Editor's Notes

The new Northwest Power Plan is still a major focus of efforts at the Council. As I write, computers are whizzing and whirring away, testing hundreds of resource combinations to find the mix that adds up to the most reliable and affordable package of power the Northwest can buy. At this stage, everything is still awaiting decisions. A draft plan for public review will be out soon. Comment on the draft will be taken for at least 60 days. The final plan is scheduled for adoption in December or early in 1991.

This issue's cover was illustrated by Eugene, Oregon, artist Joan Barbour.
There are some people in the Northwest who take the view that the Northwest Power Planning
Council is about to come out with its first power plan. There is some merit to that view.

The Council's first two plans, published in 1983 and 1986, came out during periods of considerable electricity surplus. "Those plans weren't acquisition oriented, and that was appropriate," according to Council Chairman Tom Trulove. "The short-term focus was on managing the surplus. The only immediate actions to acquire resources were limited to capturing what otherwise would have been lost opportunities and laying the groundwork for acquisitions.

"In those two previous processes, we learned how to do a plan. Now the challenge—for the region as well as the Council—is how to implement a plan," Trulove said.

Times are different now.

The region no longer has an electricity surplus, and—at least at present—its economy is expanding at a healthy rate. This growth, while welcome, poses its own challenges. Continued expansion will require new supplies of electricity. Now that the region's cheap hydropower base—which still supplies 75 percent of the region's power—is close to its maximum development, new electricity must come from more expensive resources.

And all new resources raise at least some questions. What are realistic levels for achieving conservation in a society that puts priority on voluntary implementation? Are alternative sources of renewable energy technically and economically feasible in sufficient quantities to make a difference? How does one quantify the environmental effects of various generating plants, such as those fueled with coal? Even if all other barriers were removed, what is the political reality of completing two unfinished nuclear projects? And a crucial question: what additional amount is the region willing to pay to minimize actual and potential environmental impacts—assuming that everyone could even agree first on what those impacts are.

Not all the questions revolve around new resources. Growth in demand also comes at a time when developments have cast doubt about the continued reliability of some existing resources.

For example, unless a new agreement is reached, approximately 600 megawatts of hydropower will revert to Canada in the next decade as an agreement expires. (See related story: A Gathering of Authorities.) Voters in Oregon have again secured enough signatures to put a proposal to close the state's only nuclear plant on the ballot.

There is also talk of invoking the provisions of the Endangered Species Act to protect several species of Columbia River fish. Any resultant changes in the operation of the region's dams could affect the amount of hydropower available.

There are other changes, many that will benefit the region and some that will pose completely new challenges. (See: 14 things that have changed.)

Refining a resource portfolio

As a result of analysis and public comment over the past year, the Council now has the best information available on what new resources are available and at what costs. The focus since spring has been on the two most important sections of the new power plan: the resource portfolio and the Action Plan. Both will form the basis of a draft plan that will be available for public review.

Once available resources are known, the questions come down to which will the region use, in what mix and when. The answer—the mix and sequence—is what is known as the resource portfolio. That mix has to balance several considerations. The mix has to be best, not just in terms of costs to build and operate resources, but in terms of environmental impacts and of risk.
Risk management is one of those essential components that doesn’t get much publicity, perhaps because it is a judgment call rather than a piece of data that can be computed mathematically. Risk involves such questions as what level of forecast energy need should the region build to, how much should the region be willing to rely on the economy energy market* (a resource over which there is little control), and what trade-offs should the region make in terms of cost versus reliability.

The questions come down to how much risk is acceptable.

“There are risks to the power system as well as to the environment,” Ed Sheets, the Council’s executive director pointed out. “Coal plants may appear to be cheaper than some renewables today, but if the region were to spend large sums of money to build coal plants, what is the risk down the road of new regulatory and new scientific developments that could substantially reduce their production or increase their costs? The Council has to assess the risk of that happening as well,” he added.

“Sensitivity” runs help answer the “what if”

Months of analysis go into shaping the resource portfolio. Much of this time is spent on “sensitivity” runs. These are studies that simulate the future operation of the power system. They can tell the Council how sensitive, in terms of cost, the overall power system is to individual resource decisions.

What is the region willing to pay to minimize actual and potential environmental impacts?

These sensitivity studies include such things as looking at the effects of accelerated schedules for bringing conservation online, the effects of changing assumptions about the availability of two mothballed nuclear projects, of adding 1,000 megawatts of geothermal or wind resources, and of adding solar devices in combination with combustion turbines. The studies are also being used to examine the cost impacts of mitigating global warming, the impact of uncertainty about cogeneration and the effects of uncertainties about coal and natural gas prices.

“We start with the lowest cost mix,” Sheets explained, “and then we ask a lot of ‘what if’ questions. What if the conservation level that we now assume we can reach were lower? What would that do to the system? What if a large existing base resource, such as a nuclear plant, were to be taken out of commission? We have to look at each variable and ask what difference does that make to the big picture. Some things will make a big difference; others will have almost no effect in the grand scheme of things.”

Answers to those questions can help the Council make important policy decisions. For example, if a sensitivity run indicates that putting a renewable resource ahead of a coal plant has very little overall cost impact, then the Council may decide to do so. But if the cost impact is large, the Council must balance its obligation to the environment with its obligation to ensure an economical and reliable electricity supply. Just where the compromise falls will be a judgment call, and no computer can do that.

“The computer allows us to simulate what might happen in the future, but it’s not making any decisions. The model won’t tell you how to value different risks. It can’t tell you how to make trade-offs,” Sheets explained.

Making those trade-offs has been the focus of the Council’s recent work as it shaped the resource portfolio and Action Plan.

* Economy energy refers to energy that is available on the spot market, sometimes on an hour-to-hour basis. It may include surplus generation within the region or purchases from other regions. Since there’s no way of knowing precisely how much and when this power is available, it hasn’t been counted on to meet firm or guaranteed loads.
The Action Plan is the key component

Sensitivity studies are one piece of the analysis that is helping the Council evaluate policy options for its Action Plan. When finalized, the resource portfolio will provide a blueprint for the region, indicating a direction and schedule for meeting growth in demand for electricity. The Action Plan, by far the most critical component of the power plan, will tell the region what it needs to do right now and in the next five years to meet immediate resource needs and begin preparing for future needs.

