that will alter some of the resource supply estimates shown in Table 1. As a result of this continuing work, resource costs and amounts may go up or down, and new resources may be added to the "stack" in the future.

^{2/} The Council recently began reporting both real levelized and nominal levelized costs. The Council felt that nominal levelized costs were more comparable to rates. BPA continues to use real levelized costs because they have been the most useful summary of resource costs for BPA's purposes. BPA will report resource costs in both real and nominal levelized terms. BPA's real levelized costs can be roughly converted to nominal levelized costs by multiplying them by the following factors, which depend on the resource's lifetime. For resources with 20-, 30-, 40-, or 50-year lives, multiply real levelized costs by 1.53, 1.77, 1.97, or 2.14, respectively, to convert to nominal levelized costs. For the purpose of this report BPA calculated nominal levelized costs for a normalized 40-year resource life by multiplying each real levelized cost by 1.97.

TABLE 1

BPA'S RESOURCE STACK

Resource	Real Levelized Cost a/ mills per kWh (88\$)	Nominal Levelized Costs b/	BPA Supply 1992-2010 Med Loads	BPA Supply 1992-2010 High Loads
Hydro Efficiency Improvements	13	26	112	112
Conservation:				
Refrigerators c/	13	26	34	45
Freezers c/	16	32	12	16
Industrial	16	32	120	191
Irrigation	16	32	14	14
New Commercial	19	37	109	207
Water Heat c/	19	37	114	152
Small Hydro 1	20	39	23	23
Conservation:				
Existing Commercial Remodel and Renovation	20	39	72	72
New Manufactured Housing	23	45	45	47
New Single-Family Residential (MCS) d/	27	53	66	162
New Multifamily Residential (MCS)	28	55	11	12
Existing Multifamily Residential	29	57	12	12
Existing Single-Family Residential	30	59	62	62
Existing Commercial Discretionary	30	59	86	86
Cogeneration 1	30	59	31	31
CT's and Displaceable Purchases	26-34	51-67	1500	1500
Small Hydro 2	34	70	26	26
Cogeneration 2	35	69	125	125
BPA Trans Efficiency Improvements	36	71	34	34
WNP-1 and -3	34 e/	67	1619	1619
Cogeneration 3	40	79	250	250
BC Hydro Imports	40	79	500	500
Coal	40	79	5000	5000

- a/ Year 2000 real levelized cost in 1988 mills/kWh. Levelized costs for generating resources assume 50 percent public and 50 percent private financing. Levelized costs for conservation resources assume 100 percent debt financing at a 9.2 percent nominal interest rate.
- b/ Nominal levelized costs have been normalized to a 40-year operating life. Financing assumptions are the same as those used for real levelized costs.
- c/ Achievable aMW's are for 1995-2010.
- d/ Includes 11 aMW of solar for Medium loads and 14 aMW of solar for High loads.
- e/ Assumes 21 percent public financing.

THE FINAL RESOURCE PROGRAM

BPA's challenge is to develop a resource program that uses the resources in Table 1 to fill the resource needs depicted in Figure 1, while attempting to meet the eight decision factors described previously. BPA staff have identified a final Resource Program which is evaluated against the Draft proposal.

The following are some of the considerations reflected in the final Resource Program:

- BPA should focus on an aggressive conservation program. This approach is least-cost and captures the best conservation opportunities. These opportunities include incorporation of energy efficiency measures in the construction of new buildings, during the remodeling and renovation of existing commercial buildings, and during equipment replacement cycles in the commercial and industrial sectors. While it may be possible to retrofit such measures after new construction or remodeling/renovation is completed, it typically is prohibitively expensive to do so, and thus could render the energy efficiency gain uneconomic. If BPA failed to capture these cost-effective resources now, BPA likely would be forced to pay a steep premium to replace these resources later with more costly resources. In addition, because in many cases the supply of conservation resources fluctuates with economic growth, focusing on these resources minimizes BPA's economic risk.
- It is important that BPA have a diversified resource portfolio. BPA should not overemphasize one segment of the resource marketplace. It is particularly important that BPA gain experience in acquiring generation resources. For BPA the early 1990's will be a period of testing and refining its generation resource acquisition capability.
- It is important that BPA commit to a predictable, stable conservation program aimed at achieving a specified minimum level of savings by a particular time. While conservation does offer flexibility through development in small increments, stability is important because conservation cannot be quickly ramped up or down to meet changing resource requirements cost-effectively. In addition, long-term achievement of savings is harmed by frequent changes in program direction. Also, those who deliver the conservation resource--utilities, contractors, and governments--need to be able to look ahead with some certainty while carrying out their work. Finally, having a specific target gives the overall effort a goal and a standard by which to be judged. BPA has determined that a target

of at least 200 aMW of conservation savings from 1992 through 1997 is prudent. 3/ BPA views this 200-aMW figure as a floor. If market conditions change or the ability to acquire conservation savings becomes greater, BPA will adjust its efforts to capture more of this cost-effective resource. BPA is committed to purchasing as much cost-effective conservation as can be reliably delivered in this period.

- Some generation resources should be made ready to meet extraordinary resource requirements. This means developing the capability to option and acquire them, and gaining actual experience in doing this.

With these considerations in mind, BPA set out to construct a proposal that implements the Council's guidance and at the same time comes as close as possible to meeting the decision factors.

The proposal is described below. Tables 2 and 3 identify BPA's resource acquisition goals for the 1990's as adopted in the final 1990 Resource Program. Although the Resource Program is focused on FY's 1992 and 1993, the savings and expenditures for FY's 1990 and 1991 have also been included to set a context for the Resource Program efforts.

