

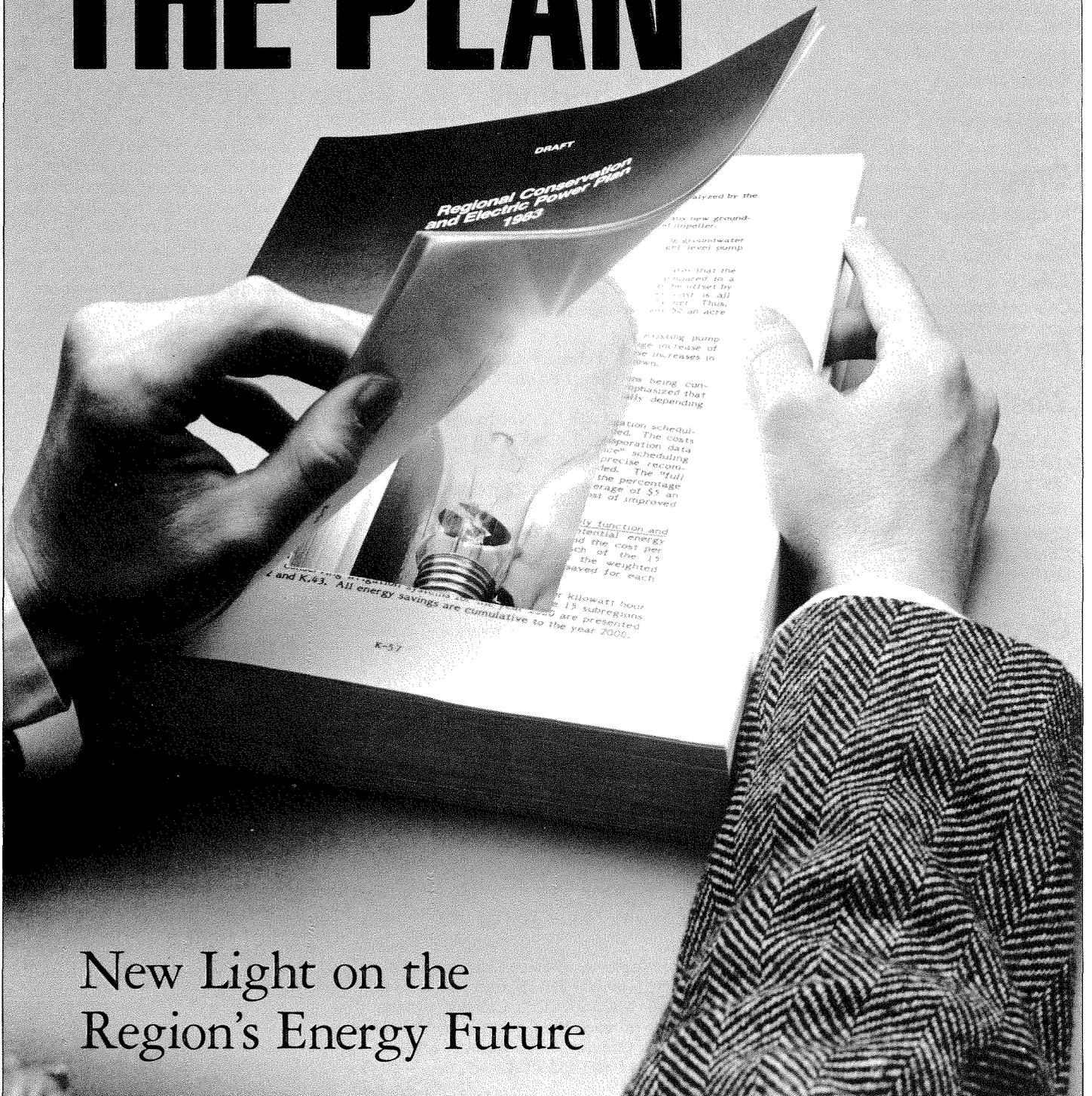
# N O R T H W E S T ENERGY NEWS

Volume 1, No. 9

Northwest Power Planning Council

January/February 1983

## THE PLAN



New Light on the  
Region's Energy Future

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## NORTHWEST ENERGY NEWS

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The Northwest Power Planning Council is required to develop a program to restore the Columbia's fisheries and a regional electric energy plan, to be carried out by the Bonneville Power Administration, emphasizing cost-effective conservation and renewable resources.

Cover photo: Kevin Haislip

# NOTICES

## Draft energy plan available

The Northwest Power Planning Council's draft energy plan is now available for distribution. To order a copy, see the form on page 31.

## Council to hold energy briefings

Northwest Power Planning Council members will hold a series of information sessions on the draft energy plan prior to the public hearings. These briefings will provide an opportunity for members of the public to find out what's in the plan and to ask questions in preparation for testifying at public hearings.

The meetings will be held in:

### Washington

Spokane, February 24, Music Room, Spokane Convention Center Opera House, 7 p.m.

Seattle, March 2, Northwest Rooms, Seattle Center, 7 p.m.

### Montana

Missoula, February 22 (tentative), Village Red Lion Motor Inn, 100 Madison, 7 p.m.

Kalispell, February 23 (tentative), Remington Room, Outlaw Inn, 1701 Highway 93 South, 7 p.m.

Butte, February 25 (tentative), Copper King Inn, 4655 Harrison Avenue, 7 p.m.

### Idaho

Idaho Falls, February 22, Pepper Tree Inn

Boise, February 23, Hall of Mirrors

For more information, contact Mickey Riley in Washington at (206) 754-0701; Bernd Hoffmann in Montana at (406) 449-3952; and Susan Skog in Idaho at (208) 334-2956.

## Film available

An 11-minute film explaining the Council's draft energy plan is available for purchase or use in both film and videotape versions. For more information, contact Annette Frahm at the Council's central office.

## Administrative record open

The Council's administrative record is available for public use in the library at the Council's central office. The record is a collection of documents that relate to the development of the Council's Energy Plan and Fish and Wildlife Program, and includes meeting minutes, staff memos, and written comments on Council proposals. It is well indexed and the documents are easy to locate.

For more information, contact Ruth Curtis at the Council's central office. Copies of documents are available, but there may be a charge for copying large amounts of material.

## Correction

Conservation can have a positive impact on monthly electric bills — but not quite the impact illustrated in a chart in the December issue of *Northwest Energy News*. The (corrected) chart below shows the impact of a rate increase on a home before and after the home is weatherized. The second column shows the cost of a rate increase with no decrease in energy use; the third column shows the cost of the same rate increase after weatherization decreases the home's January energy use by 1000 kilowatt-hours.

### Effect of conservation on electricity bill



**Before**  
January use: 3800 kwh  
Monthly bill: \$136



**50% rate increase**  
January use: 3800 kwh  
Monthly bill: \$203



**After conservation improvements**  
Capital cost: \$900  
January use: 2800 kwh  
Monthly bill: \$146

## New WATS number

The Northwest Power Planning Council's regionwide WATS line has a new number: 1-800-222-3355. Call this number toll-free to reach the Council's central office. The Oregon WATS number remains the same: 1-800-452-2324.

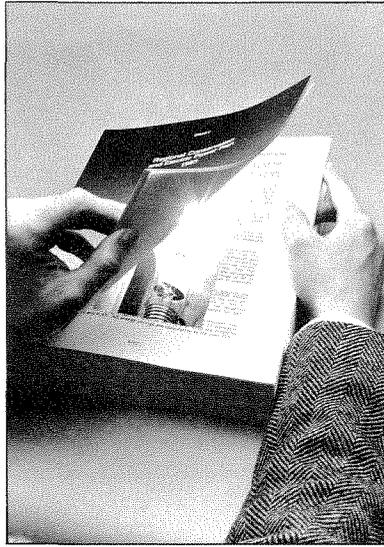
# • C O N T E N T S •

## The Plan & a New Chapter in Northwest Power History

Page 25

Things have changed a lot since the passage of the Northwest Power Act of 1980. Today, once-projected power deficits have flipped to an extended surplus and a string of court cases.

From the early days of the Bonneville Project Act to more recent power problems, events have led to a new era in generating electricity. Shaped by these events and the Northwest Power Planning Council's draft energy plan, we're all about to start a new chapter in Northwest power history.



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## Pieces to a Power Puzzle

Page 13

Using the Northwest Power Act as the rulebook, piecing together the region's power puzzle is a bit like playing Scrabble: You have to have certain resources on the board before you can start to build others. And in the end, only certain resources fit together to give you the winning score — the lowest cost mix of power. On the Council's board, there are five major resources: conservation, new hydro facilities, cogeneration units, combustion turbines and coal. More details on each can be found on:

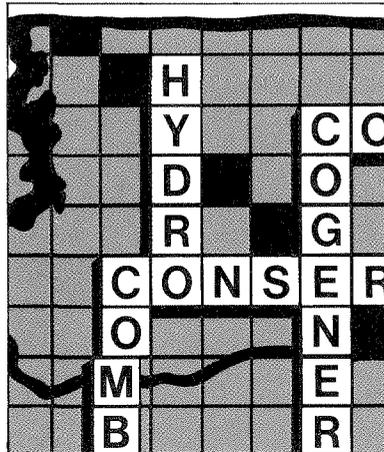
Conservation	Page 18
New Hydro	Page 22
Cogeneration	Page 23
Combustion Turbines	Page 23
Coal	Page 24

## Getting the Ball Rolling

Page 5

If a long-range regional power plan is going to work, there are scores of things that need to get rolling right away. Various conservation programs have to be tested, new hydro sites surveyed and impacts weighed, and new marketing strategies developed.

These and other tasks have to get underway so other parts of the Council's draft plan will fall into place.



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## Forecasting the Future

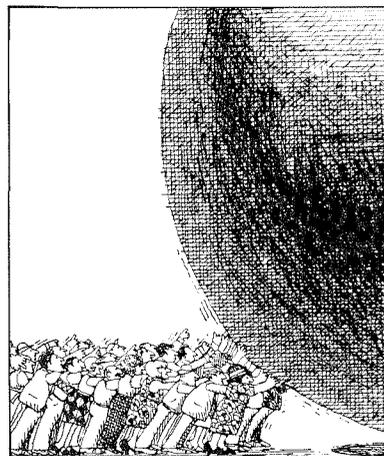
Page 6

Predicting events 20 years from today is always tricky business. Yet that's one of the jobs given the Council. So what might the future hold? While there's no way to know for sure, the Council is banking on a range of futures — from what might be the worst of times to an extended period that would make it the region's best of times.

## Buy High; Sell Low

Page 8

New power — whatever the source — is expensive. But thanks to the enormous block of cheap hydro power, we buy expensive new power, meld it with the cheap and sell it at a lowered price. The Council has some recommendations on how to send more accurate price signals.

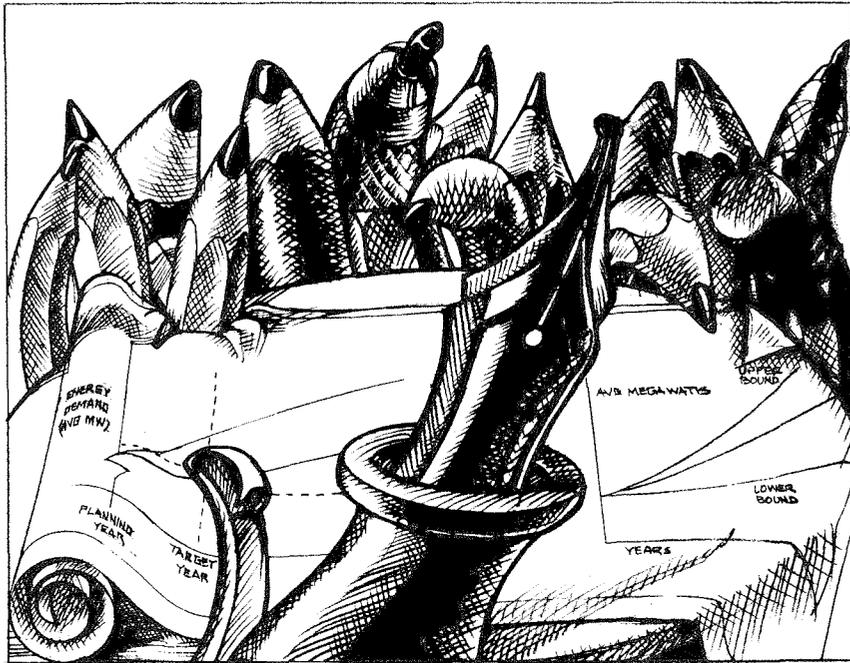


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## What Do You Think?

Page 4

The Council will be holding a series of hearings on the draft energy plan in March. Here's when and where.



# Council draft plan hearings scheduled

Hearings on the draft regional energy plan will be held in:

## **Pocatello, Idaho**

March 7  
 (Idaho Field Hearing)  
 Quality Royale  
 1555 Pocatello Creek Rd.

## **Missoula, Montana**

March 9  
 Montana Rooms  
 University Center  
 University of Montana

## **Boise, Idaho**

March 11  
 Holiday Inn  
 Interstate 80 and Vista Avenue  
 (close to airport)

## **Coeur d'Alene, Idaho**

March 14  
 North Shore Hotel  
 North Star Plaza

## **Salem, Oregon**

March 16  
 Employment Building Auditorium  
 875 Union Street N.E.  
 (in Capitol Mall area)

## **Seattle, Washington**

March 18  
 South Auditorium  
 Federal Building  
 915 Second Avenue

All of the hearings will run from 9 a.m. to 5 p.m. and 7 p.m. to 9:30 p.m., except for the Pocatello field hearing, which will run from 7 to 10 p.m.

Those wishing to testify at a hearing should call Janie Percy at 1-800-222-3355 (1-800-452-2324 in Oregon) to reserve a time slot at least five days prior to the hearing.

Written comments on the draft plan are also encouraged. They should be addressed to the Director of Public Involvement at the Council's central office, 700 SW Taylor, Suite 200, Portland, Oregon 97205. Written comments must be received in the Council's central office no later than 5:00 p.m. on March 21, 1983.

The following guidelines will apply to the public hearings and the submission of written comments:

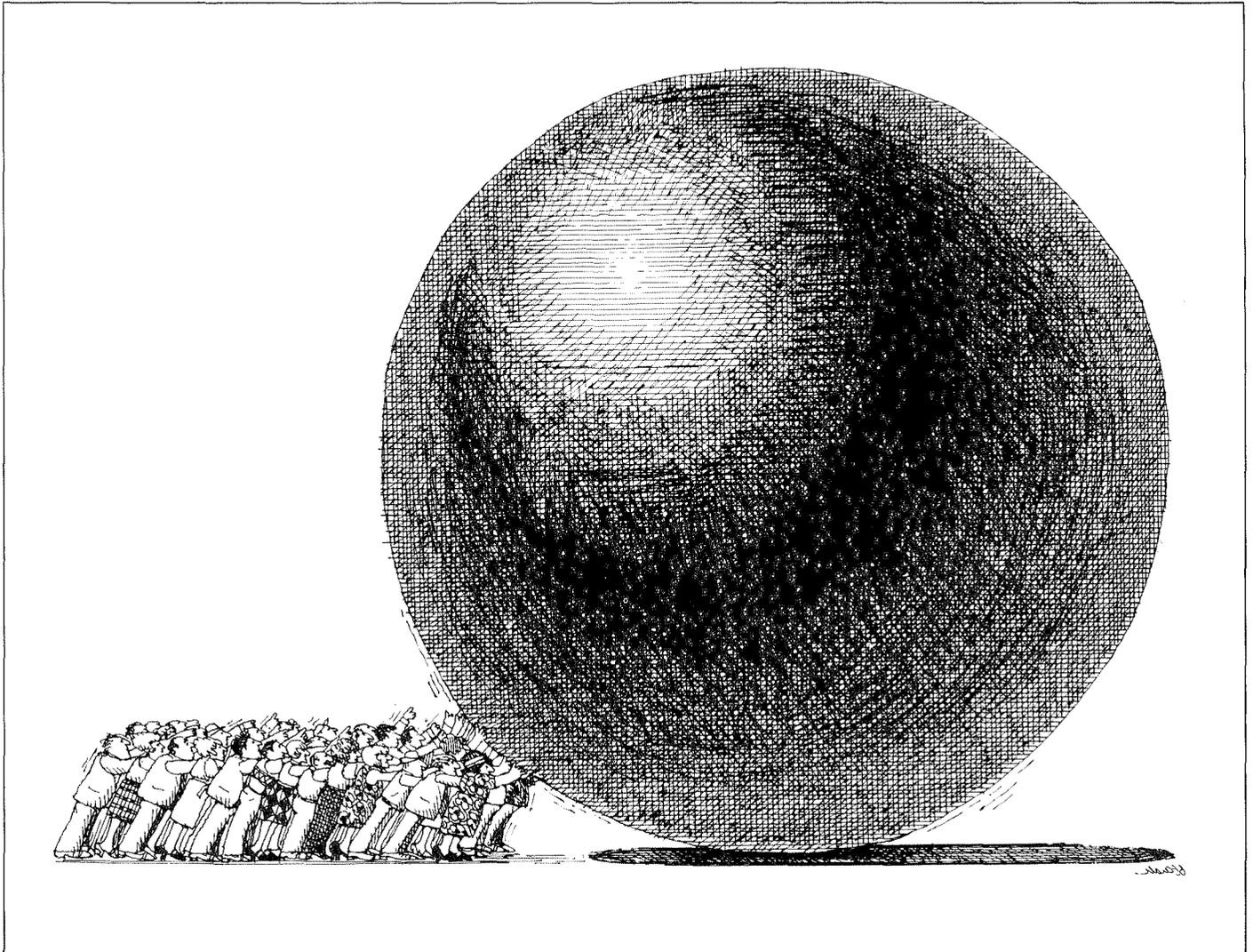
1. Each major group (PNUCC, BPA, Northwest Conservation Act Coalition) will be allowed to testify at one hearing only. Organizations that have separate individual state chapters are not subject to this limitation;
2. The hearings will be conducted by the Council rather than by a hearings examiner. There will be no cross-examination although the Council may ask clarifying questions;

3. Groups will have fifteen minutes to summarize their written testimony, testimony of individuals will be limited to five minutes;

4. Ten copies of written testimony should be submitted. Because of the large number of comments expected, special attention should be given to written comments. Written comments should be specific and concise, refer to plan sections, and provide alternative language to aid re-drafting.

The Council requests that commenters submit a "marked up" copy of the draft plan indicating suggested revisions. Where deletions are suggested, the language being deleted should be lined out and placed in parentheses. Suggested new language should be inserted and underlined. For example: (~~Line out the portions of the draft to be deleted~~); underline suggested new language.