One thing that has concerned the Council about previous plans is that the region seemed to focus on the resource portfolio, rather than on the critical short-term actions delineated in the Action Plan. The Council is considering packaging the plan in a new format to emphasize the importance of the Action Plan.

The portfolio is only a snapshot of the moment. It identifies what would be developed if all resources had to be acquired right now. Fortunately, they don’t. The Council anticipates that other, better and cheaper resources will be available as technologies improve and developers come up with innovative solutions. The main purpose of the portfolio is to provide a measurement against which all emerging resources must compete. The Action Plan—not the resource portfolio of the moment—is what will determine the resources of the next century.

In the draft stages, the broad goal of the Action Plan is to enable the region to meet electricity demand through the next decade without bringing new, large, central station coal and nuclear plants online. Last May, the Council discussed this goal in the first of a series of public meetings to address the Action Plan.

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14 things that have changed since the first two power plans

- The stagnant Northwest economy of the early 1980s has given way to regionwide, although uneven, growth. As a result, an electricity surplus that stood at about 2,500 megawatts in 1986 has been exhausted.
- The economy energy market appears to be broader than previously anticipated and could in part provide a safety net for the region if new resources are not built in time to meet load growth.
- World oil prices, which influence demand for other fuels, plummeted in early 1986, just after the last power plan had been completed.
- Increased environmental awareness has led to growing concerns about large fossil-fuel burning operations, such as coal plants, which emit carbon dioxide.
- Conservation is now widely accepted as an energy resource, and all four Northwest states, most particularly Washington, have strengthened building codes or practices. All the region’s utilities now promote energy efficiency through practical programs and incentives.
- Utility commissions in Idaho, Oregon and Washington now require utilities to submit least-cost plans patterned on the Council’s power plan. Montana Power Company is also preparing a plan voluntarily.
Jim Litchfield, the Council's power planning director, said, "The proposed goal emphasizes the need to acquire cost-effective conservation and renewables during the 1990s. If we experience medium levels of growth, these two high priority resources will meet the region's needs through 2000. If loads grow more quickly, however, the region will need to turn to other resource alternatives. So the goal also includes the need to back up the region's electric power system with efforts to confirm the viability of other resource options."

To this end, the first objective proposed for the Action Plan calls for actions to develop conservation and efficiency improvements in the existing system to meet mid-level load growth through 2001. A second objective proposes to have the ability to develop sufficient renewable and high-efficiency generating resources to bring online if they are needed. A third objective of the Action Plan under consideration would be to see that the region is prepared to bring new central station thermal plants online after 2001, if higher load growth materializes.

Against these broad objectives, the Council is now focusing on specific steps to be taken to ensure the Northwest does indeed move into a secure energy future, one in which supply is met and at a cost that will jeopardize neither the environment nor the economy.

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A recovery in world aluminum prices put new life into the Northwest's sagging aluminum industry, reversing a trend of slowdowns and shutdowns among these energy-intensive companies.

Some legal and financial barriers to completing two mothballed nuclear plants were removed as a result of a settlement and refinancing of bonds. But some institutional barriers remain (ownership for one), and other legal entanglements have arisen. The questions of practical shelf life and impacts of potential new regulation also remain.

The Hanford Generating Project, a nuclear-fueled power plant in Washington, was shut down.

Better data and newer technologies have brought some costs down and improved the chances that some alternative renewable resources could displace conventional thermal plants.

More is now known about developable hydropower. A hydropower assessment study provided data on developable sites, and the completion of a protected areas process identified areas where development should be banned because of impacts on fish and wildlife.

The utility community, as a whole, is undergoing changes in structure and in how it does business. Where once utilities developed their own generation, they are now beginning to seek bids for resources from independent power producers. There appears to be reluctance to investing in any large-scale, capital-intensive resources, even in the face of potential power deficits.

The Bonneville Power Administration's role has been changing as the region becomes less centralized. Some public utilities have sought to become more independent of the federal agency, and Bonneville itself speaks more in terms of "partnership" than "leadership."

The Council, whose very existence was questioned in a lawsuit in its earlier days, has become institutionalized. Its working relationship with Bonneville and other entities has evolved into recognizable patterns. The discussions now are far more likely to focus on issues rather than on the role or authority of the Council.

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A Gathering of Authorities
Three of the region's biggest power players, the Bonneville Power Administration, the U.S. Army Corps of Engineers and the Bureau of Reclamation, are having a kind of identity crisis. For the past 50 years or so, they have been running water through their various hydropower and irrigation projects, selling electricity and generally managing this country's most energy-productive system of dams. And while they carried on this business with the prerequisite public involvement, few Northwesterners could follow the complex intricacies of power wielding.

Then in 1980, a new law was passed by Congress, and the authorities of the big three seemed to shift. Unfamiliar faces appeared at the table when decisions were being made, and a freshly informed Northwest populace began a closer scrutiny of the river system. With the new law, came greater demands on the system.

The new law was the Northwest Power Act, signed in 1980. The Act called on Bonneville to undertake fish and wildlife recovery efforts along with finding and funding new sources for electricity. The Corps and the Bureau, along with the Federal Energy Regulatory Commission, were told in the Act to give equitable treatment to fish and wildlife, along with the other purposes for which the dams are operated.

For nearly 10 years, these agencies and others have struggled to balance power generation, flood control, recreation, irrigation, navigation and the provision of adequate water for young salmon and steelhead migrating through the system to the sea. But increasing energy use, the possible loss of power that returns to Canada starting in 1998 (see below), and expanding use of the river for recreation, irrigation and fish protection are prompting the three giant entities to re-evaluate their roles and the river operations they co-manage.

Demands on the river are tapping deeply into a finite resource. One of the world's biggest balancing acts may need to be more
The proposed “System Operation Review” coincides with the need to renegotiate several major management agreements between the United States and Canada and among Northwest entities. Perhaps the most significant of these agreements grew out of the U.S. and Canadian Columbia River Treaty, which was ratified in 1964.