Table 2 provides a detailed breakdown of the resource program components for the years 1990 through 1993. Table 3 shows the aMW targets for FY's 1990 through 1997.

1. General Direction of the Final Resource Program

The final Resource Program presents specific budgets for FY's 1992 and 1993, and sets a course of action through 1997. Starting with the increased program budgets for FY's 1992 and 1993, FY's 1994 through 1997 show a steadily increasing resource acquisition effort. Compared to the current (1990) program budgets, BPA's annual resource acquisition budget will increase roughly 53 percent from FY's 1990 to 1993, to \$167 million/year.

The final program establishes a very ambitious course for resource acquisitions. To accomplish this large task BPA proposes to move toward substantially greater resource flexibility developed in close partnership with its customers. BPA will emphasize the sharing of

3/ This target does not include additional conservation which may be acquired using "all sources" acquisition methods (i.e., billing credits and competitive acquisitions).

TABLE 2

FINAL RESOURCE PROGRAM, FY 1990 THROUGH FY 1993
(Nominal dollars in millions and incremental aMW) a/

	1990		1991		1992		1993	
	\$\$\$\$	aMW	\$\$\$\$	aMW	\$\$\$\$	aMW	\$\$\$\$	aMW
CONSERVATION								
Commercial	\$20	3	\$26	5	\$33	8	\$36	10
Industrial b/	\$12	27	\$14	31	\$18	7	\$20	9
Residential	\$57	6	\$65	8	\$64	12	\$67	14
Agriculture	\$1	<1	\$2	<1	\$2	<1	\$2	<1
Conservation Subtotal	\$90	37	\$107	43	\$117	28	\$126	32
GENERATION								
Hydro System Efficiency Improvements	<\$1	0	<\$1	20	<\$1	25	<\$1	25
Geothermal	\$1	0	\$1	0	\$1	0	\$1	0
Resource Contingency Plan	\$0	0	\$4	0	\$12	0	\$1	0
Other c/	\$11	0	\$10	0	\$9	0	\$10	0
Generation Subtotal	\$13	0	\$15	20	\$23	25	\$13	25
ALL SOURCES								
Billing Credits	<\$1	0	<\$1	0	\$2	9	\$5	6
Competitive Acquisition	\$2	0	\$7	0	\$8	0	\$20	30
All Sources Subtotal	\$3	0	\$7	0	\$11	9	\$25	36
State and Local Government	\$3		\$3		\$3		\$3	
TOTAL d/	\$108	37	\$132	63	\$153	62	\$167	93
Plus: Support Services and Corporate Overhead	\$10		\$14		\$15		\$16	
GRAND TOTAL	\$118	37	\$146	63	\$167	62	\$183	93

a/ Forecasted resource planning costs are incorporated into estimated expenditures in each sector.

b/ Includes 25 aMW/year from Con/Mod in FY's 1990 and 1992.

c/ Other includes Idaho Falls payments and generation support.

d/ Numbers may not add due to rounding.

RESOURCE PROGRAM ACQUISITIONS, BY SECTOR, FY 1990 THROUGH FY 1997
(savings in amw)

- a/ Includes 25 aMW/year from Con/Mod in FY's 1990 and 1991.
- b/ Reflects only generation resources to be acquired in this Resource Program; does not reflect generation resources which may be acquired in subsequent resource programs to meet projected load growth beyond the early 1990's.
- c/ Competitive Acquisitions and Billing Credits processes.
- d/ Numbers may not add due to rounding.

responsibility and authority for conservation programs with its customer utilities, while also providing them more flexibility than BPA-designed programs alone can offer. Through these efforts BPA will be expanding resource development beyond the programs designed, implemented, and funded up-front by BPA that were prevalent during the 1980's.

The period 1991 through 1997 will see a transition from the current approach to a blend of BPA-designed, utility-designed, and developer-initiated programs. Crucial to this transition will be the refinement of methods to verify contracted-for conservation savings, a market-oriented pricing system, and the development of new business relationships between BPA and its partner utilities.

The movement away from reliance on BPA-designed programs is not a radical departure for BPA's customer utilities. Many utilities have operated some of their own conservation programs in recent years. Creative financing of conservation investments was used by the Eugene Water & Electric Board (EWEB)--EWEB undertook the financing, with debt service provided over time by BPA. BPA worked with several utilities to enable the transfer of conservation savings from three public-owned utilities to an investor-owned utility.

Although much attention will be given to collaboratively designed approaches, BPA will continue to offer technical support and other "value-added" services. BPA is committed to working with its customers in new, flexible, and creative ways to meet their power needs. BPA also will encourage partnerships between its customers and other entities to develop the resources where necessary.

BPA remains committed to the least-cost approach for acquiring resources. This means acquiring all cost-effective conservation. In the Draft 1990 Resource Program BPA proposed to focus on lost-opportunity resources. However, BPA is interested in all cost-effective conservation. Typically lost-opportunity conservation is lower cost because it is an incremental cost to the cost of pre-planned construction or equipment replacement. It is cost-effective because of its relatively low cost. But other low cost conservation is also cost-effective (e.g., much industrial conservation). The idea is to capture cost-effective conservation savings when the opportunities for acquiring them are best. This includes securing the resource not only in new construction but also in existing buildings when they are undergoing renovation/remodeling and at the time of replacement of equipment in industrial/commercial applications. BPA does not want to forego a cost-effective resource that would be too costly to acquire later.

Cost-effective conservation resources provide reliable energy savings for the BPA system at or below the cost of other available resources (given the Northwest Power Act 10 percent conservation cost credit). BPA's current estimate of the cost-effectiveness threshold for resources is represented by the Alternative Cost for Billing Credits Resources (July 1990). Resource characteristics, such as on-line date, availability, useful life, seasonality, etc., impact the relative value of each resource for

the electric system. The alternative cost for a particular resource represents the stream of costs for resources BPA would otherwise have to acquire to meet its load obligations.