Lengthy insertions should be set out on an accompanying page. Reasons for suggested changes should be stated separately. All comments should be double-spaced. Avoid grouping on one page comments concerning different sections of the plan.



## Getting the ball rolling

*Council sets two-year actions to get long-range plan going*

To get the region moving in the direction of its 20-year power plan, the Northwest Power Planning Council has outlined a number of steps that the Bonneville Power Administration, the region's utilities, and state and local governments should take in the next two years.

"The most important of these two-year actions is BPA's responsibility to lay the groundwork for a conservation delivery system," says Edward

Sheets, Council Executive Director. To achieve the Council's conservation goals, BPA will need to work out legal and financing arrangements with utilities, local governments, and the private sector, added Sheets.

"The Council has set forth proposed guidelines for conservation programs," said Sheets. "The details need to be worked out by those who will carry out the programs. The delivery system needs to

be established now so that when the region needs more power, we will have the ability to deliver the priority resource — conservation."

In the area of conservation, the Council calls for actions to encourage the adoption of standards for new energy-efficient construction. BPA should begin programs to weatherize existing homes and businesses and to improve the efficiency of home appliances. Conservation programs should

be established for industry, irrigated agriculture, and government. And research should begin to determine the actual costs and savings of conservation. See pages 18 to 21 for more details.

The Council, recognizing that both hydropower and fish and wildlife are important to the region, has proposed a 12-month study to assess the impact of possible hydropower sites on their impact on fish and wildlife. The draft plan

also calls for BPA, within the next two years, to fund a fish and wildlife guidebook for future hydro development and to prepare a list of hydropower options.

Other renewable resources, such as wind and geothermal, may have great potential in the region. In order to gather more information about these resources, the Council proposes that within the next two years BPA establish and post a price for geothermal-generated electricity. BPA should establish a geothermal demonstration project and should study the cost and operating experiences of existing wind demonstration projects. BPA should also monitor developments in new solar technologies.

To take full advantage of the hydro system means developing ways to use cheap seasonal surplus power from the spring runoff. The Council proposes near-term efforts to develop markets for interruptible power (see story below).

While cogeneration will not be needed in the region until 1995 at the earliest, cogeneration is only available when industrial boilers are installed or replaced. So that cogeneration

opportunities are not lost, the plan states that during the next two years BPA should assist industry in selling cogenerated electricity inside or outside the region.

The Council has established a series of recommendations for electric rate designs that encourage conservation (see story page 9). These should be implemented, on a voluntary basis, by BPA and utilities during the next two years.

The Council, following the Northwest Power Act, has set forth a method for calculating environmental costs and benefits of energy resources. BPA should be prepared to use this method when new resources need to be acquired.

The last of the power plan's two year actions have to do with gathering information for future revisions of the plan, scheduled for 1985 and every two years following. BPA and the Council should explore a number of program options to be used if conservation programs and resources don't perform as well as planned, or if the region experiences very high, very rapid growth.

These options include markets for interruptible power, a

low-water surcharge, building codes and weatherization retrofit levels based on the marginal cost of new power, and the possibility of purchasing surplus power from British Columbia.

In addition, the Council will continue to monitor the region's economy, population, and electricity use; costs and schedules for new and possible resources; progress toward implementing the resource options concept; and the effectiveness of conservation programs. The Council's plan will adapt to changing circumstances and new information in order to reduce the risks of uncertainty.

## Council forecast range set

It has been one of the most nettlesome elements of power planning. How do you predict a rapidly — and, at times, radically — changing future? Over the last decade, each year Northwest utilities have

dropped their growth projections another notch. Yet, while forecasts have been dropping, there is also the question about how influenced any forecast of the future is by the realities of the present. Electrical growth no longer travels upward on a straight line. It ebbs and flows. This dictates the need for greater flexibility, and for developing a range of possible futures instead of one future precisely plotted on a graph.

To meet that reality — or, perhaps, realities — the Northwest Power Planning Council has put forward an initial forecast range in lieu of a precise "best guess" number.

The Council's forecast of the region's electric energy needs suggests a wide range of possible demand in the year 2002: from 18,800 to 27,600 megawatts.

In 1981 the region consumed 15,524 megawatts. The increases represent an annual average growth rate ranging from 0.9 percent to 2.8 percent.

The Council has also developed a medium low forecast, with a growth rate of 1.7

## Marketing interruptible energy in the Northwest

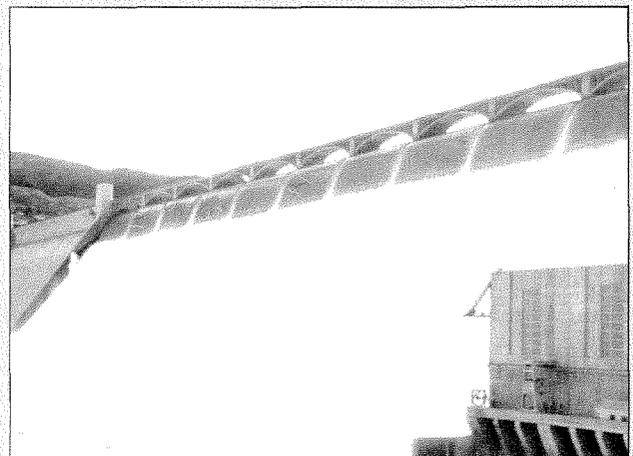
The large variations in the hydropower system lead to surplus energy during the spring runoff and during high water years. The water that cannot be stored in the system's reservoirs is either spilled over the dams or used to generate power that is sold at bargain-basement rates to California utilities to offset much more expensive power. Thus a large amount of potential value is either lost or exported from the Northwest to the Southwest.

As part of the regional power plan, the Council expects BPA to actively develop additional markets within the region for this low-price energy. The Council has looked at potential markets in agriculture and industry. In agriculture, surplus power could be used to provide interruptible service to irrigation systems. In industry, electric boilers could be installed which could be used to offset fossil-fueled boilers on an interruptible basis.

Electric boilers currently seem to be the most promising. The Council has estimated that at least 900 to 1,400 megawatts of interruptible electric-boiler load could be developed in the region's industries.

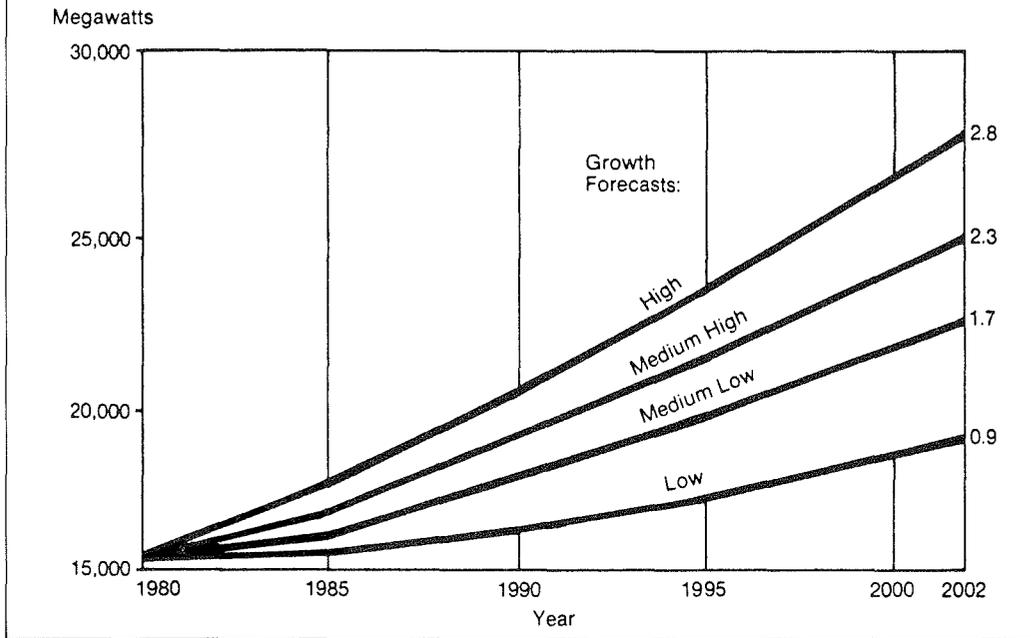
BPA could support efforts to develop electric boilers by arranging low-cost power sales to industries that install boilers or by paying to install boilers. The investment would be paid back to the region out of increased surplus sales in the future.

During the next two years, the Council proposes that BPA initiate a policy to actively develop regional markets for seasonal surplus energy. BPA should set an initial goal of 900 to 1,400 megawatts in industry and should investigate further potential.



**Spilling value:** Council proposals seek to make better use of seasonal hydro surplus.

## Electricity demand forecasts



percent, for a demand of 22,230 megawatts in 2002, and a medium high forecast, with a growth rate of 2.3 percent, for a requirement of 24,790 megawatts.

The ranges reflect the many uncertainties inherent in forecasting electric energy demand over a 20-year period — the weather, population changes, economic conditions, the price of electricity and other fuels, and the impact of conservation measures.

The economic forecast for the region, one of the key elements in the electrical demand forecast, also includes four projections of the area's economic growth. The high forecast predicts a rapid recovery from the current recession, leading to record high economic growth for the region for 20 years.

Employment is expected in the high scenario to increase 3.4 million between 1980 to 2000, more than double the number of employees added in the preceding 20 years.

The electronics industry, the high scenario anticipates, will become the region's No. 1 employer. While traditional industries such as lumber and wood products, aluminum, transportation equipment, pulp and paper, and agriculture will maintain a high pro-

duction rate, they will grow more slowly than the electronics industry. The high forecast also assumes completion of the proposed Alumax aluminum plant. Employment in trade and service industries is expected to follow the high-growth pattern.

An increase in population, households, and per capita income is linked to the high employment forecast. Population is projected to be 12.8 million by 2000.

In the low growth forecast, the Northwest is projected to grow at a slightly faster pace than the nation. Recovery from the recession is much slower than the nation, however, with the region not reaching its long-term growth levels until nearly 1990. Employment will increase by only one million between 1980 and 2000.

Under such conditions the lumber and wood products industries would recover only to 1980 employment levels (the first year of the recession).

Transportation equipment employment (Boeing) would decline 20 percent below the 1980 peak by 2000. Thirty percent of current aluminum capacity would be idle and the Alumax plant would not be built.

Population in the low

growth scenario is expected to increase from 8 million to 9.8 million in 2000, an average annual growth rate of only one percent, lower than in any previous decade.

As it did with the energy demand forecast, the Council prepared two intermediate economic and demographic scenarios based on combinations of high, medium, and low ranges.

The medium high scenario predicts rapid growth in high technology and commercial industries, but only moderate activity in the traditional industries such as forest products and aerospace. The medium low projection predicts low levels of economic activity in the traditional industries while other manufacturing and commercial industries experience moderate growth.

Similar four-step scenarios were developed to anticipate the electrical energy needs of major consuming sectors in the economy.

The Industrial Sector accounted for 41 percent of firm electrical energy sales in 1980. Forecasts for growth in electricity sales in the industrial sector range from 0.8 percent in the low case to 1.9 percent in the high case. Less electricity-intensive industries

like electronics, plastics, and other manufacturing will grow at a faster pace than traditional industries.

The Residential Sector used 36 percent of the region's electricity in 1980. While total electricity use in the residential sector increases in every scenario, use per household is projected to decline in all scenarios because:

- New housing units will be more energy efficient than older homes.
- A larger proportion of new housing units than older units may be multi-family.
- Higher electricity prices are likely to decrease household consumption through changes in behavior; for example, lower thermostat settings.

Growth in electricity use in the residential sector ranges from 0.6 percent in the low case to 2.8 percent in the high case.

The Commercial Sector covers a wide range of consumers, including hospitals, retail stores, office buildings, schools, highway and street lighting, and the BPA's federal agency customers. It accounted for 19 percent of the region's electricity use in 1980. Electricity demand growth in the commercial sector ranges from 1.1 percent to 3.7 percent. Electricity use per square foot of floorspace decreases in all forecasts.

The Irrigation Sector accounted for 4 percent of the region's demand for electricity in 1980. Annual increases in electricity use range from 2.2 percent in the high case to 1.0 percent at the lower level.

The four forecast scenarios were designed for flexible resource planning. The projections suggest a wide range of uncertainty about the future twenty years from now. The forecasts will be revised periodically based on new information about economic growth and energy demand, allowing plans for new resources to be adjusted to meet changing energy needs.

## Council adopts rate design proposals

The Northwest Power Planning Council has adopted a series of electricity rate design recommendations to encourage conservation. Following concerns expressed by utilities and others, the Council adopted rate designs as recommendations instead of model conservation standards.

These recommendations have been included in the draft energy plan.

The recommendations include the following:

1. Rates should be set to reflect the higher system cost of adding new resources to the power system.

2. Utility bills should provide consumers with information on both the rate structure and potential savings on their bill by using less electricity.

3. Rate designs should be based more on the amount of energy used and less on fixed charges such as the basic customer charge.

4. BPA wholesale rates should also more closely reflect the cost of new resources.

5. BPA should adopt a low-water surcharge to be used in the case of a critical water period where the region was forced to buy high-cost stopgap power.

6. A study should be carried out, after adoption of the final energy plan, to quantify the impact of different rate designs on decisions to conserve and how rate designs relate to conservation programs.

Several concerns were expressed about the original rate design proposal. The Northwest Public Power Association challenged the Council's legal authority to mandate retail rate designs as model conservation standards. Utilities said they were also concerned that model rate design standards, despite the Council's assurance that utilities could meet the standard by saving energy in other ways, would be de facto mandatory.

The rate design proposals

were adopted as recommendations rather than model standards in response to these concerns. The Council reaffirmed that it is keeping open the option to adopt rate designs as model conservation standards in later plans if too little progress is made on conservation programs.

The original rate design proposal called for inverted rates — the rate per kilowatt-hour would go up as total use increased. Questions were raised about whether inverted rates would, in fact, promote more efficient use of electricity. Some utilities argued that consumers only pay attention to their total electric bill and that they don't pay attention to rate changes as they use more electricity.

"There is reason to believe," said Wally Gibson, the Council's manager of rates, "that consumers will change their behavior if they are given information about how changes in electricity use affect their electricity bill. If people know that they can get a large savings on their bill for their conservation action," Gibson added, "they are more likely to act than if they don't know,

or know they will get only a small return."

Utilities were also concerned that inverted rate designs were unfair to large customers, since their total bills would go up while the total bills of smaller customers would go down. "Rate designs do not exist in a vacuum," Gibson said. "The Council's conservation efforts are aimed at the large electricity customers. Conservation actions will lessen the impact of the rate design. And energy prices can play an important role in preserving the savings from conservation actions."

Two other concerns of the utilities were whether the rate design proposals were consistent with current utility pricing practices, and what effect the proposals would have on revenue stability.

The pricing question is irrelevant, Gibson said, since the Northwest Power Act directed the Council to base its rate design recommendations on the cost to the system of new resources — not the cost of existing resources, as in current utility pricing practice.

"However, the revenue stability question is a serious

one," said Gibson, "because the current energy surplus has already increased the revenue uncertainty of utilities. Basing rate designs more on the amount of energy used and less on fixed charges causes problems for utilities when total energy use decreases. The utilities' revenue problems will likely lessen as we recover from the current recession, at which point this concern can be given less weight."

## WPPSS plant 3 faces uncertain future

"Come hell or high water," says Carl Halvorson, board chairman of the Washington Public Power Supply System, "we'll finish Plant No. 2."

Despite several pending lawsuits, Halvorson remains mildly optimistic about Plant No. 3, the only other of the five nuclear plants planned by WPPSS in the 1970s which still



**More troubles for WPPSS:** Plant 3 faces financing problems due to legal entanglements.

is under construction.

"My gut feeling," says Halvorson, "is that we will finish 2 on schedule and I think we'll find some way to keep 3 going."

Legal and financial problems have brought about the mothballing of Plant No. 1 and the termination of Plants Nos. 4 and 5.

WPPSS 2, about 94 percent complete, expects an operating license in late summer and fuel loading in the fall. WPPSS 3, 70 percent complete, has a target date of 1986. While Halvorson believes that WPPSS 2 can be completed without going to the bond market, WPPSS 3 needs an additional \$961 million to finish construction, and, says Halvorson, "we have funds to go only until May."

Normally, WPPSS would sell bonds to finance continued work on No. 3. Legal entanglements, however, have clouded WPPSS' ability to make another trip to the bond market.

Halvorson reports that the WPPSS board probably will have a special session in Richland in late February to consider the future of No. 3. The timing is directly related to court action involving Initiative 394 approved by Washington state voters in November, 1981.

Under 394, future bond sales to finance Washington nuclear projects would need voter approval in the 19 public utility districts and 4 municipalities comprising WPPSS. In June, 1982, the U.S. District Court in Seattle declared the initiative unconstitutional as applied to WPPSS projects 1, 2 and 3.

The Don't Bankrupt Washington Committee, sponsor of 394, appealed the ruling. The 9th Circuit Court of Appeals last month upheld the ruling that 394 could not be used retroactively to delay financing of the construction of the three nuclear power plants. Don't Bankrupt Washington plans to appeal the ruling to the U.S. Supreme Court.

Until the legal issues are resolved, says Halvorson, "there won't be any bonds sold to complete No. 3."

Further complicating

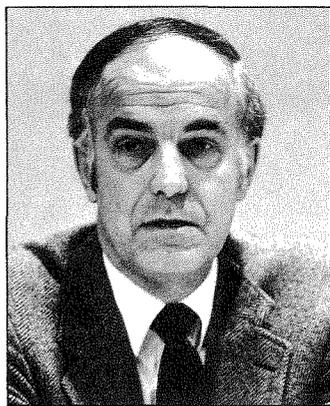
WPPSS' ability to secure financing for No. 3 are the numerous lawsuits which followed its decision last year to terminate construction of Plants 4 and 5. Investors in those projects, for which payments are now due, have sued to protect their interests. A number of utilities have filed suits, claiming they're not responsible for the multi-billion-dollar debt incurred for the construction of the nuclear plants.

"Payments are coming due for 4 and 5 which have nothing to do with 3," says Halvorson. "But the 4 and 5 litigation has had significant impact on the underwriters. It's kind of hard for them to write something for the same people — the same owners — saying they don't owe any money on 4 and 5 when they are the owners of 1, 2 and 3."

There are no financing mechanisms available," says Halvorson, "unless we can get the money from private sources, from short-term bank loans. Something like that."

A spokesman for the Bonneville Power Administration agreed.

"We could dig up some money to save No. 2. We have a line of credit. But we also have cash-flow problems. A billion dollars we don't have."



**Good news:** Council Chairman Dan Evans is "gratified" that fate of fish and wildlife program will not be settled in court.