The Columbia River Treaty was designed to share the costs and benefits of developing better flood control in the Columbia River system. Under the terms of the treaty, Canada built three storage dams (Mica, Keenlyside and Duncan) on the upper Columbia, and the United States built one, Libby Dam on the Kootenai River in northeastern Montana, to better regulate flows through the system.

In addition to flood control, the new dams enabled downstream projects in the United States to produce 2,800 additional megawatts of capacity (the maximum amount of power that can be generated by the system at a given time under specific conditions). Because it could not use even half of the new capacity and to obtain the capital to build its three dams, Canada sold its share of future power (known as the Canadian Entitlement) for 30 years, to a consortium of Northwest utilities doing business as the Columbia Storage and Power Exchange. The agreement governing this exchange (the Columbia Storage and Power Exchange Agreement) begins to phase out in 1998.

However, the Canadians have already announced that they intend to claim their power benefits (about 600 average megawatts) at the conclusion of the 30-year period. A new plan of operations must be developed by U.S. utilities to help the region adjust to the loss of power in 1998. This involves, on the U.S. side, another piece of the puzzle, the Canadian Entitlement Allocation Agreement, which describes the way the Canadian power is divided among Northwest utilities.

This agreement also expires with the Storage and Power Exchange Agreement, but it must be renegotiated by 1993 to facilitate planning for the new demands that will be put on the system when the Canadian Entitlement heads north.

To further complicate matters, yet another agreement comes up for re-examination this decade, the Pacific Northwest Coordination Agreement, which expires in 2003. This one was signed by the Corps, the Bureau, Bonneville and 15 non-federal generating utilities in the region. Its primary purpose is to coordinate power operations of the dams so the system is run as efficiently as possible. Non-power aspects of the dams’ operations, such as irrigation withdrawals and flows for fish passage, were not affected by this agreement.

But non-power uses of the river will be carefully examined if one or more Columbia Basin salmon stocks are declared endangered, a possibility that is under review by the National Marine Fisheries Service. Such a designation could expose virtually every aspect of river operations to reappraisal.

All these converging events prompted the three federal agencies to call for a comprehensive public review of the entire system. They expect to take about three and a half years to study the legal, biological, ecological, environmental, economic, social, institutional and financial aspects of operations at all federal mainstem Columbia and Snake river dams.

They will be looking at each dam individually as well as at the interactions of all the dams in the system. They will be questioning and clarifying their own roles and the limits of their authorities. They will be proposing, testing and evaluating new ways to operate the system and new terms for the various agreements. Throughout the process, they will be refin-
The planned review is big. Out of it will come a host of products: a report documenting the review; a long-term plan of operations based on the review’s findings; an environmental impact statement regarding the new system plan; improved public involvement processes for these exercises; clarification of the criteria used to make operating decisions at the dams; and new agreements to replace the Pacific Northwest Coordination Agreement and the Canadian Entitlement Allocation Agreement.

The three agencies kicked off the process last fall by convening a “joint Columbia River consultation group” that includes representatives from several dozen organizations that have vested interests in the system. Fisheries managers, the tribes, utilities that serve large irrigation loads, industrial power users, water resource managers from each of the four Northwest states, environmental interests and others were brought together to hear the big three describe their proposed undertaking.

The group has reconvened twice since then as the extent of the project became more clear. Now the three agencies are calling for help to define the perimeters of the effort. Throughout the summer and the coming year, they will be running computer models to simulate the trade-offs of power benefits for non-power ones. Increasing flows for fish will be tested against the consequent loss of power generation, for example.

At the same time, they will be seeking the advice of their consultation group to help determine how broad and detailed the environmental impact study should be. Negotiations with the Canadians and within the region over the Canadian Entitlement power and the overall dam coordination process will be concurrent.

All new agreements and reviews are scheduled to be concluded in late 1993. What the federal agencies have called a “holistic treatment of issues” will have been folded into “procedural clarity and certainty.” If they meet their goal, the breadth and limitations of the three federal agencies’ authority over the Columbia will have been written down in a single book. 

\[\text{NORTHWEST ENERGY NEWS July/August 1990}\]
For Mark Crisson, the adage “you can’t go home again” doesn’t ring true. He’s serving his second stint at Tacoma City Light, and a separation of several years in the industrial sector doesn’t seem to have hurt his career with one of the region’s largest public utilities.

As superintendent of the Light Division (Tacoma Public Utilities also has a Water Division and Belt Line Railway Division), Crisson is responsible for managing the city’s electrical utility. Perhaps more than any other utility, Tacoma embodies the dichotomy between independent resource development and reliance on the Bonneville Power Administration (BPA). Its power needs are met nearly equally from its own resources and from the regional power marketer.

Crisson began his career with Tacoma City Light after graduating from the U.S. Naval Academy and a five-year tour of service with the nuclear submarine forces. (Yes, he liked “Hunt for Red October” and, except for minor quibbles, thought it was fairly accurate.) He started out as an electrical engineer with the utility and was assistant power manager by 1983.

That year, he left the utility to take a position with Martin Marietta, an aluminum producer, as the company’s Northwest power manager. Two years later, he moved on to head Direct Service Industries Inc., a group of industries (primarily aluminum smelters) that purchase power directly from Bonneville. Then in 1987, he came home again to Tacoma as the utility’s superintendent.

Although he downplays his role, Crisson was a key player in forging a utility consensus that helped bring about a new Washington state building code that embodies the Northwest Power Planning Council’s model conservation standards. In that respect, he continues a long and strong conservation leadership tradition for Tacoma, the first city to adopt the standards.

How one public utility, Tacoma City Light, is facing the future.

Point of View

Mark Crisson

with Dulcy Mahar

NORTHWEST ENERGY NEWS July/August 1990
Q. When the Northwest had surplus electricity, yours was one of the few utilities still actively working to develop new resources. Why? What was your experience, and what direction are you headed in now?

We looked at a lot of different resources during the surplus, but primarily at small hydroelectric projects. This was largely motivated by the BPA rate increases we experienced from 1979 to 1985. When I came into my current job, my perception was that our basket overflowed. We had too many projects and weren't being discriminating enough either in an environmental or an economic sense.