The final program increases conservation budgets but not to the point that reliable, effective delivery is jeopardized. In FY's 1992 and 1993, BPA estimates it will acquire 30 to 35 aMW/year from programs specific to conservation; these acquisitions increase to 40-45 aMW/year by FY 1997. This final program is a commitment that conservation efforts through 1997 will not be reduced except for an extreme change in circumstances. By itself, conservation can meet much of the likely range of load growth that BPA faces.

Over the period FY's 1992 through 1997, the real levelized cost to BPA of the conservation portion of the final program averages about 13 mills/kWh, while the total cost (i.e., to all parties, including BPA, utilities, and consumers) averages about 22 mills. The estimated BPA cost included in the final program provides for research and development, pilot programs, market research, and other activities related to understanding the resources.

The following is a brief description of the resource acquisition efforts by sector:

2. Commercial Conservation

The commercial sector presents significant opportunities for cost-effective resource development. Since there is much new construction in the sector and a great deal of remodel and renovation activity, it is important that this sector be as energy-efficient as possible. BPA will acquire 8 aMW in FY 1992 and 10 aMW in FY 1993 from this sector. The expected total acquisition from commercial sector programs is 58 aMW for FY's 1992 through 1997. For FY's 1992 and 1993 the final budgets are \$33 and \$36 million, respectively.

The total funding for the commercial sector will increase significantly between 1990 and 1993. Numerous commenters on the Draft 1990 Resource Program were concerned that a dip in funding level for 1991 would seriously inhibit meeting the acquisition targets for FY's 1992 and 1993. BPA has added an additional \$10 million to the previously proposed FY 1991 budget, most of which will be devoted to testing enhancements to the Energy Smart Design and the development and testing of acquisition payments.

Commercial sector activities include: Energy Smart Design, Commercial Acquisition Incentives, Commercial Acquisition Support (which includes Model Conservation Standards and research, development and demonstration), and the Commercial Incentives Pilot Program through the contract closeout in 1990.

BPA believes it can successfully bridge between its current efforts and competitive acquisitions. BPA will continue to test enhancements for Energy Smart Design in 1991. Every effort will be made to move toward alternative acquisition methods (billing credits, targeted acquisitions) in 1992 to more fully leverage the capabilities of utilities and the private sector. BPA's priority is to fully implement a cooperatively designed program and to offer price/prove-of-delivery contracts to interested utilities or others. These actions will be the highest priority because, once established, they have the highest likelihood of allowing the region to rapidly increase production of the commercial conservation resource without stressing the delivery infrastructure beyond its limits.

3. Industrial Conservation

The industrial sector also offers significant opportunities for cost-effective resource acquisition. The industrial sector activities in the final Resource Program include: Energy Savings Plan (ESP), the Major Plants Program, 4/ Conservation Modernization (Con/Mod), and the research, development and demonstration efforts.

BPA will acquire 7 aMW in FY 1992 and 9 aMW in FY 1993 in this sector. The budgets for FY's 1992 and 1993 are \$18 million and \$20 million, respectively. These budgets include an estimated \$7 million/year for the Con/Mod program. The expected total acquisition for FY's 1992 through 1997 from this sector is 67 aMW.

Planned future industrial conservation efforts represent a substantial increase in the pace of acquisitions in this sector. The early years will be a period of transition as new business relationships are developed and energy savings verification methods are refined. Future efforts will feature: (1) increased reliance on utilities (because they are best positioned to tap the unique industrial conservation opportunities that are available in their service territories); (2) streamlined program management; (3) risk sharing; (4) BPA playing an important role in providing a stable market for industrial energy efficiency improvements; and (5) BPA payments over time, as savings accrue.

The initial phase of BPA's accelerated effort in the industrial sector will focus on (1) expanding the Energy Savings Program to include new and expanding industries; (2) adding a motors rebate element; (3) providing for audits to find potential projects; (4) permitting operation of the ESP program by firm power customers; and (5) beginning work on the Major Plants Program.

4/ The Major Plants Program is a new effort by BPA to purchase energy savings at an established unit price from the largest industrial firms and the major Federal installations in the service areas of BPA's firm power customers.

4. Residential Conservation

The activities in this sector include: the Northwest Energy Code Program, Super GOOD Cents, New Manufactured Housing, Residential Weatherization, Solar Access, Blue Clue for Appliances (including water heating efficiencies), and research, development and demonstration. BPA will also continue debt service payments in the EWEB Financing Agreement.

Residential sector programs will acquire 12 aMW in FY 1992 and 14 aMW in FY 1993. The residential sector budgets for FY's 1992 and 1993 are \$64 and \$67 million, respectively. The expected total acquisition for FY's 1992 through 1997 from this sector is 84 aMW. These budgets reflect the expected cost of implementing State-wide codes. Table 3 shows the incremental energy savings by year, but it should be acknowledged that after codes are in place, additional increments of savings continue far into the future. Therefore, the total energy savings from these expenditures are somewhat understated in the Tables.

The final program shows a strong commitment to meeting the Council's objectives for the residential sector. It includes efforts in the area of existing residences, new residences, new manufactured housing, appliances, and water heating. Programs in all but the existing residential area are aimed at gaining lost-opportunity resources. Finally, BPA continues its substantial support for State-wide adoption of Model Conservation Standards.