## Council fish, wildlife program underway without lawsuits

It was one of those cases when no news was good news. Northwest Power Planning Council Chairman Dan Evans hailed it as a chance for new cooperation, saying he was pleased that now the Council's fish and wildlife program could get underway without being slowed by any legal challenges.

January 31 was the last day open to file any legal challenge to the Council's comprehensive program to restore the fish and wildlife damaged by the dams of the Columbia River Basin. The program was adopted November 15 after months of meetings and public hearings throughout the region.

"I was gratified that all of the parties were willing to try to settle this through science instead of the court," said Evans. "I'm confident that the Council can play a constructive role in replacing confrontations from the past with a new spirit of cooperation."

The program calls for revised management of river flows to aid downstream passage of young fish, construction of downstream facilities to pass fish around the dams on the Columbia and Snake Rivers, and various facilities and steps to improve upstream passage.

The Council was required under the Northwest Power Act of 1980 to develop a program to "protect, mitigate and enhance" the fish and wildlife and related spawning ground which had been damaged by construction of dams on the region's major rivers.

Evans said he was hopeful that the region could now move rapidly in the implementation of the Columbia River Basin Fish and Wildlife Program. The program will be implemented by the various federal agencies and public and private utilities which op-



**Fish, wildlife head named:** Keith Colbo, Montana, will head Council's new committee.

erate hydroelectric projects on the Columbia and its tributaries.

## Colbo to head fish, wildlife committee

Montana Council member Keith Colbo, a former state fish and wildlife official, has been named chairman of the Northwest Power Planning Council's Fish and Wildlife Committee.

Colbo had extensive experience in Montana state government prior to his appointment to the Council. He served as executive assistant to Montana Governors Ted Schwinden and Tom Judge, and has been the director of four Montana departments: Fish, Wildlife, and Parks; Social and Rehabilitation Services; Budget and Program Planning; and Revenue.

The Council formed the Fish and Wildlife Committee to oversee the implementation of the Council's Columbia River Basin Fish and Wildlife Program, adopted last November. The committee will develop plans and goals for fish and wildlife-related research, will monitor the program's prog-

ress, and will try to improve coordination of fish and wildlife efforts by consulting with fish and wildlife agencies, Indian tribes, federal power agencies, utilities, and others affected by the program.

The other members of the Fish and Wildlife Committee are Dan Evans, Council Chairman, Washington; Al Hampson, Oregon Council member; and Larry Mills, Idaho Council member. The committee will hold regular meetings to develop research plans and review proposals, and will report to the full Council on its activities. All actions taken by the Fish and Wildlife Committee must first be approved by the full Council.

## Boardman, Trojan closed temporarily

Portland General Electric Company's coal-fired Boardman plant remained off-line as the new year began be-

cause of the slow economy and the availability of low-cost, surplus Bonneville hydropower.

A PGE spokesman said the 530-megawatt plant has been off-line since October. He added that the major reason for the surplus power is that many of BPA's large industrial customers, which normally receive that energy, are running below capacity and thus are consuming less power than had been forecast.

The spokesman said there were "no clues" when the plant might go back on, explaining, "that depends on the weather and the economy."

PGE's Trojan nuclear plant continued to operate at full power until late January when it was shut down several months early for its spring refueling. BPA told the utility in mid-January that it had so much excess hydropower that it would not need its 30 percent share of Trojan for several months.

BPA's hydropower surplus has also affected PGE's out-of-region sales. Pacific Gas and Electric, which buys Boardman power from PGE, is currently buying cheap surplus hydro instead.

## Cities and counties get in the act

Local governments should be involved at an early stage in planning programs to carry out the Northwest Power Planning Council's energy plan, Washington local officials told the Council at its December 15 meeting.

Local governments, said Lynn Carmichael, mayor of Yakima, Washington, and chairman of the Association of Washington Cities' energy committee, envision playing a strong role in implementing the plan, including enforcing model conservation standards, developing and carrying out conservation programs, marketing conservation, and generating energy from municipal wastes and hydropower.

Carmichael, in the first comprehensive statement to the Council from a group of city and county officials, spoke on behalf of the energy committees of the AWC and the Washington State Association of Counties. The committees have been jointly reviewing



**Locals speak out:** Local governments should be more involved in Council planning, said Lynn Carmichael of the Association of Washington Cities.

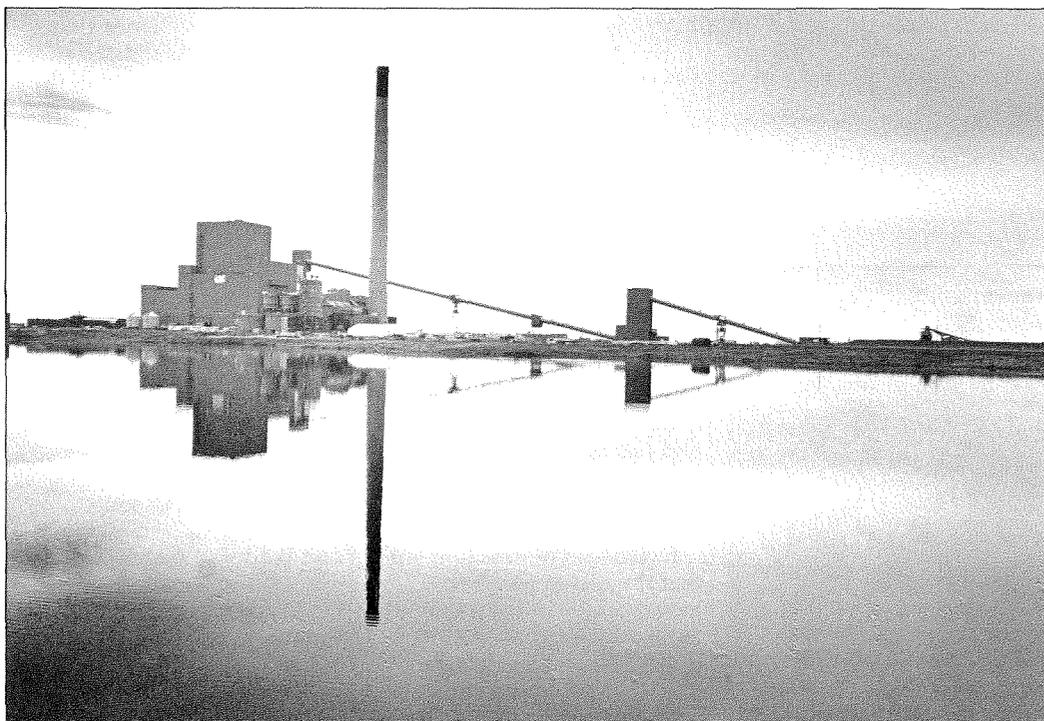
the Council's issues and decisions.

The two associations also requested that local governments be given full funding for the costs of enforcing model standards and that programs be established for conservation in the government sector.

The Washington committees aren't the only local officials to have contributed to the Council's efforts to develop a regional power plan. Comments have been provided to the Council by individual units of government, notably Portland, Seattle, and Tacoma, and local officials serve on the Council's various advisory committees.

The passage of the Northwest Power Act called for an expanded role in energy management for the Northwest's local governments. The Act requires the Council to encourage the participation of local governments "in the preparation, adoption, and implementation of the regional energy plan." The Council is also required to consult with local governments in the development of the model conservation standards.

The Act directs BPA to make maximum use of utilities and local entities to deliver conservation to consumers. BPA is also required to aid local gov-



**Slow times:** The regional energy surplus has forced the closing of several power plants, including Portland General Electric's Boardman coal plant.

ernments in implementing the Council's model conservation standards. Under the Act, BPA can provide local governments financial and technical assistance to encourage conservation; conduct demonstration projects on conservation measures and renewable resources; and provide grant and loan programs to consumers for weatherization, waste energy recovery, and increased system efficiency.

The Council and the four state associations of cities and counties are working together to inform and involve local governments in the development and implementation of the regional energy plan. The Council's local government liaison, Jim Nybo, is working with the state committees of city and county officials to help them understand and evaluate local government's role in the plan.

Those interested in how the Act may affect local governments can write the Council for a copy of "Local Government and the Northwest Power Act," a brief paper prepared by Council staff. They can also contact Mr. Nybo at the Council offices or call the associations of cities and counties in any of the four Northwest states.

## Comments hit conservation targets

The Northwest Power Planning Council's targets for potential conservation savings have been the focus of a wide variety of comments.

Penetration rates, the funding of conservation programs, local government involvement, and conservation marketing were key concerns.

Jacob Fey, Tacoma's energy conservation coordinator, urged full regional financing of conservation measures because "it is unlikely that many consumers in Tacoma or in the Pacific Northwest will have the money to pay even part of the

energy conservation investments." Fey said he agreed with the Council staff proposal to limit free financing to consumers who agree to implement all cost-effective measures.

"We believe," he said, "that some level of commitment should be required from the consumer."

Fey also called for private sector and local government involvement in establishing programs to perform energy audits, suggest conservation measures, and make certain they are properly carried out. He said the region should cover the costs of state and local governments for code enforcement, builder education programs, and the adoption of model conservation standards for new residential structures.

Lynn Carmichael, mayor of Yakima and chair of the Association of Washington Cities' Energy Committee, proposed that other fuels — oil and natural gas — be included in the Council's model conservation standards for new buildings. She said that separate building codes for different fuels would be difficult to administer and enforce and "we'll get more people on the bandwagon if we're not just talking about electrical energy, but we're talking about all fuels."

Council Chairman Dan

Evans pointed out that the Act did not give the Council authority over the other fuels.

Gary Swofford, director of conservation and division services for Puget Power, called the Council's conservation targets too high. He said the conservation plan should be based "on the experiences we have to date which we feel is the maximum potential." Although Puget does not offer full financing, it does have various financing programs which have been in effect since 1978. Swofford said space heating demands have been reduced by an average of only 25 percent.

Jean Reeder, manager of the Energy Conservation Program for the Eugene Water and Electric Board, reported that EWEB's experience has been that "most consumers who have had energy audits completed and do not go ahead with weatherization say it's because they lack the money, there is not enough time, or it's too confusing."

Portland City Commissioner Mike Lindberg said that surveys of the five-year-old Portland conservation effort indicate that 42 percent say they have fully weatherized their homes and 85 percent say they have done some weatherization work.

"If we had full financing,"

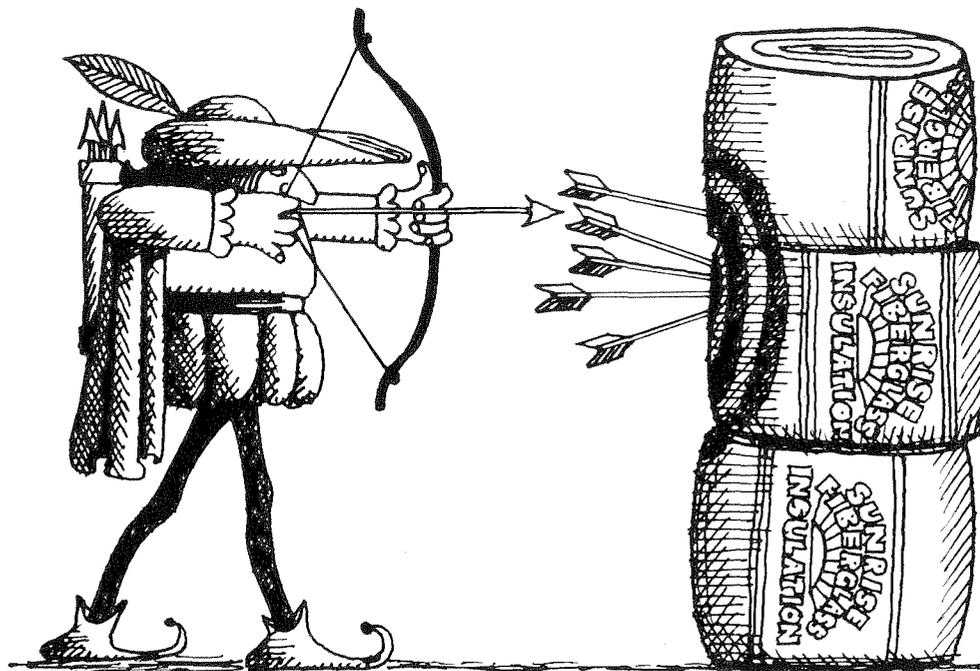
he added, "we could reach targets of 90 percent or more."

Lindberg called for "sophisticated and persuasive ways to market conservation" such as neighborhood-based organizations which actually go out to promote conservation on a block-to-block basis. He said a pilot program soon will be launched in Portland and will be particularly directed at low-income families.

"We have organized around 700 blocks in the city where there is a block leader," Lindberg reported. "My feeling is that if we can do it in crime prevention there's no reason why we can't do it in energy."

Spokesmen for the National Council for Adequate Electricity cautioned the Council "to not over-rely on a resource such as conservation which is not physically and steadily available." An NCAE statement questioned the full funding of conservation measures to meet building standards: "Some of these programs are laudable; others, as has been pointed out by PNUCC and the region's homebuilders, perhaps do not necessitate such a commitment of revenue."

Robert Greening, manager of the Public Power Council, said in a written statement that the PPC supported the



**Targeting conservation:** Different interests have taken aim at Council's conservation goals.

Council's effort "to plan for the maximum achievable conservation."

"Your staff's proposal for 85 to 90 percent penetration rates for conservation programs implemented over the next 15 years is higher than we have yet achieved with our own programs," Greening said. But the high rates "will provide an aggressive planning basis for the region." Greening cautioned that the targets should be "reviewed periodically and adjusted in accordance with actual experience."

"The PPC cannot second guess a Council decision to include high conservation penetration rates in the initial Plan," Greening added. "We stand ready to use our best efforts to meet the Plan's conservation targets."

Bonneville Power Administration staff worked for several weeks with Council staff to resolve large differences in conservation savings estimates between BPA and Council staff. By the end of December, BPA estimates had risen from 2700 to 4050 megawatts, while Council estimates had dropped from 6100 to 4800.

Sue Hickey, director of BPA's division of planning and evaluation, said at the Council's December 28 meeting that the remaining difference was small enough "to make me more comfortable with the tools we're using."

The major remaining differences include:

*New space heat.* Council estimate is 920 MW; BPA's is 625, primarily due to differences in heat loss methodology.

*Residential water heat.* Council estimate is 890 MW; BPA estimate is 725 MW, due to different estimates for savings from water heater wraps and other conservation measures.

*Commercial buildings.* Council total for savings from both existing and new commercial buildings is 1155 MW; BPA estimate is 854 MW. Work has been done by contractors to estimate conservation potential in offices, retail stores, universities, schools, hotels and motels, which together make up 70 percent of the commercial floor space. The Council and BPA dealt differently with the remaining 30 percent of floor space, which includes health care facilities,

warehouses, restaurants, groceries, and other uses.

Council staff did phone surveys and other work to estimate the potential in these types of buildings. BPA staff concluded that they would not estimate any savings for these buildings until after they had seen the results of more extensive work.

*Agriculture.* BPA's estimates in the agricultural sector are 105 MW lower than the Council's estimates (275 vs. 380 MW). BPA reduced the savings estimates, said Steve Wright, BPA public utility specialist, "primarily because we know so little."

BPA and the Council both estimated 475 MW savings in the industrial sector. BPA-Council differences were small in existing space heat (550 vs. 475 MW) and in other appliances (550 vs. 505 MW).

The Council's conservation targets are described beginning on page 18.

## BPA to hold electric motors workshop

The Bonneville Power Administration is sponsoring a workshop on energy-efficient electric motors and motor controllers February 23 at the Lloyd Center Red Lion in Portland.

The workshop will offer an overview of energy-efficient motors and controllers, including operating and maintenance factors. Pumping, blowing, and conveying motors will be covered.

Case studies from Northwest industrial plants will illustrate approaches to common problems. A discussion of regional and industrial power economics will include both simple payback calculations and more complex analysis.

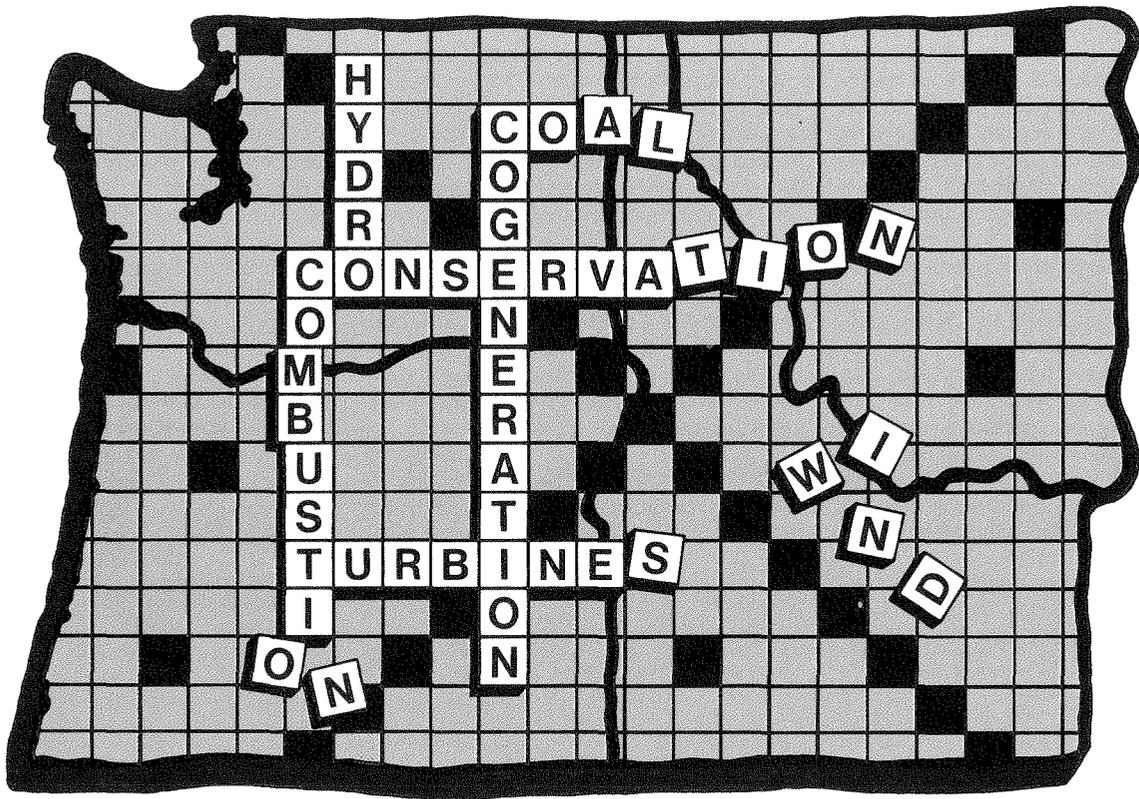
The workshop is designed for plant managers and engineers. It may also be useful to utility staffs, vendors, consulting engineers, and others responsible for making technical and investment decisions in motor selection and use.