We were on the verge of undertaking enterprises that we weren't very well equipped to manage. So we focused on doing a couple of things. One was getting potential resources down to a more manageable and more selective group. Second was to try to build public awareness and support for what we were doing.

I think we've essentially done both. We've taken our hydro portfolio down to about a half a dozen projects that I think are much more environmentally acceptable and that are the best economically. I feel good about that.

We've also completed our first least-cost plan. It's in a draft stage—out for public comment right now—and it reflects those changes.

Q. When you were looking at some hydro development, you ran up against the Council's protected areas process, and I know you found that somewhat frustrating. Do you see positive sides to the protected areas designations? Are there ways that, for example, utilities can use them to focus hydro development in areas that aren't problem areas?

Yes, although it may be a little early to say on a regional basis how well it will work. I assume there will be a significant component in the [Council's new] plan that will talk about small hydro development. Our experience has actually been pretty positive. We were concerned that a lot of very feasible sites, both from an economic and an environmental standpoint, might be indiscriminately locked into a list that wasn't subject to careful scrutiny.

During a rulemaking process, such as the one the Council engaged in, there is only so much time to review a lot of the projects on the list.

The Council went ahead with the protected areas designation, but they did agree to a process whereby projects could be reviewed, and we've exercised that process with two projects. There were questions about a couple of projects in the Nooksack Basin that had been designated as protected, and we looked into it and found out that the basis for the designations was very weak.

We presented that information to the Council under the process identified in protected areas, and with the support of state agencies and concurrence with the Council, have had [protected status] removed. So they look like they are
potential sites for development now. That was encouraging. What it told us was, "Yes there's a protected areas designation, but if you can make a strong case that an area should be modified or removed in some way, there is a process for consideration."

Q. Now that the region is at load/resource balance, or possibly even deficit, what directions do you see utilities taking?

Well, I think there's an emerging consensus that BPA and the region's utilities need to be working together to address future resource needs. The discussion surrounding the Council's formulation of the regional plan will be an important part of where the region goes. To me, there are varying degrees of uncertainty about different parts of that potential plan. I see, for instance, a growing recognition and support for the need to get on with conservation programs and increased levels in conservation activity. That's been reflected in Bonneville's projected program levels for the coming years. I think that's a very positive development.

Still, some issues surround conservation. What's the most efficient delivery mechanism, for example? Everyone agrees the greatest potential is in the commercial and industrial sector, and yet we haven't really established a lot of experience in that sector. So there's some work to be done to establish the most effective way to get the most amount of conservation for the least investment.

Q. What do you think about Bonneville's new acquisition proposals that essentially give utilities more independence by decentralizing conservation programs?

While I'm not familiar with the details, in general, I favor the notion of allowing utilities to interact with their own customers and contribute to the conservation effort through programs of their own design. Decentralizing and taking advantage of the experience that a number of utility staffs have gained over the last decade is just smart, and we support that. But again, whether it's a central or decentralized program, I think there's still some question of the most efficient way to deliver the conservation.

Q. What do you see as the appropriate role for Bonneville during the coming decade? I ask that because Tacoma seems to have taken a path toward independence from Bonneville. Is that a fair characterization?

In the past, it probably was a fair characterization. We're reviewing that right now as part of our resource planning. A more accurate statement of our current resource development policy is to try to meet all or a significant portion of our projected load growth over the next decade or two in such a way that we basically maintain our current level of reliance on Bonneville.

I don't think it's either realistic or desirable, frankly, for Tacoma to try to become independent of BPA, given our current situation, which is that we rely on BPA
for roughly 40 to 45 percent of our energy supply.

I feel very good about our relationship with Bonneville right now. I would like to see the partnership concept continue to evolve, and I’m encouraged by some of the preliminary developments along those lines. Bonneville has been receptive to our comment and others’ comments regarding the need for increased conservation levels. They’ve also been responsive to suggestions about delivery mechanisms for both conservation and generating resources.

It’s difficult for Bonneville to be all things to all people, and I think they try to be as responsive as they can. But that’s not the easiest thing to do. I would like them to try to find a way to be responsive in a more timely fashion. We recognize they’re a federal agency, that they are process oriented, and that public process is a good thing. But we’re also looking at a situation in the region where the recent load growth is well above projections.

I can see some real benefit to trying to recapture a lot of the cooperation that was the rule rather than the exception before the surplus. We, the members of the utility community, have initiated some discussions with Bonneville to try to do just that. We see some encouraging signs of that, both in our discussions at staff level and things like Bonneville being able to settle this WNP–1 [Washington Public Power Supply System nuclear project at Satsop] dispute here a few months ago. It was a compromise. It was encouraging.

Q. West of the Cascades, utilities have been urging Bonneville to step up funding for conservation programs, but public utilities on the east side of the region appear to want to put a lid on conservation spending. Is there a split among public utilities?

I think there has been a difference in philosophy. Bonneville’s doing a good job trying to reconcile the differences in views. My feeling is that if the resources are needed by the region, whether it’s conservation or generation, Bonneville ought to pursue the most cost-effective available alternatives. It only makes sense to pursue conservation where you’re having your highest amount of load growth. Currently that’s in the Puget Sound, but there’s also potential in other parts of the Bonneville service area. Frankly, I’m a little puzzled by the polarization that’s occurred.

One of the things that contributes to this is that, while a lot of us are saying that we recognize there’s a need for resources and we’re in load/resource balance, it hasn’t always translated into noticeable support for the programs necessary to meet load growth. It hasn’t translated to a recognition that there may be, very likely will be, an impact on the bottom line for Bonneville’s costs. It’s a cost associated with meeting growth.

The issue of how the costs are allocated to meet that growth was addressed in part in the regional [Northwest Power] Act and can be addressed in part in the future as Bonneville decides how, for example, conservation programs are funded. I’m concerned that the
While a lot of us recognize there’s a need for resources, it hasn’t always translated into noticeable support for the programs necessary to meet load growth. 

Q. How do you perceive the Council’s power planning process so far? Do you feel utilities have been involved? Is the new plan going to be worthwhile to them?

Yes, I think so. This Power Council is very open, very accessible. It’s making a real effort to get out to consult directly with utilities or utility groups. There’s a general recognition that this plan can really make a difference, because it could provide a blueprint for how we proceed with actually developing resources.