5. Agricultural Conservation

From the agricultural sector, the final resource program acquires less than 1 aMW in FY's 1992 and 1993. The expected total acquisition for FY's 1992 through 1997 from this sector is approximately 5 aMW. The FY's 1992 and 1993 budgets are about \$2 million/year. This is a discretionary program, but the resource is estimated to cost 16 mills/kWh, which makes this program very cost-effective. This program promotes installation of low-pressure devices on center pivot systems, mainline improvements, and fitting redesign. The final Resource Program meets the Council's guidance to maintain programs to assist with implementation of cost-effective efficiency improvements for irrigation.

6. All Sources Acquisition Approaches--Competitive Resource Acquisitions and Billing Credits

a. Billing Credits

Billing credits is another mechanism that will be relied upon to help BPA meet its more ambitious resource acquisition goals in the 1990's. Section 6(h) of the Northwest Power Act directs BPA's Administrator to grant billing credits to customers upon request for resources that reduce BPA's obligation to serve loads. Billing credits are based on the premise that independent utility action to develop conservation or generation resources reduces BPA's need to acquire resources. BPA developed a Billing Credits Policy in 1984. Discussions with utilities have convinced BPA that the Billing Credits Policy is flexible and can provide a workable mechanism

for resource acquisition. Therefore, BPA has decided to go forward with a 50 aMW billing credits test in the final Resource Program.

BPA's objective in this first use of billing credits is to ensure that this mechanism is workable for resource developers. If needed, the Billing Credits Policy will be revised based on the results of this test.

BPA will have a solicitation for billing credits resources in the summer of 1990 and anticipates that a portion (9 aMW) of these resources will become available by 1992. In the final Resource Program \$2 million is budgeted for billing credits in FY 1992 and \$5 million is budgeted for FY 1993. It is expected that additional conservation (beyond BPA's target of at least 200 aMW from FY 1992 through FY 1997) will be acquired from this solicitation since, all other things being equal, conservation will be selected prior to generation.

b. All Sources Competitive Acquisitions

As the Federal System approaches load/resource balance, BPA believes that it is important to develop proven capability to acquire resources as needed. The competitive acquisition will provide BPA with the ability to systematically solicit, evaluate, and select resource proposals that are offered for purchase. In addition, it will enable BPA to compare diverse resource alternatives while providing developers with an opportunity to propose creative projects or measures. The final Resource Program includes an initial competitive solicitation for a minimum of 100 aMW. This is double the size of the resource acquisition test proposed in the Draft 1990 Resource Program. BPA has concluded (with the support of many commenters on the Draft 1990 Resource Program) that a 100 aMW effort is needed to demonstrate this approach and fully capture its advantages. BPA also concluded that it should be expanded to include demand-side measures in a parallel solicitation. The increased size of this effort is expected to attract greater interest and higher quality resources. A 100 aMW effort may be particularly important in light of preliminary information indicating that Federal System loads are expected to grow at a somewhat faster rate for the next few years than was assumed in the Draft. The inclusion of demand-side measures will assure that BPA does not overlook viable, cost-effective conservation measures that might not be captured in its other programs. BPA plans to issue a solicitation for resources in the fall of 1990, and begin taking delivery of part of the power in FY 1993. Budgets of \$8 million in FY 1992 and \$20 million in 1993 are included for this acquisition test in the final program.

7. Generation

A modest quantity of new generation resources are proposed in the near term, but the more important role generation resources play is providing the flexibility to respond to changing load circumstances. With an aggressive, stable conservation effort, BPA proposes to develop generation resources in varying amounts depending on changing load and resource situations. These resources will come from three sources, those submitted under the competitive acquisition and billing credits solicitations, and specific resource actions that BPA is in a unique position to initiate.

The competitive acquisition solicitation will provide the vehicle for acquisition of generation resources that can be most effectively developed by customers or independent developers. This includes resources such as cogeneration, hydroelectric, or other conventional and nonconventional generating technologies.

The generation resource actions included in the final Resource Program consist of three components, each intended to meet a particular objective. A discussion of the components and their objectives follows.

a. Hydro, Thermal, and Transmission Efficiency Improvements

Efficiency improvements consist of control system improvements at several major Federal hydroprojects as well as improvement projects at the Supply System's WNP-2 facility. These improvements are estimated to have an average real levelized cost of less than 13 mills/kWh and could yield approximately 115 aMW (100 aMW of hydro, 15 aMW of thermal) to the Federal System. The final Resource Program includes capturing these efficiencies over a 5-year period to allow time for developing institutional arrangements with the Corps of Engineers, Bureau of Reclamation, and the Supply System, and coordination with their maintenance activities. The budgets for hydro efficiency improvements in FY's 1992 and 1993 are \$0.3 million/year. ^{5/} In addition, there are an estimated 10 aMW of low-cost transmission efficiency improvements on BPA's transmission system. Although these transmission efficiency improvements are identified as resource acquisitions, presently they are to be budgeted and implemented through BPA's Transmission System Development Program (\$4 million/year in FY's 1992 through 1997).

b. Geothermal Pilot Project

The Pacific Northwest is thought to have large geothermal resources. Estimates of developable resources are in the thousands of megawatts. Due to the high risk and costs of geothermal exploration, and because the region's long time power surplus has precluded power purchases, developers have had little incentive to confirm resources. Even if resources are found, land use issues must be resolved in many areas before power plants and transmission lines can be built. Confirming the existence and developability of this low-cost, renewable resource at several of the largest, most promising sites in the region would have great value to BPA and Northwest utilities because it would help prevent unnecessary commitments to more expensive power sources.