Co-sponsors of the program are the Northwest Pulp and Paper Association, Northwest Food Processors Association, Industrial Customers of Northwest Utilities, and the Institute of Electrical and Electronics Engineers.

For more information, contact Mary Lawrence at BPA at (503) 230-5488 in Portland. Outside Portland, call 1-800-452-8429 in Oregon or 1-800-547-6048 in other western states.



**Commercial savings:** Council targets estimate 1155 megawatts of savings in groceries, hotels, restaurants, retail stores, and other commercial uses.



## Pieces to a Power Puzzle

*Council resource portfolio seeks best power mix for region's energy future*

**T**he rules are in the Northwest Power Act. The strategy can be summed up in one word: flexibility. The pieces that fit together for the winning score are the resources chosen to provide a reliable power supply at the lowest possible price. But it's more serious than Scrabble.

The Northwest Power Planning Council's resource portfolio unveiled January 7 in Portland might be seen as a strategy for choosing the right words (resources), fitting them together in the right way (cheapest first) to build up the right score (reliable power supply).

Flexibility is the key to winning. Just as the successful Scrabble player fits the tiles to the conditions on the board, the Council plans to fit its resource mix to the conditions of the region's economy.

"Conservation," "hydropower," "cogeneration," "combustion turbines," and "coal" are combined in the portfolio's strategy to supply power to a strong economy for the next 20 years. But, if the rate of

regional economic activity is slower, and the consequent demand for power less, the Council's flexible strategy allows a different "fit" of the resources across the regional board.

The rules were laid down by Congress when it passed the Northwest Power Act in 1980. It said the Council must adopt a regional electric power and conservation plan to provide a cost-effective, reliable supply of power for a 20-year period. To supply this power, said Congress, the plan must employ, in order of priority, conservation, renewable resources, high-efficiency resources (like cogeneration) and, last, conventional or thermal resources.

For now, as the Act envisioned, conservation programs and new hydroelectric dams form the foundation for the Council's plan to supply new electricity during the 1980s. Industrial cogeneration, natural gas-fired combustion turbines and coal-fired steam plants complete the resource mix arranged by the Council to supply larger amounts of power if, and

when, the Northwest economy regains its vigor.

The total portfolio is designed to meet even the highest possible rate of growth in the demand for power, 2.9 percent, for the next 20 years. And while Council analysis indicates there is little chance this high growth scenario will actually occur, the proposed portfolio would satisfy such demand by producing a projected total of 11,290 megawatts. Briefly, each resource could generate the following power:

1. Conservation — 5,300 MW;
2. Hydroelectric — 1,236 MW;
3. Industrial cogeneration — 500 MW;
4. Combustion turbines — 1,050 MW; and
5. Coal plants — 3,204 MW.

(For a profile on the characteristics of each proposed resource, turn to page 18.)

The resource mix is the result of a 1½ year planning effort by the Council, its staff and consultants in coordination with the Bonneville Power Administration, Northwest utilities, businesses, civic and

citizens' groups. This work is not unlike dealing with the kind of tough, tricky conditions found on the Scrabble board. However, the conditions facing the Council and the region contain an added twist. Unlike the conditions of the Scrabble board when the conditions are static, the power needs of the region change over time. So the solutions must be adjusted to satisfy the changing conditions. This element of uncertainty, though it can be narrowed somewhat, requires a measure of flexibility. Therefore, the Council built its portfolio upon the theme of flexibility so that its resources could be changed to meet changing conditions.

The full-blown electric energy plan containing the portfolio will usher in a new era of regional power planning and development. Formal adoption of the plan will occur April 28. And it will embrace the notion that the electric energy future we see today will not necessarily be the reality

of tomorrow. This built-in flexibility the Council believes will be the key to providing tomorrow's power in the cheapest way.

Recognizing that forecasting future demand for power is, at best, imprecise, the Council's resource portfolio fits a mix of resources together so they can be deployed, incrementally, to satisfy the pace of growth as it emerges. If demand for power picks up, depleting the current surplus, then the right set of resources can be deployed to satisfy the developing need for new power, be it slight, moderate, or strong. If in the Council's plan, then the resources may be acquired by the Bonneville Power Administration, the federal agency charged with carrying out the elements of the plan.

### Resource options

Under the adopted resource portfolio, BPA would be able to meet any one of the

four projected growth scenarios by employing another Council planning innovation: resource options. The options concept introduces a new element of flexibility into the business of supplying power to the region.

Certain generating resources like coal and nuclear power plants require long lead times for planning, and they require large amounts of capital during their planning phases. Options offer a device for shortening the lead time and shrinking the up-front financial commitment for coal and nuclear plants, should they be perceived as needed to meet a high rate of load growth.

For example, if by the mid-1980s the region's demand for power began to grow rapidly, Bonneville could purchase an option to acquire a resource, without actually acquiring it. Through this purchase agreement with a sponsor, say a utility, BPA would pay for planning costs, licens-

# Comparing resource costs

How do you compare the costs of different energy resources? How do you determine whether a conservation program is cheaper than a coal plant, or whether one hydro project is cheaper than another?

To help in comparing resource costs, power planners convert the costs of each resource to a common basis. A common method of conversion is called "levelizing costs."

The costs of conservation and other energy resources vary over time. For a power plant, the highest costs are during construction of the plant. After the plant comes on line, its primary costs are for operation and maintenance (including fuel, employees, equipment servicing and repair) and to pay off the construction debt (see figure 1).

Levelizing takes these costs and, through a series of steps, converts them to an equal annual payment for each year of the resource's life (see figure 2).

Dividing this annual payment by the resource's output gives a levelized cost per kilowatt-hour which can be directly compared with other resources' costs.

Comparing levelized costs is only the first step in making judgments about different resources. The energy planner then must consider other factors such as how reliable the resource is, how well it will fit with other resources in the power system, and how much lead time is required.

There are several steps to the process of levelizing costs.

1. Calculate the actual costs for the resource over its life: construction costs, debt payments, fuel costs, maintenance costs, etc.

2. Convert these costs from "nominal" dollars to "real" dollars. Inflation changes the value of money over time: a dollar now buys much less than a dollar bought in 1930. "Nominal" or "current" dollars include inflation; they are the actual money you spend at the time that you spend it.

"Real" or "constant" dollars do not include inflation. One year is chosen (the Council uses 1980 dollars) and all costs are converted to that year's dollars.

Figure 1. Timing of expenditures

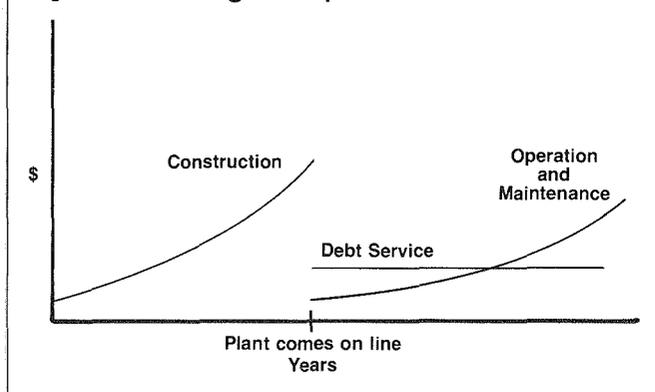
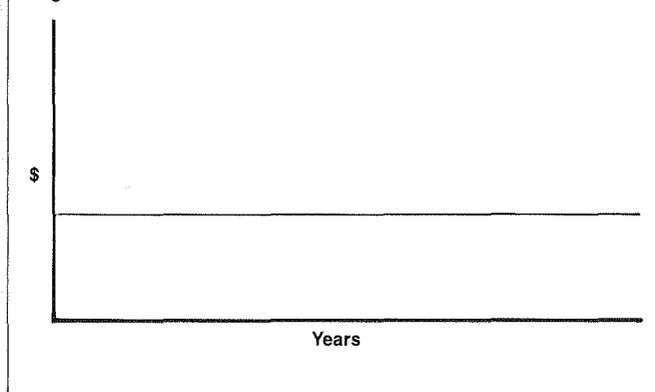


Figure 2. Levelized costs



ing fees (if any), and other charges up to the point of actual construction or implementation. This would reduce the risk to a project sponsor and the region by paying for preliminary but not actual construction costs.

And the option would buy time to watch regional power demand to see if it remained high. If so, the BPA could go ahead and acquire the resource to supply power. But if demand slackened off, the resource would not be bought. The option would not be exercised. The money spent would be limited to the planning phases only.

For capital-intensive resources like nuclear and coal plants, options afford a kind of power planning flexibility largely unknown in the past. And the options concept forces close examination of alternatives. Nuclear plants, for example, need longer lead times and more capital investment in the planning phases than do

coal plants. This affects decision schedules for exercising options for these two resources.

The Council foresees five types of purchased options:

1. Financing a resource through the design, siting and licensing stages to the point of actual construction. This "site-banking" concept requires relatively small amounts of money in return for delaying a decision to actually build a resource until such time as the need for it becomes clear. Thus, the high construction costs are not incurred unless necessary, but the resource is ready to go if needed.

2. Buying a resource before it is needed in the region, selling off the power it produces with a "callback" provision so the power can be used in the region when it is needed here.

3. Financing demonstration projects to verify the cost and results of a resource, typically a conservation program, then

deploying if and when it is needed.

4. Buying the power from existing resources to meet short-term electricity needs, as in purchasing the production of a combustion turbine to help meet the winter peak demand.

5. Surcharges for low-water years so consumers will receive immediate cost signals to curtail electricity use and utilities can recover the funds needed to buy power outside the region to supplant the power "lost" from low hydroelectric production.

The idea of resource options amends a long-established axiom of the electric power industry: that it is better to overbuild generating resources than to underbuild them and fall short of power. Through resource options, it is possible to build resources to more closely match the actual need for power, as that need emerges. And because options can be acquired for all types of resources, they en-

Costs are converted from nominal dollars to real dollars so that actual differences in cost can be more easily compared. For example, suppose that the Council's plan called for a 5-megawatt hydroelectric project to come on line in 1986. Projects A and B can be built by 1986. Project A is estimated to cost \$15 million in 1986 dollars. Project B is estimated to cost \$11 million in 1980 dollars. To compare the two projects' costs, you must convert their costs to the same year's dollars. If the cost of Project A is deflated to 1980 dollars, assuming a 7 percent inflation rate, its cost is \$10 million. So Project A is really cheaper than Project B.

Levelized costs can be calculated in either real or nominal dollars. The Council calculates levelized costs in 1980 dollars. If calculated in nominal dollars, resource costs would not be adjusted for inflation.

3. Calculate the present value of the resource costs. The concept of "present value" assumes that *when* you have money is important. \$1,000 is worth more now than a year from now because you can use the money for other things during that year. You could, for example, earn interest on the money by depositing it in a savings account.

The present value calculation "discounts" money spent each year in the future to come up with a value of that money in the present. The farther it is in the future, the less the money is worth today, and the smaller the present value.

For example, if \$10 is discounted at 10 percent a year for 15 years, its present value is \$2.39. If discounted at 3 percent for 15 years, its present value is \$6.42 (see figure 3.).

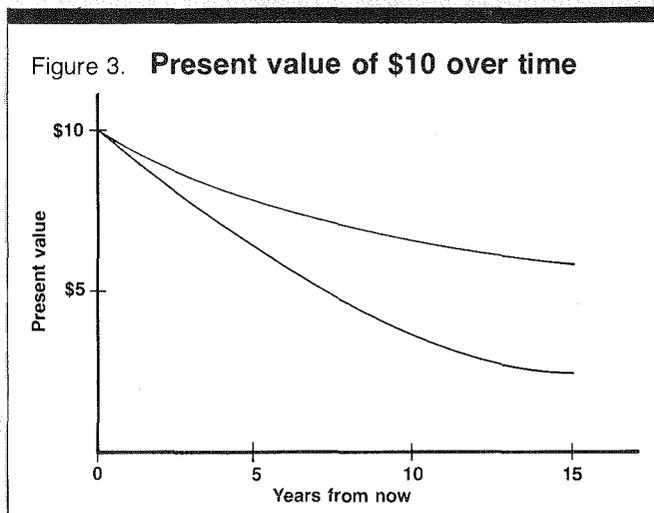
The Council uses a 3 percent real discount rate since the Council's resource costs are calculated in real (inflation-adjusted) dollars. If calculated in nominal dollars, a discount rate of 10 percent may be more appropriate.

4. Calculate the levelized cost of the present value. The resource's levelized cost is calculated using the present value of the resource's direct cost, the interest rate, and

the number of years of the resource's life. This results in an equal annual payment for each year of the resource's life. This annual payment is then divided by the plant's output or savings each year to get the levelized cost per kilowatt-hour.

A mortgage payment is a nominal dollar levelized cost. It is calculated using the present value of the home's cost, the interest rate on the home loan, and the period of the mortgage. This results in an equal mortgage payment for each month of the mortgage period.

The discussions of the Council's resource portfolio on pages 18 to 24 include cost estimates for the resources. These costs are levelized costs in 1980 dollars.



hance the flexibility of regional energy planners holding open a wider range of choices to generate power. Options enable the Council to meet one of its primary aims: to develop a regional electric energy plan to provide for high (if unlikely) levels of demand for power in the future, without making irrevocably large financial commitments in the present.

### Monitoring developments

Another planning innovation embodied in the Council's resource portfolio is the continual monitoring of electric energy developments by the Northwest Power Planning Council. Essentially, the Council views for itself a continuing role of analyzing and revising both its demand forecast and resource portfolio about every two years. Thus, if demand grows rapidly, it can adjust its energy plan accordingly.

Flexibility again is the key idea. The Council views the energy plan and its components as adaptable according to changing conditions. Unlike the more static, diverse planning efforts of the past, this plan is as much a process of documenting events and programs as it is en-scribing numbers on pages of paper.

As it has to date, the Council and its staff will continue to work closely with the utility, business, and citizen interests in the region to develop and maintain a dialogue focusing upon general developments and specific data that influence electric energy planning decisions.

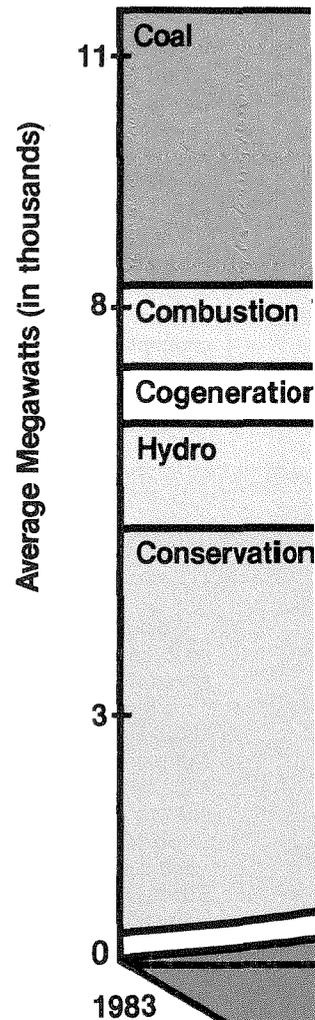
By monitoring events and by continuing to gather additional and better data, Council probably will amend its resource portfolio. It may decide to add more hydroelectric generation. Or if the studies the Council is proposing for renewable resources like solar, wind, and geothermal indicate these will be practical to develop, one or more may be inserted into an updated portfolio. New technologies like the solar cell may dramatically alter the available choices by the early 1990s, causing the Council to change its resource mix substantially.

So the conditions will change in this Scrabble game of Northwest power supply and demand. New words and different arrangements more likely than not will be needed to respond to the region's changing power requirements. If the Council's new planning approach allows the region the flexibility intended to address several possible futures, the Northwest should be able to have the electricity it needs at the cheapest available price and with a minimum of risk.

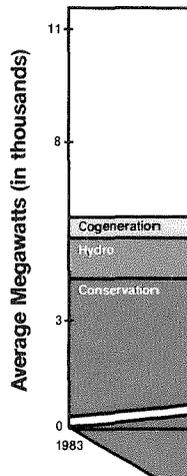
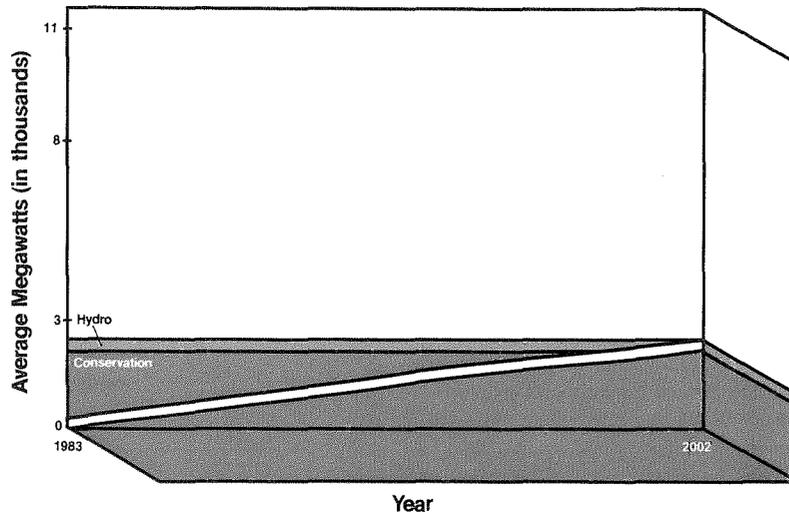
# Future resources

## Legend

20% Light Screen	Planned Option
50% Screen	Purchased Option
70% Screen	Construction
100% Screen	Generation