I think the Council is doing a thorough job not only analyzing the alternatives with the staff—which is very capable—but making sure they talk to everybody. That has to go beyond just the input they take at Council meetings, and it would appear there’s a recognition of that. There appears to be a very positive outreach effort going on right now to come and meet all of us, and not just on their turf, but on our turf.

I think this discussion represents growth on the part of both the industry and the Council. We’ve learned more about some of the realities the Council has to deal with in today’s environment. Similarly, the Council’s learned more about some of the real world concerns utilities have—meeting load, satisfying customer needs, the reality of actually having to develop a resource and all that entails.

I was very encouraged to hear, for example, that one of the Council members met recently with some state agencies to talk about their concerns related to small hydro development in Washington. I’m not sure what came out of that meeting, but just the fact that he took the time to do it, I thought, was significant. What that tells me is they’re willing to take a proactive role to try to see some of the things in their plan actually come to fruition. And I think they’re in a unique position to do that.

The Council is viewed, and I think rightly so, as objective and credible and trying to balance competing concerns. They can play a very helpful role in seeing that some of the things in the plan are more than just resources on paper.

Q. What would you like to see in the new power plan?

I think one of the concerns a lot of us have is the region’s ability to develop necessary resources in a timely manner. Maybe I’m just more sensitive to it, being a westside utility, but we’ve been looking at rates of growth recently that are quite a bit higher than most forecasts have been predicting long term. Maybe that trend will continue, maybe it won’t, but if it does, we’re looking at needs for additional resources early in this decade. And given the lead time, the licensing, siting, permitting requirements for most resources, that presents a real problem.

So while I think the Council’s plan ought to look down the road and be long term, I see the need for a near-term component as well. I would like to see that addressed as part of the plan, a recognition that there may be some hard decisions, some tough steps to be taken, hopefully in concert—utilities, Bonneville, the Council—to meet that nearer-term need should it materialize.
And if current trends continue much longer, it will.

Q. What do you see as the proper role for the Council in the coming decade?

Certainly a big part of the Council's role and responsibility is to put the plan together. I personally would like to see them continue to remain active in helping to get it implemented as well. I can see the Council members being helpful in siting decisions, being pro-active with state agencies in that regard, helping us deal with and balance concerns state agencies might have, whether it's in the small hydro area or cogeneration, or what have you. That's something that I know the utilities and Bonneville have focused on recently—not just what we do, but how do we get it done.

Q. Besides conservation, what kind of resources is Tacoma looking at?

Pretty much exclusively hydroelectric and some system efficiency improvements. We've identified in a recent survey and study significant cogeneration potential. We have a number of large industries in Tacoma, so we may be pursuing that as well. The cogeneration alternative is something we need to learn more about as a utility and as a region. In most cases, it also involves learning more about gas supply, availability, pricing and what the outlook is. In our case, and I think in other utility cases, we're not all that familiar and, consequently, not all that comfortable with the gas option yet.
I think there needs to be a recognition that firming nonfirm has potential and that there are costs as well as benefits there. We need to recognize that Bonneville and a lot of the region’s utilities derive significant revenues right now from nonfirm sales, and that has to be factored into the cost of firming nonfirm.

There are questions that are yet to be resolved, or at least better answered, about the gas option. On the surface, however, it would appear that if we were talking about operating gas turbines a few weeks or months, as opposed to some base-load operation, that there’s merit at least in exploring and considering it as part of the portfolio.

One of the things that ought to be said for gas is, if for some reason we the region or we the utility had to have some increment of new generation online in a relatively short period of time, I’m not sure what other option we would have. Siting decisions and lead times involved in permitting or licensing have become longer, not shorter. They’re very involved. Something with a relatively short lead time to construct, such as a gas turbine, has some advantages.

I think WNP-1 and WNP-3 face a number of formidable roadblocks to completion. That stops short of saying they’re dead resources. First, there would be a significant additional investment required to complete either one of the projects. The time involved to complete them exposes them to some additional regulatory risk, and the nagging question of long-term waste disposal for nuclear waste is still not resolved. That is a problem nationwide for the nuclear industry.

My perception is that nuclear simply doesn’t enjoy a large degree of public confidence at this point. My personal feeling on this is that if the only voice of support for completing the nuclear plants is coming from the utility industry, it’s not likely the plants can be completed. There needs to be a greater degree of public support from other sectors. There has to be, if not a consensus, at least a majority view on the part of a fairly diversified constituency that, while there may be some risks or costs involved with nuclear, the alternatives are less desirable.

Whether the alternatives are other forms of power generation or rotating blackouts, I don’t know at this point. Maybe we have to get farther into a supply problem before that kind of a consensus emerges.

Q. That issue has come up in connection with firming nonfirm power.  

I think there needs to be a recognition that firming nonfirm has potential and that there are costs as well as benefits there. We need to recognize that Bonneville and a lot of the region’s utilities derive significant revenues right now from nonfirm sales, and that has to be factored into the cost of firming nonfirm.

There are questions that are yet to be resolved, or at least better answered, about the gas option. On the surface, however, it would appear that if we were talking about operating gas turbines a few weeks or months, as opposed to some base-load operation, that there’s merit at least in exploring and considering it as part of the portfolio.

One of the things that ought to be said for gas is, if for some reason we the region or we the utility had to have some increment of new generation online in a relatively short period of time, I’m not sure what other option we would have. Siting decisions and lead times involved in permitting or licensing have become longer, not shorter. They’re very involved. Something with a relatively short lead time to construct, such as a gas turbine, has some advantages.

Q. Do you think that the region’s two mothballed nuclear plants [Washington Public Power Supply System nuclear projects 1 and 3] are viable options? Or are they a dead issue?

I think WNP-1 and WNP-3 face a number of formidable roadblocks to completion. That stops short of saying they’re dead resources. First, there would be a significant additional investment required to complete either one of the projects. The time involved to complete them exposes them to some additional regulatory risk, and the nagging question of long-term waste disposal for nuclear waste is still not resolved. That is a problem nationwide for the nuclear industry.