Consistent with previous suggestions by the Council, BPA will participate in pilot projects aimed at confirming resources and determining developability at three of the largest, most promising sites in the region. BPA will do this by purchasing--in joint ventures with regional utilities--up to 10 aMW of energy from each of the three projects. Contracts

^{5/} The majority of the costs of these improvements are budgeted by the Corps of Engineers and Bureau of Reclamation, and later repaid by BPA with interest.

with developers will pay only for electricity delivered (in other words, BPA will not finance the projects). If joint ventures can be arranged, power contracts may be awarded as soon as FY 1991, with power deliveries commencing about 1995. Since no payments will be required until plants come on line, the final Resource Program requires no outlays for acquisition during FY's 1992 and 1993.

c. Resource Contingency Plan

The first four elements of the final Resource Program--conservation, the 150 aMW of billing credits and competitive resource acquisitions, efficiency improvements, and the geothermal pilot project--would be sufficient to cover the deficits shown in Figure 1 for the 1989 medium-high load forecast through 1997. However, as Figure 1 also shows, deficits of over 1,000 aMW by 1996 are possible under the high load forecast. There is roughly a 10 percent chance of load growth of this general magnitude. Furthermore, preliminary results from the 1990 joint load forecast suggest that the medium-high load forecast should be about 200-400 aMW higher, with the draft 1990 medium case falling close to the 1989 medium-high. The Council has advocated the development of flexible resource options to cover the risk of large, but fairly unlikely, near-term deficits. BPA developed a Resource Contingency Plan to put this concept into practice. The Resource Contingency Plan is the source of the fifth major component of the Resource Program.

Figure 2 illustrates BPA's exposure to deficits under the high load growth scenario, without a Resource Contingency Plan. The assumption made in Figure 2 is that BPA moves as fast as possible, starting in FY 1993, to develop all available resources to meet high loads. For example, aggressive programs to capture discretionary conservation are started, and new generation resources are added as soon as possible. However, even after "pulling out all the stops," BPA could not add enough new long-term firm resources to meet deficits under the high load scenario. As shown in Figure 2, deficits of as much as 1,000 aMW in 1996 would still remain, after making all feasible resource additions.

The Resource Contingency Plan concludes that it appears worthwhile to take actions now, at reasonable cost, to reduce this risk of deficits. The most promising action appears to be to start soon to option about 800 aMW of resources which, if necessary, could be brought on-line by 1996. This will likely, but not necessarily, be the siting and licensing of two combined-cycle CT's with a total capacity of over 800 MW. Another possibility may be the optioning of cogeneration potential. This action will significantly increase BPA's assurance of having sufficient cost-effective firm resources on-line if loads grow much faster than the medium forecast, or if a major resource fails. The cost of this action in FY 1992 is estimated to be approximately \$12 million, and the continuing cost of maintaining an "optioned" status would be about \$1 million/year. Only if the option were exercised would acquisition costs be incurred and energy received. Locating these resources in the Puget Sound area also may help address the transmission capacity limitations in that area if the resources are eventually acquired.

FIGURE 2

RESOURCE CONTINGENCY PLAN Resource Availability Versus Need (High Loads and No Resource Contingency Plan)

BPA intends to proceed with the implementation of this contingency plan through a solicitation in early 1991. The solicitation will seek optionable resources that meet the criteria for BPA's contingency plan in a flexible, cost-effective manner, but will not categorically exclude any resources. In the interim, BPA will seek to resolve several remaining questions regarding short lead-time displaceable resources, including the future cost and availability of natural gas.

EVALUATION OF THE FINAL RESOURCE PROGRAM

In the Draft 1990 Resource Program a proposed set of resource actions was developed and evaluated against five alternatives using the eight decision factors. 6/ Although the Draft proposal did not rank the highest on all eight decision factors, it ranked first (or tied for first) on seven of the eight decision factors. The Draft proposal ranked last in terms of near-term rate impacts, but the estimated 0.5 mill impact it creates was judged not to offset its other advantages--particularly in light of recent information on the Federal System load/resource balance over the decade of the 1990's. 7/

This section presents a comparison of the final Resource Program with the Draft proposal according to the eight decision factors. This comparison is made using the same data, assumptions, and analytical model as were used for analysis in the Draft. This evaluation indicates that the final Resource Program improves upon the Draft proposal when compared on a quantitative basis.

6/ The alternatives, as presented in the Draft 1990 Resource Program, are:

- Alternative 1: The Draft Resource Program, which included: 20-25 aMW of conservation per year from FY's 1992 through 1997 to a target of 200 aMW by 1997; a 50 aMW generation acquisition test, 100 aMW of hydro efficiency improvements, a 30 aMW geothermal pilot project, and acquiring options on two CT's.
- Alternative 2: Acquire half of the lost-opportunity conservation of the proposal and no generation resources or discretionary conservation (primarily weatherization).
- Alternative 3: Acquire the generation resources of the proposal and no conservation.
- Alternative 4: Acquire the conservation resources of the proposal and no generation resources.
- Alternative 5: Acquire the lost-opportunity conservation of the proposal and the generation resources, but no discretionary conservation.
- Alternative 6: Acquire all the conservation and generation of the proposal, except the siting and licensing of two CT's.

7/ See the Technical Report for a detailed discussion of the ranking of the Draft proposal relative to the five alternatives.