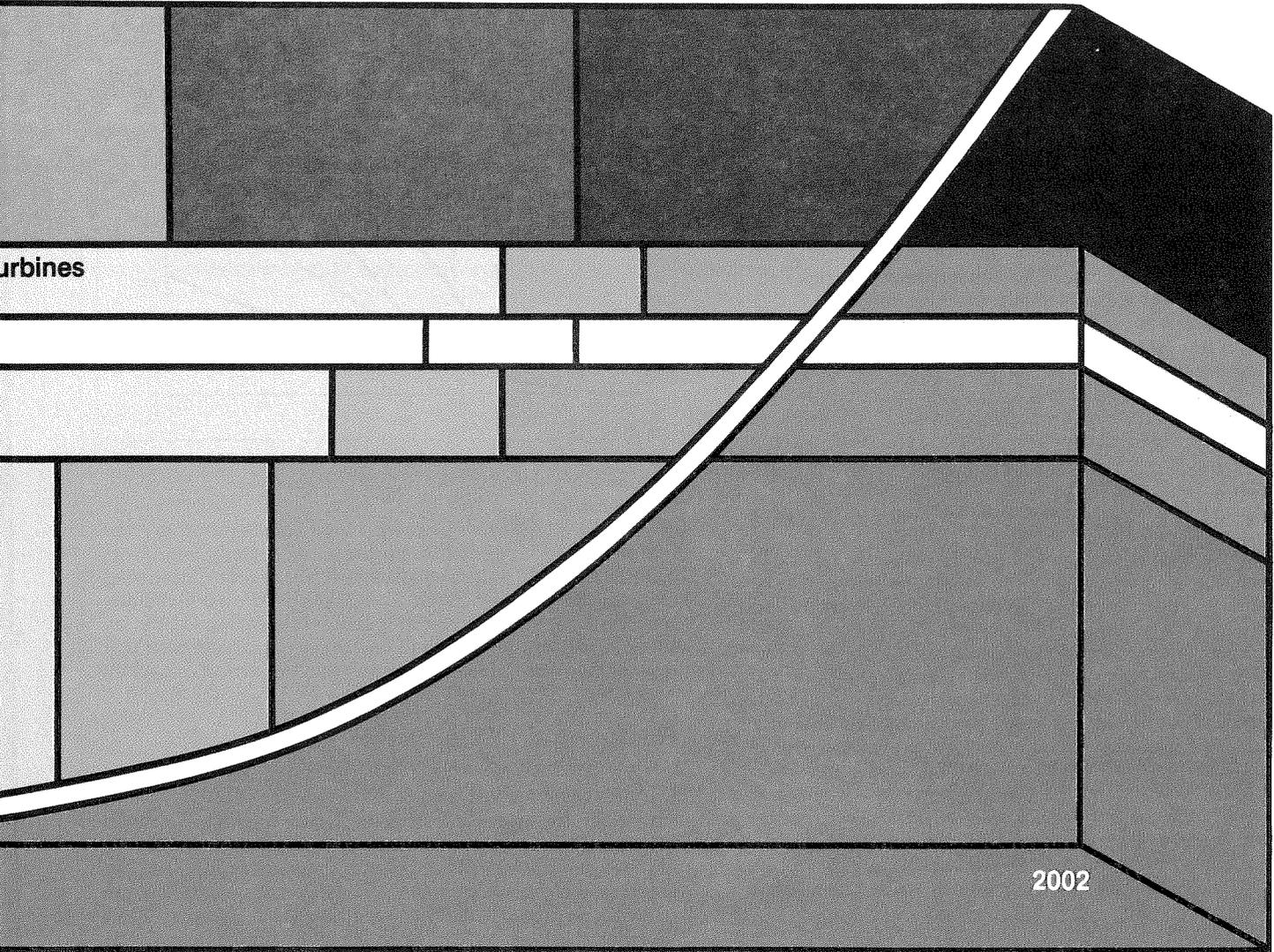


## Low Forecast



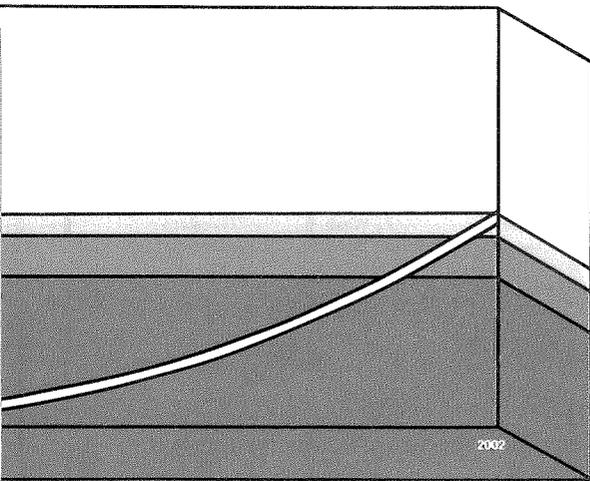
# to 2002

## High Forecast



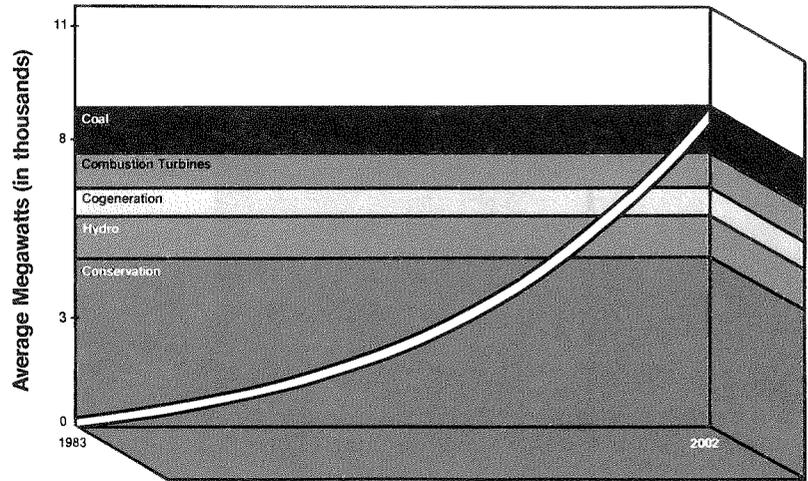
Year

## Medium-Low Forecast



Year

## Medium-High Forecast



Year

# Conservation

**NEED:** All growth scenarios  
**COST:** 1.8¢/kwh  
**TIMING:** 1983 staged through 2002  
**POWER:** 5,300 megawatts

Conservation, or energy efficiency, forms the foundation of the Council's resource portfolio. In the high load growth case, conservation could produce up to 5,300 megawatts of electricity.

Since the amount of possible conservation is directly related to the amount of energy used, the savings decrease in the other load forecasts: 4,600 megawatts in the medium-high case, 4,100 megawatts in the medium-low case, and 2,100 megawatts in the low case. The conservation savings estimates for each sector are based on the high forecast.

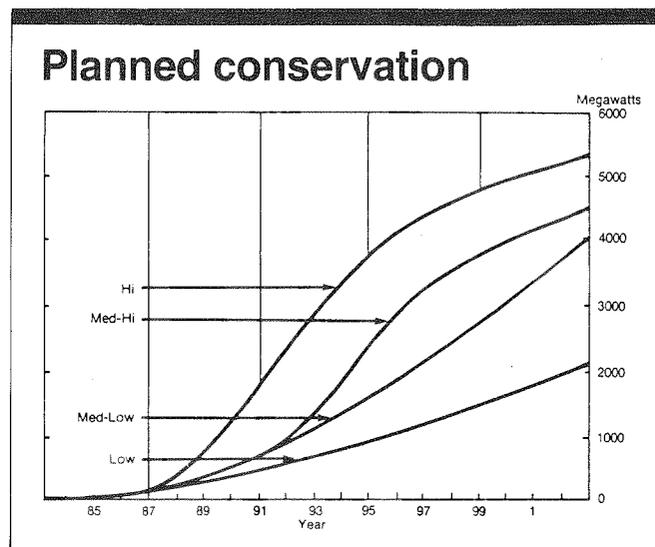
Conservation has many positive characteristics. As a new resource, it represents some of the cheapest power available, averaging about 1.8 cents per kilowatt-hour. It can be developed in small amounts and "ramped in" (developed) incrementally, according to the power demand. Most important, conservation can inexpensively extend the region's abundant and cheap federal hydropower. By making more efficient use of existing power, conservation holds down consumer costs and offsets the need to develop new, more expensive sources of power.

In contrast to large-scale power plants, conservation is also relatively free of financial risk and generates power almost immediately. The pace of implementation of conservation programs can be tailored to fit energy needs. But some efficiency improvements need to start immediately — even given the present energy surplus — to avoid losing the potential savings altogether or having to get them later at a higher cost. For example, energy-efficient new buildings, appliances, and manufacturing processes nail down opportunities to increase energy efficiency from the start and last for decades to come.

The series of programs the Council proposes to promote energy efficiency recognizes an important distinction: the difference between conservation's technical and economic potential and the maximum achievable conservation savings. In setting conservation targets, the Council has taken into account



**Building in savings:** New energy-efficient homes could use 60 percent less electricity and could save the region 920 megawatts by the year 2000.



costs, technical and quality control problems, and consumer resistance.

Below are highlights of the planned conservation savings and proposed conservation programs by sector. Specific actions BPA should take during the next two years to implement the programs are also listed. The Bonneville Power Administration's principal task over the next two years should be to lay the groundwork for a system to deliver conservation so that aggressive conservation programs can be carried out when needed.

## Residential

(Projected conservation: 2,785 megawatts)

### Planned conservation

In 1980, the region's residential sector consumed an estimated 5,323 average megawatts of electricity, about 34 percent of the region's total consumption. Significant residential conservation savings are possible. More efficient space heating in new homes could save 920 megawatts by the year 2000. Weatherization of existing homes could save 475 megawatts by the year 2000. More efficient water heating could save 890 megawatts, and more efficient appliances could save 500 megawatts by the year 2000. The average cost of these savings is less than 2 cents per kilowatt-hour.

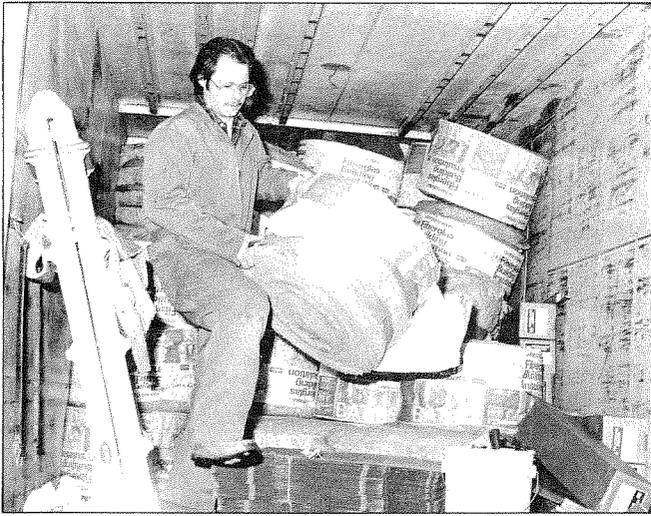
### New buildings

To ensure the construction of more energy efficient residential structures, the Council proposes the following model standards:

#### Electricity Use for Space Heat (kwh/square foot/year)

Building type	Climate Zone		
	1 (West of Cascades)	2 (E. Wash./ E. OR & Idaho)	3 (Western Montana)
Single family to 4-plex	2.0	2.6	3.2
Multifamily (5-plex and larger)	1.2	2.3	2.8

Builders would be allowed to choose alternative approaches to achieve the standards.



**Rolling up savings:** BPA would pay most, or all, of the cost of weatherizing existing homes under the Council's proposal.

### Two-year actions

By January 1, 1986, state or local governments should adopt and enforce the model standards, or prepare an alternative plan to achieve comparable savings. These standards are subject to surcharge.

During the next two years, BPA should develop and implement the following programs:

- Reimbursement to code enforcement agencies for the cost of model standards implementation and inspection.
- A consistent procedure for certifying compliance with the model standards.
- An education program for builders, code enforcement officials, and others regarding the provisions of the model standards.
- An incentive program to encourage the construction of structures which meet or exceed the Council's efficiency standards for new structures prior to January 1, 1986.
- Technical and financial assistance to the shelter industry (builders, lenders, appraisers, etc.) to implement an energy performance rating system for new and existing structures.
- An incentive program for governments adopting and enforcing model standards for new structures prior to January 1, 1986.
- A demonstration project of homes built to the model standard in order to gather data on energy use and air infiltration.

### New appliances

To encourage the purchase of appliances which are energy efficient, incentives would be offered to dealers and/or customers based on the amount of energy saved by the appliance. Incentives would also be offered to encourage retirement of older, inefficient refrigerators and freezers.

### Two-year actions

During the next two years, BPA, in consultation with the Council, should undertake demonstration programs to test the results of offering financial incentives to encourage the sale and installation of energy-efficient appliances. BPA should also test the effect of energy-efficient appliances on space heating requirements of fully weatherized new and existing residences.

### Existing buildings

To improve the efficiency of energy use in existing electrically heated homes, the Council has proposed a retrofit weatherization program. The program would require, as a

condition for payment, the installation of all conservation measures that are cost-effective to the region. The program would pay 100 percent of the cost of these measures for renters and for homeowners with incomes below \$16,000 a year. For other homeowners, BPA would pay the amount necessary to achieve the conservation targets set by the Council.

The program would allow private contractors to solicit a consumer's business directly, without going through the local utility. However, payment would not be made without an inspection by the utility. It would permit private contractors to contract directly with a utility to weatherize rental property, with approval of the property owners. Energy-efficient rental units would be certified. Utilities, local governments, and others would be encouraged to market residential conservation savings directly to BPA.

### Two-year actions

During the next two years, BPA, in consultation with the Council, should undertake a demonstration program which tests the results of contracting directly with private energy services firms to secure residential conservation. BPA should also modify its existing residential programs to incorporate the features above, and should acquire 110 megawatts of residential space and water heater savings by January 1, 1986.

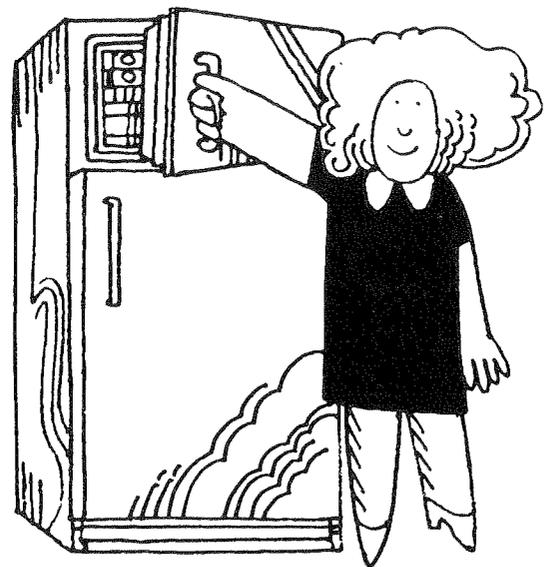
### Conversion standards

To ensure that buildings converted to electric space heating from other fuels meet minimum energy efficiency requirements, the Council proposes model standards for conversion of residential and commercial buildings to electric heating. These standards are subject to surcharge.

### Two-year actions

By January 1, 1986, state and local governments, or utilities where legally authorized, should adopt and enforce the Council's efficiency standard for conversion to electric space heating, or prepare an alternative plan for achieving comparable savings.

During the next two years, BPA, in consultation with the Council, should provide financial and technical support to state and local governments and/or utilities which implement the Council's model efficiency standard for conversion to electric space heat prior to January 1, 1986.



**Cool juice:** The region could generate 500 megawatts of savings by the year 2000 through more energy-efficient appliances.

## Commercial

(Projected conservation: 1,180 megawatts)

### Planned conservation

In 1980, the commercial sector accounted for about 17 percent of BPA's firm sales, or 2,713 megawatts. The Council proposes programs targeted to conserve 1,180 megawatts of power by the year 2000 — 700 megawatts through upgrading existing structures and 480 megawatts through building more energy-efficient new structures.

### New buildings

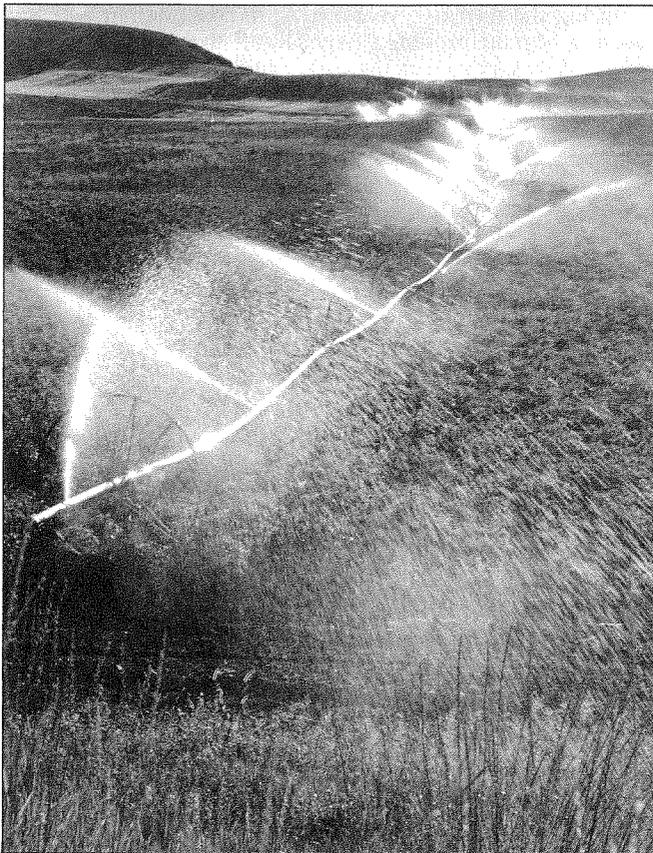
Model design and construction standards would be required for all new non-residential structures. These standards would be based, with changes in the lighting budget, on the most recent model energy code of the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE 90-80). This standard is subject to surcharge.

### Two-year actions

By January 1, 1986, state and/or local governments should adopt and enforce the Council's model standard for new structures or prepare an alternative plan for achieving comparable savings.

During the next two years, BPA, in consultation with the Council, should develop and implement the following programs:

- Reimbursement to code enforcement agencies for cost of model standards implementation and inspection.
- A consistent procedure for certifying compliance with the Council's model standards.
- An education program regarding the provisions of the Council's model standards for builders, architects, designers, code officials and lending institutions.
- An incentive program to encourage new structures to be built to the standards prior to January 1, 1986.



**Sprinkler savings:** More efficient irrigation could save energy for the region and dollars for the farmer.

- An incentive program for governments adopting and enforcing model standards prior to January 1, 1986.
- A demonstration project of buildings built to the model standard.

### Existing buildings

To improve the efficiency of energy use in existing commercial buildings, a program is proposed which includes audits of potential building energy savings in all fuels, payments based on a set amount per kilowatt-hour of electricity saved, and reimbursement for auditing costs when audits result in electricity savings. Private contractors would be encouraged to market commercial electricity savings to utilities.

### Two-year actions

During the next two years, BPA, in consultation with the Council, should initiate a region-wide commercial conservation energy "buy back" program. This program should acquire at least 40 megawatts of energy by January 1, 1986.

### Conservation options

To develop a resource option for conservation savings greater than those required by the proposed non-residential model standard, a program is proposed which offers financial incentives for the design and construction of energy-efficient commercial buildings, and technical and financial assistance to local governments to adopt model standards stricter than the Council's. Payments for energy savings should be "fuel blind." The savings from this program are not included in the resource portfolio.