My perception is that nuclear simply doesn’t enjoy a large degree of public confidence at this point. My personal feeling on this is that if the only voice of support for completing the nuclear plants is coming from the utility industry, it’s not likely the plants can be completed. There needs to be a greater degree of public support from other sectors. There has to be, if not a consensus, at least a majority view on the part of a fairly diversified constituency that, while there may be some risks or costs involved with nuclear, the alternatives are less desirable.

Whether the alternatives are other forms of power generation or rotating blackouts, I don’t know at this point. Maybe we have to get farther into a supply problem before that kind of a consensus emerges.

Q. What other issues do you see ahead for utilities in the ’90s?

Given environmental concerns, this “NIMBY” [not in my backyard] phenomenon has become something that we have to deal with. It’s probably at least in part a product of past sins, errors and omissions by industry—whether it’s utility industry or other big business or government. You see a fairly deep-seated mistrust of government or large industry, combined with a very personal interest in what goes on in your own community and neighborhood.

I see a number of things that have to happen to deal with that, because I think it’s going to be a major factor in the ’90s, particularly if you talk about doing small projects, maybe some at the local level. That could involve the Council in a proactive manner. We will need somebody’s views that are credible and objective, someone who can come in and say, “It [the project] does a good job of balancing a lot of competing concerns.” That’s not what you typically see in these cases. A NIMBY group just comes in and says, “No,” instead of, “No, here’s a better way.”

As an industry, we have to work primarily at the local level to establish greater confidence and trust and comfort that what we’re doing is balancing a number of concerns. That’s going to be a challenge that I think is going to be part and parcel of developing resources in the future.

1. Firming nonfirm refers to backing up a portion of the additional hydropower available in wetter years, so it can be used to meet guaranteed power needs. Gas-fueled turbines are one alternative.
The recipe for squeezing more electricity from Pacific Northwest hydropower dams may involve drought-stricken California. It may also rely on windswept natural gas fields in the Rocky Mountain regions of the United States and Canada.

In the paradoxical recipe book of power planning, those locations may play a key role in stretching the Northwest's vast sources of hydroelectricity.

Power planners at the Northwest Power Planning Council calculate that the region may be able to obtain enough additional hydropower to light four cities the size of Portland, Oregon, without running more water through existing dams, changing their operations or building new dams.

Instead, that power could come from buying energy from California as a backup to the Northwest's hydropower system. It could come from using natural gas-fired turbines as a backup. Or it could come by encouraging some customers who use large amounts of electricity to use interruptible supplies rather than firm supplies whose delivery is guaranteed all the time.

These are among a number of strategies the region's utilities may use to stretch the firm supplies of power existing dams.
produce. Dubbed "nonfirm strategies" in planning lexicon, they likely will play a prominent role in the Council's new 20-year power plan for the Northwest. That plan will identify ways the region can address a possible power need that could reach 13,000 megawatts by 2010 under certain high-growth conditions.

All nonfirm strategies have the same goal: to transform what the region today considers secondary or surplus hydropower—power that is available during normal, wet years, but not in dry ones—into firm supplies of power that utilities can guarantee to customers year in and year out.

None of that additional hydropower would come from running more water through the region's existing dams or from building new hydro facilities in the region.

"The key is we have a tremendous resource, the Columbia River System, that we should try to exploit fully," notes Ed Sheets, executive director of the Council. "Can we come up with strategies to better use nonfirm power?"

Hydropower is the dominant source of electricity in the region, supplying three of every four kilowatt-hours Northwesterners consume. But dams may be able to supply even more power. Power planners speculate the region hasn't fully exploited its existing hydropower network. New strategies may allow utilities and dam operators to squeeze more power from those facilities. Since existing hydropower dams are the least expensive source of energy in the region, any scheme to stretch the amount of firm power that dams already produce would help preserve the Northwest's low-cost energy base. That would spell good news for the region's electricity-dependent economy and way of life.

Hydropower's dominance has given the Northwest some of the lowest electric rates in the country. But at the same time, low-cost hydropower has made the region disproportionately vulnerable to jumps in the price of electricity. The region has the highest per-capita electric use in the country. Many Northwest residents have all-electric homes, and numerous electricity-intensive industries are located in the region.

Four years ago, in its 1986 Northwest Power Plan, the Council—a four-state body empowered by Congress to oversee the region's long-range utility planning—outlined strategies utilities could employ to wring an extra 700 megawatts of firm, guaranteed energy out of Columbia River hydropower dams. This energy—more than enough to power a city the size of Portland, Oregon—would cost less than power the region could obtain over the next 20 years from most new conventional coal plants.

That estimate may have been too low. Today, as the Council prepares a new regional power plan, its studies suggest that a variety of strategies could allow the region to guarantee an additional 1,000 megawatts from existing dams before the year 2000 and another 1,500 megawatts by 2010.

Put another way, those strategies may allow the region's utilities to sell additional guaranteed supplies of hydropower from existing dams equal to the output of five newly built, large coal plants.

The Northwest's network of dams has the capacity to produce some 30,000 megawatts at times of peak demand. But the dams don't operate for long periods at that capacity, because they are constrained by the amount of water available at any given time.

As a result, the amount of hydropower the region can produce depends on the weather, on how much rain and snow falls during a given period. This means that utilities in the region can guarantee customers power only up to the point at which they're sure sufficient amounts of water will be available. They can't sell guaranteed supplies of power based on amounts of water they're not confident the region will receive year after year.
If utilities use too much water one year, they risk running short the next if precipitation is below normal. To reduce that risk, Northwest energy planners use a tool known as the "critical water standard" to calculate how much firm power dams can produce each year regardless of the weather.

Critical water refers to the amount of water the region would receive if it experiences a repeat of the driest years on record, which took place during 42 months in 1929-1932. Under those conditions, the region's dams could produce nearly 12,500 megawatts. Any energy dams generate above that level is nonfirm power, since its delivery can't be guaranteed year after year.

During average years, the region produces some 4,000 megawatts of nonfirm power, enough to supply four cities the size of Seattle. Because it's an unsteady source, that electricity can't power the region's firm needs, which include most residential, commercial and industrial uses. Instead, it's bought by aluminum companies for part of their loads, allowing them to run at fuller production; by utilities in the Northwest, allowing them to shut down expensive thermal power plants; and by utilities in California, allowing them also to displace more expensive thermal resources.