The results of this comparison are summarized in Table 4 and explained below:

- Minimize the Present Value of Total System Costs. The present value of total system costs of the final Resource Program is \$102 million less than that of the Draft proposal. By increasing the size of the all sources competitive acquisition and the billing credits test, as well as expanding efforts at capturing cost-effective conservation from 1992 through 1997, an additional \$102 million saving is realized over the Draft proposal. The other alternatives all result in higher total system costs than the proposal.
- Ability to Meet Contingencies. The second column in Table 4 shows a 131 aMW energy surplus in FY 1997 resulting from actions specified in the final Resource Program (including the contingency plan acquisitions), assuming that high load growth occurs in the early 1990's. The final Resource Program puts BPA in an even better position for dealing with contingencies (such as prolonged high load growth) than did the Draft proposal due to additional resource acquisitions in 1992 and 1993. In this case it was also assumed that more conservation would be acquired from 1994 through 1997 due to high load growth and that 150 aMW of cogeneration would be acquired by 1997.
- Minimize BPA Financial Risk. Financial risk is measured as the probability of BPA incurring significant negative cash-flows in a particular year. Significant negative cash-flows are judged to be cash-flow shortfalls of more than \$200 million. The final Resource Program decreases this likelihood by about 1 percent relative to the Draft proposal. This difference, however, is not statistically significant. Therefore, on the basis of financial risk, the final Resource Program and the Draft are ranked equally.
- Minimize Near-Term Rate Impacts. The effect of the final Resource Program on rates in 1992 and 1993 compares favorably to the impact of the Draft proposal. Relative to the impact of the 1990 and 1991 budget, the final Resource Program causes a 0.1 mill/kWh smaller effect on rates than that caused by the Draft proposal. Thus, the contribution of the final Resource Program to an increase in the PF rate, assuming no other changes in BPA costs, is estimated to be 0.4 mills/kWh.
- Minimize Long-Term Rate Impacts. The final Resource Program does not compare quite so favorably to the Draft proposal when considering effect on the average PF rate from 1998 through 2010. The final Resource Program causes a 0.2 mill increase in average long-term rates relative to the Draft proposal. This increase, in spite of the decrease in present value of system costs, results from the reduced sales caused by increased conservation acquisitions.

TABLE 4

Decision Factor Scores for Final and Draft 1990 Resource Programs

	System Cost Minimization 1/ (millions 88\$)	Ability to Meet Contingencies 2/ (aMW)	Financial Risk Minimization 3/ (%)	Near-Term Rate Minimization 4/ (mills/kWh 92\$)	Long-Term Rate Minimization 5/ (mills/kWh 92\$)	Economic Risk Minimization 6/ (# outcomes)	Environmental Impact Minimization	Deliverability Maximization
Draft Resource Program	0	+31	0	+0.5	0	0	N.Q.	N.Q.
Final Resource Program	-102	+131	-1	+0.4	+0.2	3	N.Q.	N.Q.

N.Q. Non-quantifiable.

- 1/ Increases (+) or decreases (-) in the expected present value of total system costs compared to the Draft 1990 resource program.
- 2/ The EPA energy surplus (+) or deficit (-) in 1997 assuming High loads. High loads are a proxy for a variety of contingencies which could create deficits.
- 3/ The final 1990 resource program reduces the probability of negative cash flows in 1997 (in excess of \$200 million) by one percentage point compared to the Draft. These results are not statistically significant.
- 4/ The change in the PF rate for the 1992/93 rate period due to the proposed budget change (relative to 1990/91 program levels).
- 5/ The change in the average PF rate for 1998-2010 compared to the Draft, in 1992 dollars.
- 6/ The number of outcomes (out of 100) in which the final resource program causes an increase in total system costs of \$300 million or more, compared to the Draft.

- Minimize Exposure to Economic Risk of Unplanned Changes in Load Growth, Resource Availability, and Costs. Table 4 shows that the final Resource Program involves a slightly greater risk of an increase in present value of system costs greater than \$300 million. This slight increase in risk occurs because there is some chance that the increased expenditures on resources included in the final Resource Program will ultimately prove unnecessary.
- Minimize Local and Global Environmental Impacts. The final Resource Program and the Draft are ranked against this decision factor based on the premise that conservation is relatively environmentally benign compared to generating resources. The final Resource Program acquires more conservation than the Draft. However, the additional all sources competitive acquisition in the final may result in more generation resources being acquired in the final compared to the Draft. Hence, the final Resource Program and the Draft are ranked about equally. Except for the global warming analysis, which is described in the Technical Report, BPA did not conduct new environmental analysis of this Resource Program. BPA is planning to complete a Resource Programs Environmental Impact Statement (RPEIS) in 1992. The RPEIS is expected to be available for use in decisionmaking for the 1992 Resource Program.
- Maximize Resource Deliverability in View of Social/Political Factors. The rankings are based in part on the premise that conservation has earned broad acceptance in the Pacific Northwest both by consumers and BPA's wholesale customers, and that reductions in conservation reduce the "deliverability" of the alternative. A stable conservation program also is believed to be a key to that resource's deliverability. In addition, there is broad public support for a diverse package of resource actions. Program emphasis on conservation and lost-opportunity conservation minimizes institutional and political barriers in light of BPA's growing resource needs. Also, broadening generation resource options through the test of the "all sources" resource acquisition process would improve the overall future resource deliverability. The final Resource Program is ranked slightly higher than the Draft because the final program includes a larger stable conservation program that captures the lost-opportunity conservation resource. In addition, the final Resource Program includes a larger competitive resource acquisition effort and a billing credits test.

SELECTION OF 1990 RESOURCE PROGRAM

The following are BPA's reasons, in view of the decision factors, for selecting the final 1990 Resource Program.