### Two-year actions

During the next two years, BPA, in consultation with the Council, should offer financial incentives for construction of energy-efficient commercial buildings, and offer financial and technical assistance to local governments to develop and adopt standards that exceed the Council's.

## Irrigated Agriculture

(Projected conservation: 385 megawatts)

### Planned conservation

In 1980, irrigation in the region consumed 770 megawatts of power, about 5 percent of the region's total consumption. The projected conservation savings for irrigated agriculture are 385 megawatts in the year 2000.

### Programs

To improve energy efficiency in irrigated agriculture, a program is proposed in which BPA or a local utility would solicit irrigation conservation projects and offer a set payment per kilowatt-hour for energy savings. BPA would also offer financial assistance to lending institutions which provide below market-rate capital to farmers to install energy efficient irrigation systems.

### Two-year actions

During the next two years, BPA, in consultation with the Council, should:

- Initiate an irrigation "buy back" program which acquires at least 28 megawatts of irrigation conservation by January 1, 1986.
- Initiate a demonstration project to assess the feasibility and cost of achieving irrigation conservation by working through agricultural lending institutions.
- Initiate a request for commercial demonstrations of irrigation system efficiency improvements.

## Industrial

(Projected conservation: 510 megawatts)

### Planned Conservation

In 1980, the region's industries buying power from utilities consumed 3,670 megawatts. BPA's direct service industrial

customers used 3,155 megawatts, of which 2,600 was firm load. Working, tentative estimates suggest this sector could generate about 510 megawatts of conservation power by 2000.

### Programs

To improve the efficiency of energy use in industry, a program is proposed in which BPA or utilities would solicit industrial sector conservation projects. Payments for energy savings would be set at a certain level, regardless of the measures installed. Technical and financial assistance would be provided to industrial customers who request help in preparing a response to a request for industrial conservation projects.

### Two-year actions

During the next two years, BPA, in consultation with the Council, should:

- Initiate a regionwide industrial sector "buy back" program which purchases at least 16 megawatts of savings.
- Initiate an industrial sector technical and financial assistance program to aid industrial customers in preparing a response to a request for industrial conservation projects.
- Conduct, with regional industry, a survey to identify

industrial conservation potential above the 510 megawatts estimated by the Council.

### State and local governments

To assist local governments in identifying and preparing energy conservation plans and projects, a program is proposed which would provide technical and financial assistance to local governments to begin conservation projects in government facilities and to revise ordinances which affect energy use. Local governments would also be reimbursed for added costs in carrying out the Council's plan.

### Two-year actions

During the next two years, BPA, in consultation with the Council, should initiate a program which provides technical and financial assistance to governments to implement the Council's plan, and should initiate an assessment of energy conservation potential in government owned or operated facilities, exclusive of buildings.

## Exploring the renewable future

Renewable energy resources, wind, geothermal, solar, and biomass, were regarded as too expensive and commercially unavailable at present for inclusion in the Council's 1982 resource portfolio. But the potential of solar, wind, and geothermal energy is huge. And as their economics improve and advances are made in each technology, the likelihood of one or more being included in a later resource portfolio will increase.

Below are summaries of the Council's findings with respect to these resources.

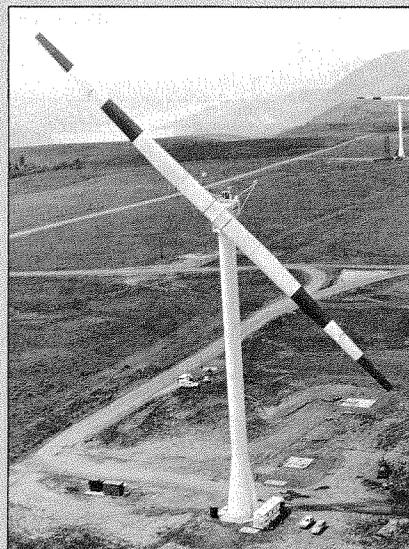
**WIND:** Electricity generated by wind offers a potential of 2,200 megawatts by the year 2000. Too expensive to construct at current production costs, wind machines could become more practical if a market for them grows. Uncertainties exist about the cost and performance of wind turbines.

During the next two years, BPA in consultation with the Council, should conduct a study of the cost-effectiveness and operating experiences of existing wind demonstration projects. The Council is interested in the possibility of including 50 megawatts of wind energy in the next revision of the plan.

**GEOTHERMAL:** A large geothermal potential exists in the region. High-temperature geothermal resources could generate over 2,000 megawatts of electricity, and intermediate-temperature resources could replace 716 megawatts of electricity for district heating. Potential also exists for

greater use of low- and intermediate-temperature geothermal resources. More information is needed on temperature, chemical makeup, and size of promising geothermal reservoirs.

During the next two years, BPA, in consultation with the Council, should



**Wind power:** The potential is huge if problems of cost and reliability can be solved.

establish and post a price for electricity generated from geothermal sites and should develop a geothermal demonstration project that guarantees the purchase of electricity from the first 10 megawatts generated at a promising geothermal site within the region. The purchase price should be tied to the cost of a new coal plant. The Council may include this project in the next revision of the plan.

**SOLAR:** Although currently too expensive to compete with other resources, solar electric technology is viewed as offering great potential in the medium to long term. Technical breakthroughs may occur in central station receivers and photovoltaic cells. Passive solar design techniques and solar water heating systems are included in the Council's recommended conservation programs. The Council and BPA will monitor developments in solar technology. BPA should work to improve the data base on solar in the region, both broadly and at specific sites.

**BIOMASS:** Compared with the potential of other alternative resources, new electricity from non-industrial uses of biomass is much smaller, estimated at only 380 megawatts. The Council has included 400 megawatts of cogeneration, or industrial use of biomass, in its resource portfolio. Non-industrial biomass is presently more expensive than competing fuels. Planning for biomass generating plants is apparently risky, as evidenced by the recent cancellation of the proposed Oregon City municipal solid waste project.

# New hydroelectric generation

**NEED:** All growth scenarios  
**COST:** 1-5¢/kwh  
**TIMING:** 1985 staged through 1995  
**POWER:** 1,236 megawatts

For planning purposes, the Council selected a target of 1,236 megawatts of power from new hydroelectric sites throughout the region.

Studies have produced varying results describing the potential of hydroelectric potential in the Northwest. A consultant for the Pacific Northwest Utilities Conference Committee (PNUCC), CH<sup>2</sup>M Hill, concluded that only 450 megawatts could be obtained from new hydro generation. (This study, however, began by removing from its list a number of projects totaling about 500 megawatts). But a PNUCC Hydro Resources Committee estimated that 4,356 megawatts of new hydropower could be developed at a cost of 3 cents per kilowatt-hour or less.

The figure chosen by the Council represented an average that was in line with estimates of new hydro potential by Battelle (1,530 megawatts) and BPA (1,600 megawatts). The estimated cost of this power ranged from one to five cents per kilowatt-hour.

The Council chose an initial target of 1,500 megawatts of hydropower after assessing the cost and environmental constraints of a large number of potential sites. This target was lowered to 1,236 megawatts after looking at data on seasonal streamflows. Sites which generate most of their power from winter snows are more valuable to the hydro system than sites which peak during the spring runoff. Thus 264 megawatts of spring-peaking hydropower were removed from the Council's targets.

The 1,236 megawatts of hydropower will come on line in increments over the 20-year planning period depending on

demand for electricity. In order to develop hydropower as a viable future option, changes need to be made in regulatory processes. More study of the impacts of hydro sites on fish and wildlife is also needed.

## Two-year actions

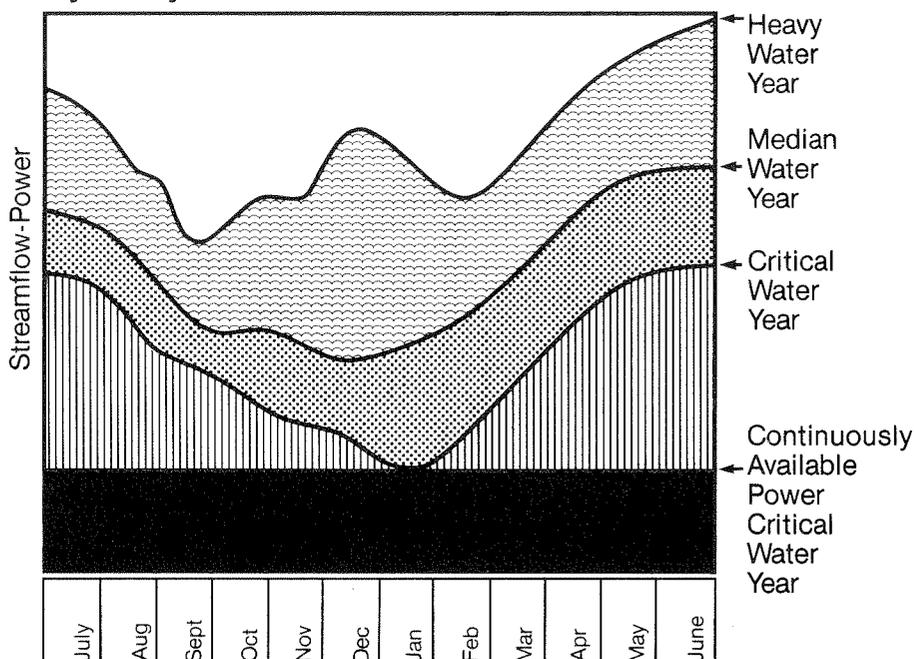
BPA, in consultation with the Council, should:

- Coordinate and fund a 12-month study by fish and wildlife agencies, Indian tribes, and resource sponsors to identify and rank potential hydropower sites according to their likely impact on fish and wildlife populations and habitat and the possibilities for reducing these impacts.
- Acquire hydropower development under construction, as needed, if it is cost-effective and consistent with this plan.
- Prepare a list of options available for hydropower development and make recommendations concerning those resources for which BPA would like to initiate an option. The Council's portfolio would require options on approximately 198 megawatts by 1984 to meet loads in 1998.
- Fund the preparation of a guidebook for hydropower development in the Pacific Northwest. The guidebook should outline the fish and wildlife problems likely to be encountered, alternative solutions to those problems, and their estimated costs. It should also contain, to the extent practicable, standard criteria for fish ladders, intake fish screens, and diversion structure placement design. The guidebook should be completed by April 30, 1984.
- Cooperate with the Council in its efforts to refine the data base on existing and potential hydropower sites that are environmentally sound and cost-effective.

The amount of water available to produce hydropower varies dramatically from year to year and within each year. The rainfall and the mountain snowpack determine the amount of electricity that the dams of the Columbia River hydro system can generate. A high water year can produce as much as 6,600 megawatts more than a drought year. "Critical water" planning assumes that the hydro system will produce no more than it did during the worst conditions of the last 102 years — conditions expected about every 45 years.

Seasonal variations each year also affect the amount of power available. Winter snows melt in the spring, producing most of the hydro system's water supply. Less than half of the average snowmelt can be stored in the system's reservoirs. Excess water is either spilled or used to generate power. It cannot be saved to produce power later in the year.

### Hydro System Streamflow



# Industrial cogeneration

**NEED:** Medium low through high scenarios  
**COST:** 3.5¢ to 6.5¢/kwh  
**TIMING:** 1995 staged through 1997  
**POWER:** 500 megawatts

Industrial cogeneration, producing both electrical energy and heat for industrial processes from the same fuel source, could provide up to 500 megawatts of new electricity in the Council's projected high growth scenario. This would be in addition to the 541 megawatts of existing cogeneration already in place throughout the region. The 500 megawatts of planned cogeneration include 400 megawatts from biomass and 100 megawatts from gas, oil, or coal.

Cogeneration provides a special feature in that it tends to mirror economic activity. When business activity declines, so does the demand for power and cogenerating units can be shut down. As business activity picks up, so does the demand for electricity and the cogenerators can be brought back into service.

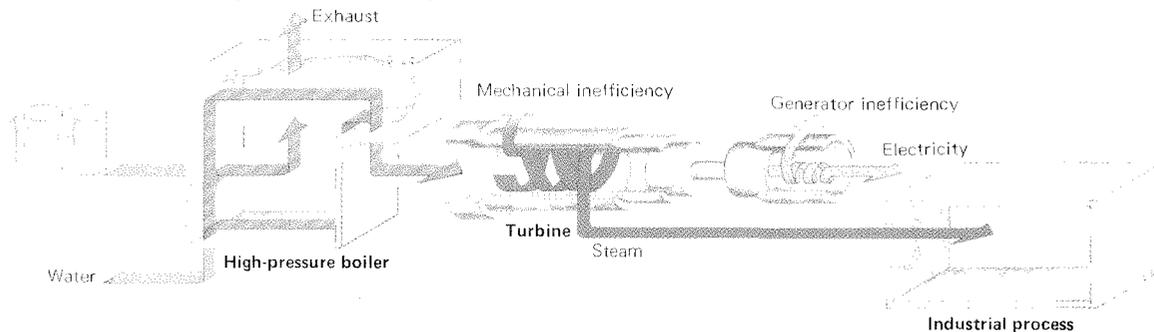
A regional cogeneration policy is needed so that the region may capture the potential of this resource. While cogeneration is not needed until 1995 in the high case, opportunities for cogeneration exist only when industrial boilers are installed or replaced. Cogenerators face difficulties in marketing electricity because of limited access to transmission lines and because cogenerators generally are not utilities.

## Two-year actions

During the next two years, BPA, in consultation with the Council, should:

- Assist potential cogenerators in gaining access to tielines to market cogenerated electricity not currently needed in the region. BPA should find ways to use the region's surplus to displace cogenerated power.
- Assist potential cogenerators in their efforts to market cogenerated electricity in the region.

## Industrial cogeneration process



# Combustion turbines

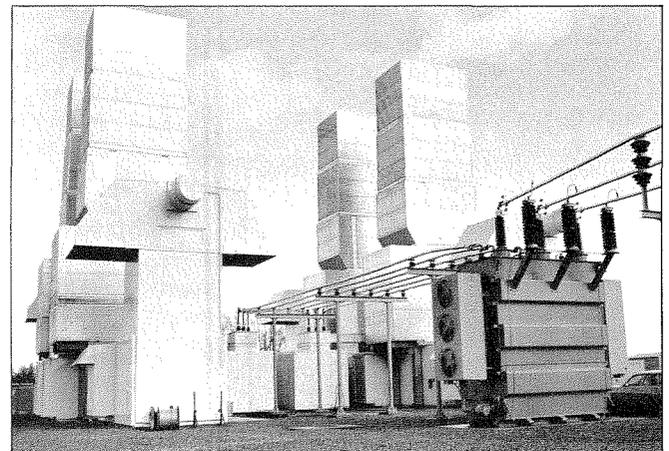
**NEED:** Only medium high and high scenarios  
**COST:** 8¢/kwh  
**TIMING:** 1995 staged through 1997  
**POWER:** 1,050 megawatts

Combustion turbines, burning either oil or natural gas, could supply up to 1,050 megawatts of power in the Council's high growth scenario.

Combustion turbines offer several positive features. They require low amounts of capital to build, can be built fast and can be built incrementally in small units. While their fuel costs are high, about 8 cents per kilowatt-hour for gas-fired turbines, they can provide a good backup to the hydro system during short periods of peak demand, such as during cold winter months when the demand for power rises dramatically.

Combustion turbines can play an important role in planning to meet future energy demand. Their construction lead time (18 months) is short compared to coal plants (48 months) and nuclear plants (128 months). Thus, a planning agency faced with uncertain future demand could wait longer to build resources by holding options on combustion turbines. If demand materialized, the turbines could be built quickly to provide power while a coal plant was being constructed. After

the coal plant was completed, the turbines could provide standby energy for future periods of rapid growth. If demand did not materialize, no new resources would be built and the region would have saved the cost of building new electricity resources.



PGE's Bethel combustion turbine unit near Salem.

# Coal plants

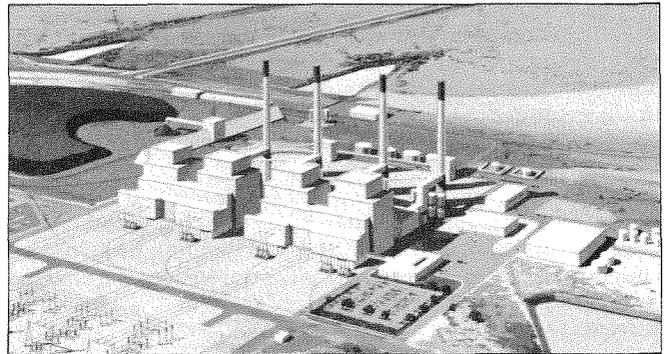
**NEED:** Only medium high and high scenarios  
**COST:** 4.0¢ to 4.7¢/kwh  
**TIMING:** 1998 staged through 2002  
**POWER:** 3,204 megawatts

According to the Council's projections, as much as 3,200 megawatts of electricity from coal-fired plants could be produced if needed. But the region would have to experience a sustained high rate of growth in energy demand, between 2.6 and 2.9 percent over the next 20 years, for the addition of new coal resources to be necessary.

Already in the region there exists 2,112 megawatts of coal power. Another 2,860 coal-fired megawatts are classified as planned or prospective. The Council's plan includes 3,200 megawatts of coal in the high case and 712 megawatts in the medium-high case.

Coal-fired generation is a well-established technology. New pollution abatement equipment has made new coal plants more costly and somewhat less reliable than earlier plants. But coal plants could provide power at a cost of 4.0 to 4.7 cents per kilowatt-hour.

The Council analyzed both coal and nuclear energy as possible additions to the regional power system if high energy demand growth occurs (see discussion below). Based on this analysis, the Council has concluded that coal is less expensive than nuclear power because it fits better with the hydro system.



Artist's conception of proposed Creston coal plant.

## How WPPSS 4, 5 stack up against coal

As the time came for the Northwest Power Planning Council to approve a proposed resource portfolio for inclusion in its draft electric energy plan, pressures mounted for including two cancelled nuclear plants among the chosen resources.

"The key question that is on many people's minds, if my phone from the past week is any indication, is the question of the Creston coal plant versus the WPPSS 4/5 plants," Council member Charles Collins told an attentive audience almost filling the Portland Hilton's Pavilion Room January 7.

"The data that we have assembled to date, the analysis that we have done, in two senses points in the direction of coal," Collins continued.

"On the basis of risk — and that's primarily a question of the size of the units — and the lead time, coal plants would be favored. And the economics," he said, "with respect to how they work with the hydro system, point in the direction of a coal plant."

The analysis the Council staff had done and presented to the Council members indicated that it takes about 13 years to plan and build a nuclear plant with a very large capital investment up front. Even WPPSS 4 and 5, cancelled last year and upon which \$2.25 billion had already been spent, would take eight years to complete.