As the region's firm power needs grow, planners increasingly point to nonfirm power as a potential "new resource." If some of that power could be transformed into firm energy, the region would be able to exploit its cheapest resource—hydropower—without having to construct expensive new central generating facilities.

The Council has found that backing up hydropower with another resource to operate in poor water years would be one of the cheapest ways to meet growing firm energy loads.

In one sense, that's what the region has done for years, notes Tom Foley, conservation and resources manager in the Council's power planning division. In good water periods, the region's utilities have shut down expensive thermal plants, such as a large, coal-fired facility at Boardman, Oregon, or sold their output to California utilities, replacing even more costly power produced there. During dry years or peak demand periods, they've fired up those plants.

However, this may not be the most cost-effective future strategy, Foley says, particularly as the region's electricity surplus diminishes. That's because large central stations carry substantial capital and debt costs, regardless of whether they're operating. Other generating facilities with smaller fixed costs may be more economical, even with higher operating costs, if they operate sporadically. Moreover, with today's energy prices, California utilities can produce more power at lower cost than in the past, diminishing their demand for more expensive thermal power from the Northwest.

Combined-cycle combustion turbines may be one option. Similar to commercial jet airplane engines, combustion turbines run...
on natural gas or oil and can be linked to a generator to produce electricity. Combined-cycle units use the waste heat from an initial combustion turbine to run a second steam turbine. They are inexpensive to build, compared with coal or nuclear facilities, although their operating costs, which depend on gas prices, can be relatively costly.

They’d lie idle during wet years, only firing up in dry periods or when power operators are unsure that reservoirs will refill. Between 60 percent and 70 percent of the time they’d not be used, according to recent Council estimates.

However, at least one gas utility observer suggests that estimate may be high. “It has been difficult for us to get an idea of how combustion turbines would really be used,” says Dwayne Foley [no relation to the Council’s Tom Foley], vice president of gas supply and pipeline relations at Northwest Natural Gas Company in Portland. “Once you’ve built $500 million worth of combustion turbines, the owners will have an extraordinary temptation to use them. If you’re running your operations on incremental economics, you’ll run quite a bit of the time.”

At current and projected natural gas prices, the Council figures that a network of combustion turbines could allow the region to produce an additional 1,000 megawatts of firm hydropower by the year 2000 and another 1,500 megawatts by 2010. That power would cost less than energy from most conventional coal plants the region’s utilities could build to obtain the same amount of electricity.

Moreover, new cogeneration facilities in California that produce electricity as a by-product of other industrial efforts may have power to sell. “We know that, because of the construction of a lot of cogeneration plants, there will be a lot of facilities that run 24 hours a day in California,” notes Sheets. “Could we buy cogeneration power during the off-peak hours to let our reservoirs fill during dry years?”

Other strategies may be cheaper still. Power may be available in a number of markets in California and the Desert Southwest. For example, California utilities have some 15,000 megawatts of gas-fired capacity installed today, a large portion of which is near retirement. Rather than build turbines in the Northwest, it may be cost-effective for the Bonneville Power Administration or the region’s utilities to keep those California plants in running order to use as backup, the Council’s Foley notes.

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Solar, geothermal and wind resources need testing.

Geothermal, wind and solar energy are among the Northwest's most promising new renewable resources, but their future is obscured by technical, environmental and institutional clouds. So how does the Northwest clear the view and ensure that the region has the expertise to develop these resources when they are needed? This is one of the issues the Northwest Power Planning Council is wrestling with this year as it develops a new 20-year electric power plan for the region.

These renewable resources are attractive because they are just that—renewable. They don't depend on ever-decreasing supplies of oil, gas or coal. Their fuel is...
Power from geothermal and wind sources, and possibly from solar, could be needed within the next 20 years.

fundamentally free—sunlight, hot underground water and wind. And they usually come with significantly fewer social and environmental drawbacks than other sources of electricity.

What has slowed their development in the Northwest is their cost, relative to other power resources and the past decade's surplus of electricity. But technological refinements have decreased their costs in recent years and improved their reliability, making them increasingly attractive at a time when new resources are likely to be needed.

The Council's studies in preparation for the new power plan have concluded that power from geothermal and wind sources, and possibly from solar, could be needed within the next 20 years if the Northwest continues to grow at or near its current pace. But until the availability of these resources is confirmed by practical demonstrations, an accurate reading of how much the Northwest can expect from these sources remains nebulous.

Over the past year, the Council's Research, Development and Demonstration (RD&D) Advisory Committee has been evaluating renewable resources and developing plans to help make the resources available to the region. The committee includes representatives from government agencies, utilities and renewable resource companies.

This spring, the committee proposed strategies for testing geothermal, wind and solar resources. These strategies were compiled and released as a Council issue paper (publication #90-5). Fine tuned by public comment and Council discussion, these strategies, or "confirmation agendas," will likely be included in the draft power plan. Other renewable resources are also being examined, but these three—geothermal, wind and solar—are being looked at first, because they have the greatest potential to offer the Northwest, and they are closer to being viable power generating resources.

Geothermal

Geothermal power—using naturally occurring underground hot water to make steam that drives turbines to produce electricity—is not the exotic technology that it once was thought to be. Throughout the world, there are more than 200 plants online, generating enough electricity—about 5,400 megawatts—to power more than five Seattles. These plants are proving that geothermal electricity can be reliable and cost-effective.

However, in the Pacific Northwest, the power surplus of the 1980s and low electricity prices made geothermal development anything but cost-competitive. Geothermal explorers and developers turned their attention to California, Nevada and other areas of the country and the world, where electricity was in short supply and geothermal was a comparative bargain. As a result, the Northwest's geothermal resources remain a technical mystery, and the region is handicapped in its effort to obtain geothermal power.

Furthermore, more than most renewable resources, geothermal development poses environmental and land-use conflicts that could hamstring development. This is because many of the most promising geothermal sites are located near national parks, wilderness areas and other important natural landmarks.