- Least-Cost Approach. The proposal represents the least-cost approach for meeting BPA's load obligation. The Resource Program captures all the cost-effective resources that can realistically be acquired in FY's 1992 and 1993. However, if market conditions change or the ability to acquire cost-effective conservation or generation resources becomes greater, BPA will adjust its efforts to capture additional resources.
- Budget And Rate Effects Are Within Bounds. Total capital and expense costs for the proposal, not including the large thermal budget and overheads, average \$160 million/year for FY's 1992 and 1993. This is roughly a 50 percent increase over expenditures in FY 1990; considering only these expenditures, this translates into roughly a 0.4 mill/kWh increase in FY 1992 over the current average PF rate. This rough estimate of the implications of the Resource Program on PF rates does not consider other BPA expenditure needs and therefore should not be interpreted as BPA's estimate of future rates. BPA's judgment is that these expenditures and rate impacts are acceptable, in view of the load/resource outlook.
- Manages Risk Appropriately. The program includes capturing lost-opportunity and other low-cost resources that would keep BPA in load/resource balance under the 1989 medium-high forecast. In addition, it recommends low-cost actions, short of acquisitions, such as the acquisition of options on 800 aMW of short lead-time resources to prepare BPA to reliably and efficiently meet the high load growth contingency. The Resource Program imposes no increased financial risk on BPA, and minimizes the risk of large future system cost increases.
- Stable Conservation Program Securing All Cost-Effective Conservation. The cornerstone of the Resource Program is a commitment to a steady ramp-up of the conservation programs to at least 200 aMW by FY 1997. This aspect of the program is key to achieving the least-cost approach to resource development, and to making the conservation resource deliverable in the long run.
- Flexibility And Diversity. The program takes significant actions in a wide range of new resource types, without irrevocably committing BPA to major investments until the need for such investments becomes clearer. In particular, BPA will be gaining needed experience in acquiring generation resources to efficiently meet anticipated growth in Federal System loads later in the 1990's.

OTHER RECOMMENDATIONS

In addition to recommending actions BPA should take to develop resources, the 1990 Resource Program addresses other important resource-related issues, and develops recommendations on these issues. Following are the highlights of these recommendations.

A. WNP-1 and -3

In the Draft 1990 Resource Program BPA recommended starting a new comprehensive study of the future of WNP-1 and -3 beginning in July 1990. BPA's rationale was that many significant changes in issues surrounding the projects had occurred since the last comprehensive study in 1987. Among these changes were the reduced risk of default on outstanding bonds should the projects be terminated and the lower probability that either project would be needed to meet future load growth.

BPA received many comments on this recommendation, the majority of which suggested a new study was either premature or not needed at all. One reason given for postponing the next study was that a study in 1990 would divert regional attention from the Council's new Power Plan. BPA views this as a valid concern and considers input from the Power Plan to be important information that will complement the next study of WNP-1 and -3. Another reason given was that a study commencing in 1990 would not have the benefit of information from BPA's Puget Sound reinforcement study that currently is underway. In addition, the feasibility and cost-effectiveness of cogeneration and firming nonfirm are still uncertain and significantly affect the future of WNP-1 and -3. A clearer picture of the costs and availability of these competing resources should emerge as BPA proceeds with Billing Credits, competitive acquisitions, and implementation of the Resource Contingency Plan.

Some commenters suggested that the next study should focus on the institutional issues surrounding the projects, with less attention on economics. Reasons cited were that the economics are fairly clear--that the projects essentially provide no benefits on an expected value basis, but potentially would have high value if long-term load growth continues. The institutional issues BPA was encouraged to address are those dealing with the regional consensus on the projects, the process by which the projects would be terminated, BPA's relationship with the Supply System, and other broader policy issues. BPA agrees that any subsequent study of the projects should include a thorough evaluation of the relevant institutional issues.

BPA's final recommendation is to defer a new comprehensive study of the future of the projects until significant new information becomes available or conditions change sufficiently to warrant a new study. In the interim, there is no change in the status of WNP-1 and -3 within BPA's resource planning process. Based on current schedules for the Council's Power Plan and BPA's Puget Sound reinforcement study, it appears likely that a new study will be deferred at least until 1991.

B. DSI Load Uncertainty Beyond 2001

The assumption for most of the Resource Program analysis was that the DSI's would continue to receive the same type of service as they receive now after their contracts expire in 2001. There is some uncertainty about whether this assumption will hold true. BPA is moving to resolve this uncertainty. Changes in type of service or rates after 2001 could change the level of DSI load served by BPA. Since this uncertainty is not yet resolved, BPA conducted analysis to determine whether the Resource Program actions would still make sense even under the extreme case that all DSI load is gone in 2002. This analysis indicated that the Resource Program remains the best choice, even under this extreme scenario. That is, the resource actions in the program remain economic compared to the alternatives tested even if all the DSI load unexpectedly leaves BPA's system.

As the year 2001 approaches and BPA is faced with larger resource decisions, DSI load uncertainty is likely to play a bigger role in the Resource Program. This issue will require careful attention in the 1992 Resource Program.

C. Global Warming Insights

BPA received extensive public comment on its Draft Global Warming Study published in the Draft 1990 Resource Program. Many commenters applauded BPA's willingness to address the global warming issue. Some commenters, however, expressed concern about fuel switching as a global warming mitigation alternative. BPA views global warming as a serious environmental risk. As a Federal agency, BPA has a responsibility and a commitment to provide a reliable, cost-effective, environmentally sound electric power system. The 1990 Resource Program represents BPA's initial effort to examine the consequences of resource alternatives regarding emissions of greenhouse gases.

Carbon dioxide, produced by combustion of fossil fuels, is the primary greenhouse gas. BPA's analysis examined a range of alternatives designed to reduce net carbon dioxide emission on the West Coast.