Nuclear plants have relatively low fuel costs, with most of the cost em-

bedded in the construction of the actual plant. With the Northwest's hydro system, high water years can yield cheap surplus hydropower that can be used to back down more expensive power sources. Because about 90 percent of the cost of a nuclear plant is embedded in the facility, which is a fixed cost plugged into the rates, you save very little from shutting a reactor down.

Coal plants, on the other hand, require shorter lead times and can be built in smaller units, such as 500 megawatts, instead of 1,000 megawatt modern nuclear plants. Also, coal plants require less initial preconstruction capital (\$15-20 million for Creston). Because coal plants have about 40 percent of their total cost in fuel, substantial operating costs can be saved by simply not running the plants during high water years. Thus, coal plants have operating traits which mesh better with the hydro system.

Collins also noted the requirements the Northwest Power Act imposed on the Council as it chose resources to supply future power needs.

"We act under two requirements: buy power that is needed — only power that is needed — and buy the cheapest power that is available," he said. The Council staff's analysis indicated that the region is unlikely to need power from new thermal (coal or nuclear) plants until at least the turn of

the century.

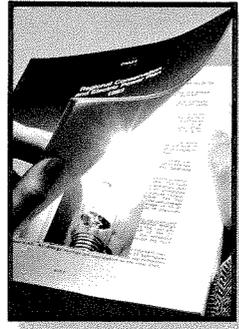
Council member Roy Hemmingway, Oregon, addressed the widely circulated proposal by Charles Luce, attorney for the 88 WPPSS 4/5 sponsoring utilities and former BPA Administrator, that the two plants should be incorporated into the resource portfolio in the event their power can be sold to California.

"I don't see," said Hemmingway, "how our substitution of 4/5 for Creston would give anybody considerably more hope that the plants would be constructed without a California sale being part of that package, and we don't have that package in front of us."

Collins had noted that if a sale of WPPSS 4/5 power were made to California, the Council could analyze the terms of the sale to determine whether the analysis of potential thermal resources would change. "The sale to California is something we need to hear a lot more about between now and the adoption of the final plan (April 28)," said Council Chairman Dan Evans, Washington.

But, as Hemmingway observed moments later, inclusion of the 4/5 plants in the resource portfolio now would not affect the participants' obligations to pay the debts coming due on the plants" . . . which, according to the best information, are not likely to be constructed."

# THE PLAN



Shaped by past events, the Council's draft plan writes the beginning of a new chapter in the region's power development

*It is, indeed, the most important piece of legislation to affect the Pacific Northwest since the 1937 Bonneville Project Act.*

Senator Mark Hatfield, Oregon  
The Congressional Record  
November 19, 1980

**I**t was the beginning, as Senator Hatfield's comments predicted, of a new chapter in the history of Northwest power. With little fanfare or hoopla, the Northwest Power Planning Council adopted in late January the first-ever draft Regional Conservation and Electric Power Plan. The words of Senator Hat-

field, urging passage of the Northwest Power Act two years earlier, foretold the event. Now, the ideas born in Congress in 1980 had taken shape. A new era of energy conservation was underway.

The Council's draft plan is up for review — from energy expert and citizen alike. Its goals are simple and direct: First, to offer an orderly public process for deciding how the region will meet its power needs for the next 20 years. Second, to acquire only those new resources that are needed and are the cheapest available. Third, to make everyone in the

region a potential power source by establishing energy conservation as the foundation to meet future demand whether it turns out to be large or small.

The draft plan's central driving force is better control over electric power matters in the Northwest. It calls for a flexible mix of resources to meet a range of potential power needs over the next 20 years. It envisions a continuing role for the Council to closely monitor developments in regional economic activity and population growth. Thus, the Council can change the plan as circumstances change. It is carefully designed to reduce power planning risks while providing sufficient power for whatever the region needs. The hope is to install again the order and harmony once enjoyed in the days of hydropower dominance.

### The Hydropower Era

Those days began, as Senator Hatfield suggested, with the Bonneville Project Act of 1937. It was part of the New Deal: visionary and aggressive. Build large dams on the Columbia River to generate power, ease navigation, control flooding, reclaim land, irrigate crops. When completed, the hydropower system of the Columbia River Basin stood without equal: 55 dams, federal and non-federal. The 28 dams of the Federal Columbia River Power System alone could produce an annual average of 13,000 megawatts of power — more than enough to supply the average daily needs of 13 Seattles.

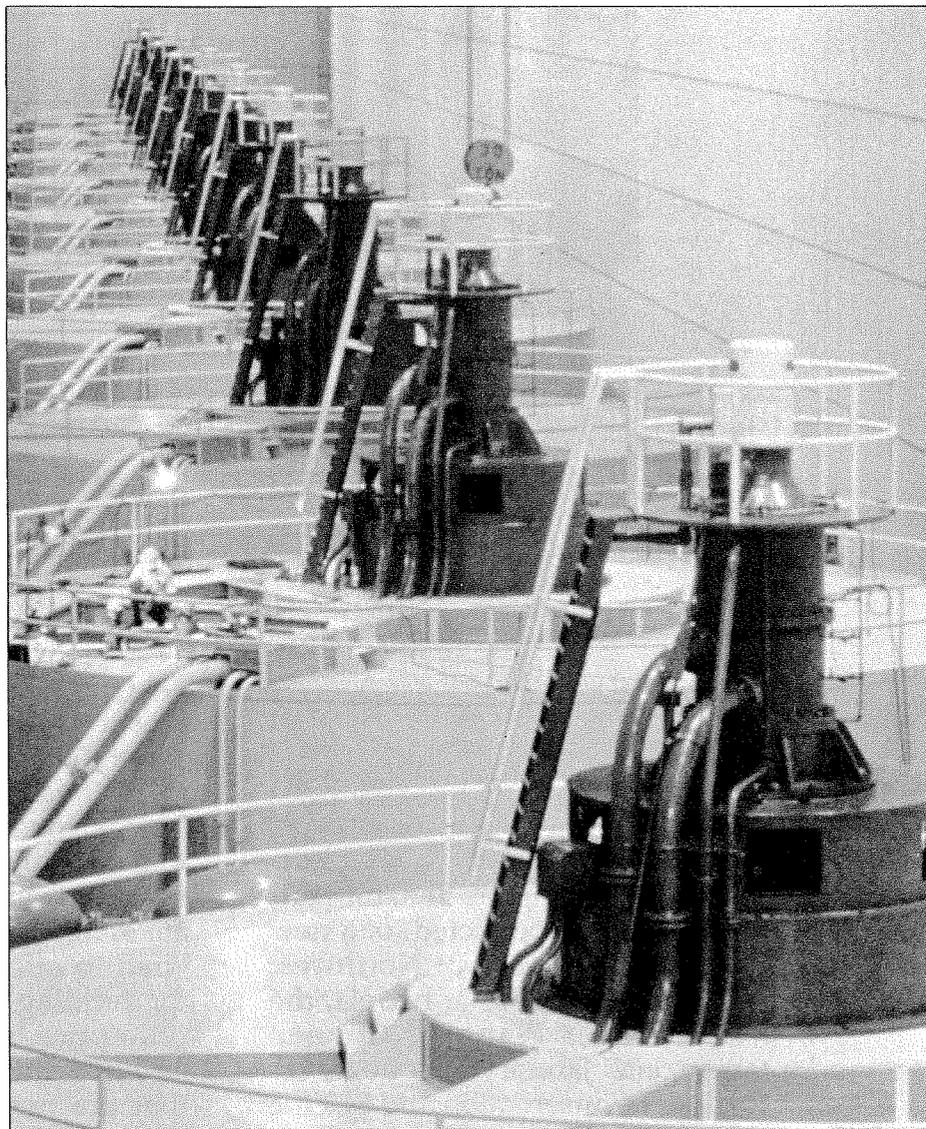
Initially, the dams produced so much power that big industries, mainly aluminum companies, were encouraged to locate in the Northwest to help sponge up the power and some of the cost. As more dams were built, Congress authorized Bonneville to construct a network of inter-regional power transmission lines so surplus power not needed in the Northwest for summer use could be sold to California. A United States-Canada treaty laid the groundwork for upstream storage dams for additional flood control and hydro system resource management. Thus, the Columbia River System became a finely tuned hydropower machine. These were the halcyon days of the hydropower era. The more dams that were

built, the more abundant and cheaper the power.

By the 1960s, however, the sites for large hydropower dams were virtually used up. The regional economy was growing. The outlook was bullish. The expectation was that even more power would be needed. To meet this need utility executives and power experts designed the hydro-thermal plan.

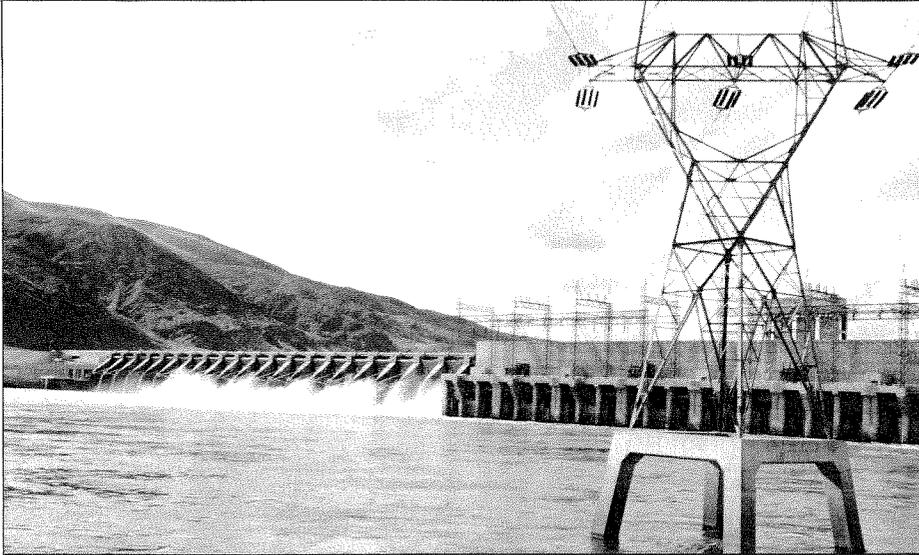
### The Hydro-thermal Era

The idea was simple enough. Build coal and nuclear plants to supply the Northwest's basic power. Then use the hydroelectric dams to store fuel (water) and provide operational flexibility to meet peaking loads, mainly in the cold months for heating. When peak demand rose, so could the dams' power production. Flood gates could be raised, allowing the water to rush through power tunnels, spinning turbines to generate



**Finely tuned machine:** The spinning turbines of the Columbia River hydro system produce thousands of megawatts of the nation's cheapest power.

*Under the hydro-thermal plan,  
electricity rates would average the costs  
of expensive thermal with cheap hydro.*



**Peaking power:** The hydro-thermal plan would have shifted the dams' use to peaking power for winter heating.

electricity. That way, the dams would augment the base load power supply of the nuclear and coal plants.

Economically, it made good sense. While the thermal plants were more expensive to build because of the longer lead times, greater borrowing, and higher inflation and interest rates, they were most economical to keep running on a steady basis. Also, the thermal plants represented a more complex technology than the span of steel and concrete stretched across a river to make a hydroelectric dam. These higher costs would be held down by a pricing feature designed for the hydro-thermal plan. As the new, more costly thermal plants came on line, their power would be mixed with the cheaper power from the dams. Consumers would pay an average cost.

Initially, the Hydro-Thermal Power Plan called for 20 nuclear plants and two coal plants. Its designers confidently predicted the region's demand for more power would grow annually at a steady six percent clip. Kicking off the program was construction of the N-Reactor at Hanford for producing weapons-grade plutonium and making steam to spin an electric turbine. The Washington State Legislature authorized establishment of the Washington Public Power Supply System to build the electric generator of the N-Reactor.

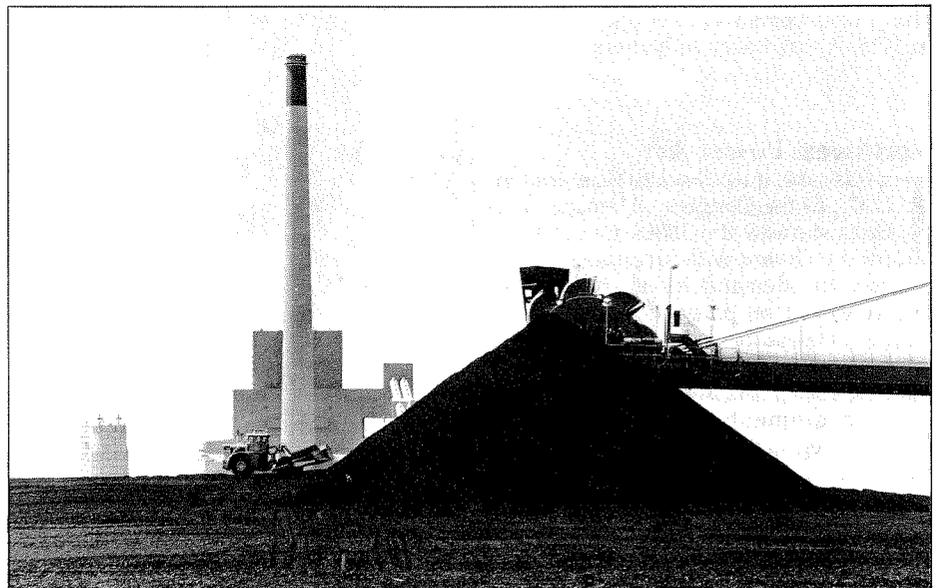
The construction arm of the state's public utilities, WPPSS in the 1970s began a program to build five nuclear plants. And BPA helped out. It signed a "net billing agreement" with the public utility owner/participants of the first three WPPSS plants, agreeing to buy each utility's share of WPPSS electricity and to sell back to each

utility a like amount of power at a melded rate, combining the higher costing nuclear power with the low-cost hydropower BPA sold.

Private utilities also participated in the hydro-thermal program. Pacific Power and Light was the chief sponsor of the Centralia Coal Plant, completed in 1972 for \$310 million and generating 1,200 megawatts. Portland General Electric built its Trojan nuclear plant at Rainier, Oregon, for \$503 million. Completed in 1976, it generated 1,080 megawatts.

Despite this auspicious beginning, countervailing forces began to buffet the hydro-thermal program. The U.S. Treasury Department ruled public utilities would lose their tax exempt bonding status if they signed any more net billing agreements with BPA. Public resistance to nuclear and coal plants began to mount. Double-digit inflation and construction delays pushed the costs of thermal plants up by billions.

By the mid-1970s, there were more problems. BPA halted all but surplus power sales to private utilities, causing them to turn to more expensive thermal power projects and raise their rates to help pay for them. The 1976 Notices of Insufficiency by BPA put its customers on notice that after 1983 it could not guarantee meeting all their power needs. BPA's big di-



**Base power:** Coal and nuclear plants would have been the foundation of regional power supply under the hydro-thermal plan.

rect service industries began to fear they would lose access to low-cost federal hydropower as growing demand would find BPA shifting supplies to meet the needs of its public utility preference customers. And BPA's rates were on the rise. Unchanging at .28 of a cent from 1937 to 1965, they jumped to .35 in 1975, an ominous 25 percent increase in just 10 years.

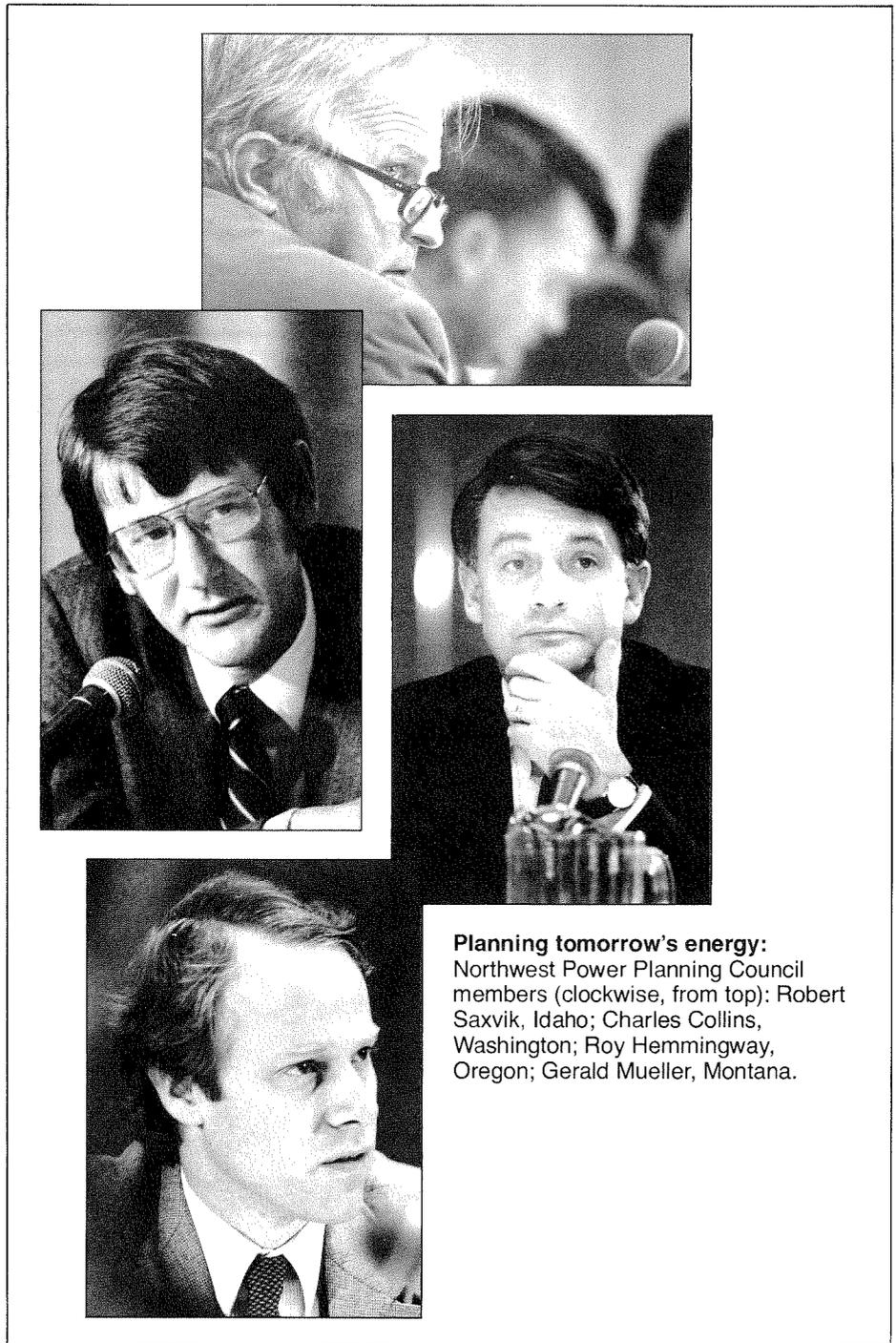
1976 turned out to be a watershed year in the Northwest's electric energy history. Seattle's rejection of a share of WPPSS 4 and 5 in favor of a conservation program was the first serious official challenge to the hydro-thermal program.