The results of the analysis suggest that increases in energy efficiencies are the most economic means of reducing carbon dioxide emissions. Specifically, the analysis found that switching from electric water heaters to gas water heaters would reduce CO₂ emissions significantly (because combustion-generated electricity would likely be displaced) and provide economic benefits as well. Prohibitions on fossil fuel resources and building WNP-1 and -3 ahead of need do not appear to be a cost-effective means of reducing carbon dioxide emissions. Strategies for mitigating global warming will be examined further in the RPEIS.

D. Fuel Switching

The Global Warming Analysis in the Draft 1990 Resource Program addressed the potential for switching water heating load from electricity to natural gas. Many utilities commented that fuel switching could threaten the

financial health of individual utilities, and that any action in support of fuel switching should come from the local utility, not BPA.

Since the Draft, BPA has concluded that reductions in electricity consumption which result from switching water heating, space heating, or other end-use loads from electricity to natural gas or other alternative fuels do not appear to meet the Northwest Power Act's definition of a "resource." BPA also agrees that decisions on whether to try to influence end-use fuel choice should be left to the local utility. Hence, no BPA actions in support of fuel switching are included in this Resource Program.

However, the question remains whether BPA should support customers who choose, on their own initiative and using their own funds, to encourage fuel switching. Such fuel switching, when it is independently undertaken by customers, has the potential to reduce BPA's obligation to acquire new resources and transmission facilities, reduce BPA costs, reduce BPA rates, and reduce West Coast CO₂ emissions.

Though fuel switching will not be included in the first round of billing credits, BPA support similar to a billing credit may be appropriate in certain circumstances. A mechanism similar to billing credits could be appropriate because billing credits are granted only for independently-undertaken actions which reduce BPA's obligation to acquire resources, and because BPA rates are no higher with the billing credit than without it.

BPA intends to look into authorities and mechanisms for providing such support to BPA customers who choose to pursue fuel switching. BPA will provide additional opportunities for input from customers and other interested parties before implementing any strategy for providing support to independently-undertaken fuel switching.

E. Resource Actions in the Puget Sound Area to Mitigate Peak Load Problems

Since the bitter cold spell of February 1989, BPA and other utilities have become increasingly concerned with the ability of the power system to deliver electricity into the Puget Sound area reliably. Loads have been growing rapidly in the Puget Sound area, causing greater needs for transmission from resources on the east side of the mountains to demand centers on the west side. As a result of these increased loads, the risk of voltage instability during line or generator outages is increasing.

To deal with this complex problem, BPA and the utilities of the Puget Sound area have begun a public process with the goal of completing an EIS in 1991. This process includes public meetings as well as working meetings with representatives of the utilities in the Puget Sound area. Work teams currently are addressing issues of future demand in Puget Sound, as well as quantifying the size and costs of measures available to mitigate the problem. Four areas of potential solution are: (1) load curtailment; (2) local generation; (3) conservation and load management; and (4) additional transmission.

The final Resource Program, as already described, includes siting and licensing two combined-cycle CT's, or optioning similar resources, with a total capacity of over 800 MW. If they were built in the Puget Sound area, these units could contribute substantially to relieving the immediate peak load problem in the Puget Sound area.

The appropriate resource question for the Resource Program is whether or not efforts should be made to locate or develop resources needed for Federal System energy needs in the Puget Sound area so that they can also help alleviate the transmission capacity problem. A preliminary analysis, based on the current estimated direct cost of a cross-Cascades transmission line, indicates that a benefit of about \$100/kW exists for siting resources in the Puget Sound area rather than in some other part of the region. This benefit is rather small, compared to the capital cost of most power resources (CT's, for example, cost about \$600/kW) and does not provide a large incentive to locate a resource in the Puget Sound area rather than elsewhere in the region. However, since the construction costs of the CT's do not vary substantially with their geographic location, the economic advantage may be sufficient to warrant location of the CT's in the Puget Sound area.

The study of the peak load problem of the Puget Sound area is continuing in the context of work on an environmental impact statement. However, there is also a concern that winter peak loads in the Puget Sound area have grown beyond the levels that can be reliably served by the existing transmission system. To mitigate this problem, short lead-time resources and/or load management may be necessary simply because a cross-Cascades transmission line cannot be built soon enough to solve the problem. For example, BPA is now working with the Supply System to study the feasibility of using the generator at WNP-3 as a synchronous condenser that could help alleviate the Puget Sound peak load problem in the near term.

F. Planning for Surplus

Now that BPA is in load/resource balance and is projected to remain so through the turn of the century assuming the 1989 medium load forecast, suggestions have been made that BPA plan for a small surplus as a cushion against higher-than-medium load growth or resource failure. Currently, given the range of load uncertainty, BPA plans for enough resource additions to meet projected firm loads under critical water conditions at least cost. This least-cost planning includes adding all low-cost resources that can be sold for more than they cost.

BPA examined the cost of planning for at least a 200 aMW surplus in all load conditions. The analysis shows that the present value of total system costs would increase by approximately \$350 million, even after taking credit for the additional revenues received from selling the surplus. Thus, maintaining a surplus as insurance against higher-than-planned-for loads or other extreme conditions appears rather expensive.

A number of commenters continue to urge that BPA plan for a 200 aMW surplus despite this analysis of the increased costs of carrying such a

surplus in all load conditions. Some additional information that should be considered in this debate is that under BPA's analysis in almost 80 percent of the 2,000 cases analyzed (100 games x 20 years) BPA has a firm surplus. This surplus averages 350 aMW. In cases where BPA fails to achieve load/resource balance, the firm deficit averages only 50 aMW. This surplus in most cases is the result of the lead time needed to bring large resources on line. If BPA planned to always have a 200 aMW surplus, in most cases the surplus would be substantially higher than 200 aMW. Instead, a more prudent "insurance policy" appears to be the Resource Contingency Plan, as described previously.

END

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