In the hydropower era, electricity costs had remained low, actually dropping in relation to consumer purchasing power. Since the dams had relatively low embedded costs and no fuel costs, rates remained stable. Thermal plant economics proved to be more volatile. Their embedded costs were higher to start with simply because the plants were more expensive to build and they carried high interest costs on larger amounts of upfront capital required. The greater complexity of the thermal technologies required more labor and materials, both soaring upward due to inflation. By the mid-1970s, these developments threatened to provoke a war over who would get and control access to the largesse of the limited but low-priced federal pool of hydropower. The golden years were ending. Like leaving Oz, it was "back to Kansas."

### Northwest Power Act

In this case, it was back to Washington, D.C., to the Congress. Demand forecasts showed the 1980s would leave the Northwest without enough power to meet the demand for it. Fearing the region would be plunged into a murky tangle of lawsuits over who had access to the limited cheap federal electricity, utilities, both public and private, state and local governments and big industries sought a legislative, political solution. It took four years. But on December 5, 1980, President Jimmy Carter signed into law the Northwest Power Act. Congress had turned a page in the history of Northwest power development. It was now up to the region to begin a new chapter.

The Act restructured the framework



#### Planning tomorrow's energy:

Northwest Power Planning Council members (clockwise, from top): Robert Saxvik, Idaho; Charles Collins, Washington; Roy Hemmingway, Oregon; Gerald Mueller, Montana.

and course of the region's electric energy present and future. It permitted the governors of Idaho, Montana, Oregon and Washington to appoint two members to a

Northwest Power Planning Council. In an open, public process, this new institution would have three basic responsibilities:

- Determine how much electric energy

*By the time the Northwest  
Power Planning Council was formed,  
projected energy deficits had turned to surpluses.*

the region might need through the end of the century;

- Develop a comprehensive plan to meet those needs, a regional electric power "blueprint" to be followed by BPA, utilities, local governments and consumers in seeking new power resources but giving priority to conservation first, renewables (like hydro) second, cogeneration third, and conventional (like coal and nuclear) fourth; and

- Establish a program to "protect, mitigate and enhance" the fish and wildlife habitat harmed over the years by development of the hydropower system.

To accomplish this new regional power plan, the Act expanded BPA's authority. It permitted Bonneville to sign long-term supply contracts with the DSIs. BPA could provide rate relief to the residential and farm customers of private utilities, paid for by higher power charges to the DSIs. BPA could now acquire generating resources directly from utilities and consumers. It received \$1.25 billion of new bonding authority to finance energy conservation programs. And, finally, the Act preserved the preference status of public utilities and

cooperatives. Plus, it assured them for the first time that BPA would guarantee to meet their future load growth.

Clearly, the new law was designed to allow the region to deal with expected electricity deficits. But by the time the four states had selected their representatives to form the Northwest Power Planning Council, the projected deficits had flipped to surpluses. Not just the periodic seasonal surplus but protracted surpluses of electricity through the 1980s, and perhaps beyond.

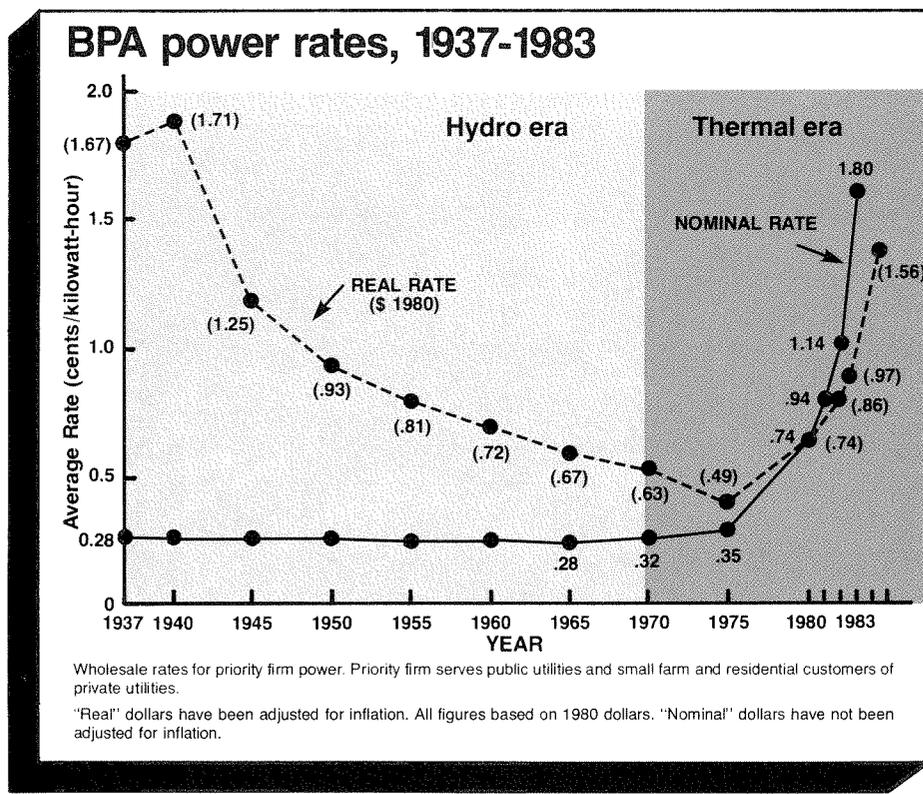
The surplus arose for several reasons. First, a string of good water years from ample rain and snowfall provided excess hydropower. Second, the region had an excess of thermal generating capacity. For years, utilities overbuilt generating capacity, expecting demand to catch up with supply and to brace against seasonal hydro shortfalls. But the third, critical reason — rising electric rates coupled with a depressed regional economy — dampened demand for power. High unemployment in Washington and Oregon, spurred by weak markets for forest products and aluminum, converged in a vi-

cious downward cycle in the demand for power.

Meanwhile, construction delays, cost overruns, and management problems struck at the WPPSS program. Initially projected to cost \$4 billion, by late 1981 the cost for all five plants was estimated to be \$24 billion. The economics of thermal plants, the linchpins of the hydro-thermal plan, were crumbling. In January, 1982, the WPPSS board of directors rejected mothballing plants 4 and 5, choosing instead to cancel them. Portland General Electric withdrew its license application for twin nuclear plants at Pebble Springs. And the Skagit/Hanford plants of Puget Power were put on hold. It was a reflection of a larger pattern nationally. Since 1978, there has not been a single order placed for a new nuclear plant in the U.S. Just the opposite. The Tennessee Valley Authority cancelled four nuclear reactors. Virginia Electric Power Company cancelled North Anna 3 and 4, and still more utilities have scrapped other big thermal projects. The trend seemed clear.

In the Northwest, electric rate increases compounded problems. BPA rates, .35 cents in the mid-70s, hit 1.8 cents a kilowatt-hour by 1983. This five-fold increase particularly struck public utility customers, largely dependent on BPA power. Inate over high bills, made worse in bad economic times, consumers challenged local utility commissioners for answers. In Washington, 11 of 13 reform commissioners were elected to public utility boards. WPPSS' financial ills and record rates brought regional power issues to the forefront of public concern. Utilities once friendly to WPPSS turned against it — and to the courts for help.

In a suit filed by 11 Oregon utilities, a Lane County judge invalidated contracts with Oregon utilities to participate in WPPSS 4 and 5, ruling that they did not have to pay their share of the \$2.25 billion owed on the cancelled plants. In Washington, the Chemical Bank of New York sued all 88 WPPSS 4 and 5 sponsors, trying to force payment of the debt. The validity of contracts between WPPSS and utilities in Idaho has reached that state's Supreme Court. In Wyoming, courts began reviewing a state utility commission directive banning WPPSS sponsors from including WPPSS costs in their electric rates. The tiny electric cooperative, Orcas Power and



## *The Council's plan tries to harmonize new resources with the hydro system.*

Light, serving Washington's San Juan Islands, filed for reorganization under federal bankruptcy laws, arguing it can't meet its WPPSS obligations. And in a "seduction suit" several Washington utilities are asking the court to dissolve their obligations to WPPSS on the grounds BPA seduced them into participation by predicting long-term power shortages in the 1980s and beyond.

The web of lawsuits has threatened to entangle all of the WPPSS projects and drop the consortium into possible default on the bond repayment for Plants 4 and 5. Furthermore, Initiative 394 — passed by Washington voters in 1981 to require WPPSS to win voter approval of future bond sales — has complicated financing of the first three projects. And while portions of the initiative have been ruled unconstitutional, the combination of litigation over Plants 4 and 5 bills and Initiative 394 has virtually frozen WPPSS out of the bond market. So, ultimately, all these factors, along with other problems, have brought an end to the hydro-thermal era.

The old power planning method had become fraught with hazards. The fixation on single point forecasts led to a surplus of expensive thermal capacity. The huge front-end costs and long lead times for construction posed high-stake risks for the regional economy. It meant that multi-billion dollar investments might be made that weren't needed after all.

By the early '80s the old planning methods had produced upward spiraling electricity costs, a near-term and potential long-term power surplus, and a series of lawsuits threatening what once had been an orderly structure for power production. And it was amid this whirlwind of events that the Northwest Power Planning Council sought to meet a new reality.

### **The Energy Efficiency Era**

**I**f we are to be in control of our electrical destiny," said the Council in its draft plan, "we must recognize the changes from our past that will influence the decisions we make about our future."

The Council's draft seeks a renewed harmony in the region, a harmony of new resources with the long-standing hydro resource. It attempts to overcome some of

the major planning pitfalls of the past by focusing on two primary goals: Getting the power that's really needed; and getting it as cheaply as possible with the least amount of risk. To achieve these goals, the Council has developed two innovative approaches to Northwest power planning.

"Any forecast, no matter how sophisticated, has an inherent element of imprecision," says the draft plan. "No one can predict with pinpoint accuracy the myriad of events that go into determining our energy needs 20 years from now. And as events have underscored, there is a high cost to being wrong." Indeed. To have too little power risks hobbling economic growth. To build too much, however, means billions may be spent on unneeded power projects.

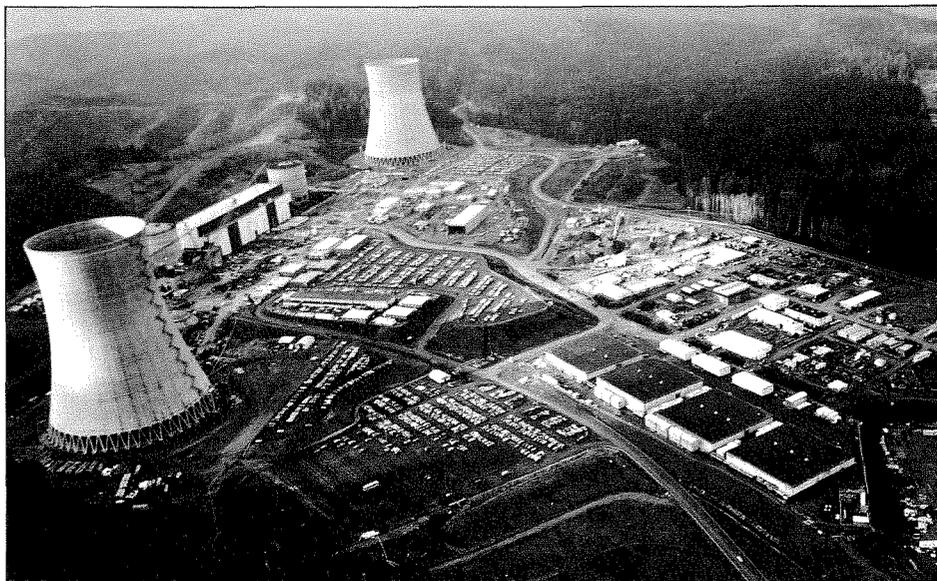
To cut the risk of being wrong, the Council adopted a range forecast as opposed to the traditional single-point forecast used by the region's utilities. The Council's forecast weighs a variety of economic conditions and population changes, setting the highest and lowest plausible but unlikely growth rates out to 2002. Then new resources can be planned and adjusted to meet whatever growth actually occurs. The Council chose four possible growth rates:

High case, 2.8 percent;  
Medium high case, 2.3 percent;  
Medium low case, 1.7 percent; and  
Low case, 0.9 percent.

But even given this broad range, the Council says it's vital that power planning decisions not become overly driven by any forecast. "Certainty about the future does not come from the technical sophistication of a forecast," says the Council in the draft plan. "Instead, it comes from the flexibility and confidence one has in the array of resources available to meet any given condition."

Following the priorities of the Northwest Power Act — to acquire conservation first, renewable resources second, cogeneration or high-efficiency resources third, and conventional thermal resources last — the Council selected a resource mix aimed to provide enough power whether demand is great or small.

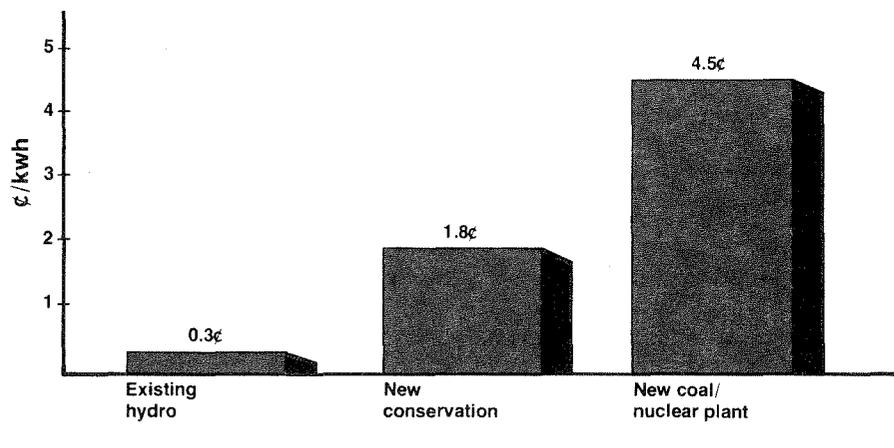
This means resources can be tailored to meet whatever is the emerging pattern of energy growth. For instance, conservation programs can be brought "on line" quickly and incrementally as needed to meet the demand for energy. Other resources need more time to develop. So the Council developed a new legal arrangement called "options." An option on a resource can allow the region, for exam-



**Big costs for big projects:** The changing economic realities of large thermal projects have spelled the end of the hydro-thermal era.

## Comparative resource costs

Cents per kilowatt-hour, 1980 dollars



ple, to pay for the time-consuming but relatively inexpensive siting and design stages and place it on "hold" for construction. This optioned resource, say a coal plant, would then be ready for quick construction when it was clear it was required for continued economic growth. Thus, the

region would be assured of the resource without facing the financial risk of building it before it is really needed. This pre-construction phase would be financed by BPA. It would require spending money, possibly several million dollars, but would avoid the possible multi-billion dollar risk

of starting to build a resource years in advance of knowing whether it would be really needed.

The range forecast and portfolio of flexible resources is the Council's attempt to bring a more private sector-like management method and better control to the Northwest's troubled electric energy scene. It also recognizes the vast, still bountiful hydroelectric resource as the region's power base once thought used up by planners in the hydro-thermal era. The Council's proposed resource portfolio tries to mesh new resources with the idiosyncracies of the huge hydro system. The best example of this is conservation.

Whatever the pace of Northwest economic growth, the Council's draft plan places emphasis upon stretching present resources to meet future needs. Conservation energy will cost about 1.8 cents per kilowatt-hour, according to the Council's analysis, or about  $\frac{1}{3}$  the cost of new thermal power. It also allows the already cheap and abundant supply of hydropower to be put to greater efficiency in use. Using existing hydropower more efficiently offers the region a far cheaper alternative than building new expensive generating capacity to provide added supplies of power. It is this new reality

**Please send me a copy of the draft Regional Conservation and Electric Power Plan.**

Name \_\_\_\_\_

Address \_\_\_\_\_

Send this coupon to:  
Northwest Power Planning Council  
700 SW Taylor, Suite 200  
Portland, Oregon 97205  
Attn: Beata Teberg

Those who request a copy of the draft plan will also be sent the final plan.

Technical appendices are included in the plan document with the exception of Appendix J, Model Standards for New Construction. For information on obtaining Appendix J, please contact Carol McAllister at the Council's central office.

Technical exhibits, including contractor reports, staff issue papers and model documentation, may be examined at the Council's central and state offices and BPA area offices during regular business hours. For more information, contact Ruth Curtis at the Council's central office.

*"The challenge to exert some control over our energy future . . ."*

that drives the Council's draft plan. Conservation can provide new power and save ratepayers money on their electric bills. And it complements the hydropower system, in good and bad water years.

The other proposed resources also mesh well with the existing hydro system. New hydroelectric dams would offer renewable sources of power, but would be located with minimal impact to the environment and fish and wildlife. Cogeneration facilities, which produce power from industrial waste heat, tend to follow economic activity so they would be in use during vigorous business periods and shut down when business slacks off. Combustion turbines, inexpensive to build but expensive to operate over extended time periods because they burn oil or natural gas, likely would be used to cover sudden growth spurts or for short periods to provide peaking power.

The Council chose coal as its last resource. While any thermal resource is expensive, coal plants cost less to build than nuclear plants. They can be built quicker than nuclear plants, and because more of their costs are for fuel, coal plants are more economical to shut down when the hydro system is generating surplus power

thanks to high water.

Planning the power for many possible tomorrows. Using a mix of resources flexible enough to adapt to changing growth



**A new era:** Energy conservation is the linchpin of the Council's regional power plan.

patterns. Applying the test of cost-effectiveness, efficiency and risk management. These are the key elements the eight Council members propose for bringing a new order to the Pacific Northwest's troubled electric power scene.

It's a big change. Perhaps it's the kind of change Senator Hatfield had in mind as he addressed the Senate urging passage of the Northwest Power Bill. "Our solution," Hatfield advised his colleagues in describing the proposed legislation, "sought the injection of the public's participation, directly and through the Governors of the States, into the power planning process which was once the exclusive domain of utility executives."

Through the public and the governors, the Council has sought to initiate the region's first complete electric power plan. As the Council says in its draft, "Today, our region faces a new challenge — the challenge of a new era in generating electricity for the Pacific Northwest. Fundamentally, it is a challenge to us as North-westerners to exert some control over our energy future, to craft a plan that can confidently meet a wide range of potential tomorrows at the lowest possible cost to the ratepayers of our states."

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