Despite these problems, the Council estimates that 350 average megawatts of geothermal energy could be available for development in the Northwest over the next 20 years at costs of 6 to 10 cents per kilowatt-hour. Commercial plants could be in service as early as 1997. Much more additional energy—perhaps several thousand average megawatts—might be available from unconfirmed sources.
To demonstrate whether geothermal can become a viable resource in the Northwest, the Research, Demonstration and Development Committee put together a four-part agenda:

- Create and maintain a data base containing geothermal resource and power plant data for active North American sites.

- Before development begins in the Northwest, assemble information on existing environmental conditions at promising geothermal resource areas. This would provide more reliable estimates of the environmental impacts of geothermal power plants, facilitate the study of possible cumulative impacts from several plants in the same area, and shorten the lead time for building plants.

- Work with state and local governments, geothermal developers, environmental organizations and others to reduce the potential for land-use and environmental conflicts. This might be done through comprehensive land-use plans, zoning, site development standards and state siting council regulations.

- Finally, develop a demonstration program to confirm the resource at several promising areas. These demonstration projects would have several benefits including confirming that the resource can be developed, providing an opportunity to refine geothermal technology for Northwest conditions, identifying needed environmental controls specific to the Northwest, confirming whether more of the resource is available for development and shortening the lead time to develop those additional resources.
Wind

While wind farms are common in California, the Northwest has little satisfactory experience with this resource. Only two commercial wind power farms were ever built in the Northwest, but these were built with technology that is now outdated, at sites with poorly understood wind conditions. Only one of these wind farms continues to operate. A few residential-scale turbines have been installed at sites with sufficient wind. The few larger units that were experimented with in the region were prototypes, not commercially proven units.

In California, the high cost of other sources of energy, favorable tax incentives and extensive studies of the actual wind characteristics in the state provided a basis for the rapid development of wind power. Wind now supplies about 1 percent of that state's electricity.

Something like that level of development could come to the Northwest. The Council estimates that there is a good possibility that 400 average megawatts of wind energy could be available for development at costs ranging from 8 to 11 cents per kilowatt-hour.

In addition, the potential exists for much more wind power, particularly along the eastern front of the Rocky Mountains in Montana. But development of these resources will require settling questions about the cold-climate operation of wind turbines (something not experienced at California's wind farms) and additional transmission capacity between eastern Montana and the region's western population centers.

The agenda the research committee is recommending for wind is in many ways similar to that recommended for geothermal—collect data and sponsor a demonstration project. While it was not completed as this story went to press, the wind confirmation agenda's basic elements are likely to be:

- Assess the feasibility of developing promising Northwest wind resource areas,
- Measure the quantity and quality of wind resources at selected sites,
- Resolve major uncertainties and risks to development at selected wind resource areas,
- Develop a pilot project to resolve technical uncertainties regarding wind machine operation at cold Northwest sites,
- Monitor the long-term (over several years) variation in regional wind resources,
- Develop a commercial-scale wind farm at a representative Northwest site to demonstrate the cost and performance of wind farms under Northwest conditions, and to shorten development lead time for subsequent projects at that site.

Solar

Solar resources are divided into two broad categories of technologies—solar thermal energy systems and photovoltaics. Solar thermal systems are similar to conventional steam-electric generating plants in that they convert heat into electricity via a turbine generator. Photovoltaics convert the sun's energy to electricity without moving parts by using the electrical properties of the semiconductor materials used in the construction of photovoltaic cells.
Both of these are proven technologies and are used currently in a variety of ways throughout the world.

Jeff King, the Council's senior resource analyst, reports that "solar's costs are continuing to decrease, and the performance of the technologies is improving. In fact, the developer of one design, the parabolic trough with natural gas backup, reports it to have costs of 7 to 8 cents per kilowatt-hour. If this is accurate, it could be competitive with coal-fired power plants. But these estimates are based on a California site, and costs would be somewhat higher in the Northwest."

At the right costs, solar could be used in this region. For example:

- A solar resource could be combined with a natural gas resource. The gas would back up the solar when the sun didn't shine.

- Because dry years are often sunny years, the combination of solar and natural gas could replace some of the hydropower lost in drought years.

- A stand-alone solar resource could be used as a “must-run” resource. That is, all solar energy that’s produced would be used. Output from other stand-alone resources could be used to fill in when solar is not available.

- For applications such as irrigation pumps, where energy use peaks in the summer and transmission lines are scarce, solar plants could provide electricity without new transmission lines.

- Photovoltaics also could be used in remote applications to avoid running transmission and distribution lines to relatively small loads.

The research committee produced the following list of actions to help develop the solar resource in the Northwest:

- Collect improved solar insolation data for the Pacific Northwest. This data is extremely important to predict solar’s contribution to the region’s electrical system and to plan for appropriate resources to complement solar.

- Have the Northwest participate in “PV-USA—Photovoltaics—Utility Scale Applications,” an ongoing project, sponsored by several utilities including California’s Pacific Gas and Electric, the U.S. Department of Energy and the Electric Power Research Institute (a utility research organization), which monitors the development of photovoltaic technology and constructs small-scale demonstration projects.

- Assess the opportunities for applying solar photovoltaic systems in the Northwest and the constraints that may inhibit these applications.

- If necessary, undertake follow-up activities to resolve region-specific constraints to promising photovoltaic applications. These might include specialized demonstration projects and building code and zoning amendments.

The bottom line

The committee estimates that the costs of the proposed wind and geothermal confirmation agendas during the years prior to the demonstration project actually coming into service are in the range of $500,000 to $1 million dollars each year.

1. Insolation is the rate of solar energy falling on the earth’s surface.
The Council is looking at ways to spread these costs out among those who will benefit from the resources. Most of the actions should have regionwide benefits, and the Council and its advisory committee believe that the costs should be spread as equitably as possible among the region’s ratepayers. In the past, Bonneville has been looked to as the source of funding for this type of project, but it is clear that over the next 20 years, Bonneville will not be the sole entity acquiring new electrical resources. One promising approach to spreading the costs is that these actions be sponsored jointly by several utilities and Bonneville.

Bonneville has proposed a partnership or joint contract approach for the geothermal demonstration program. In this case, Bonneville or another utility would take the lead, contracting with other utilities for support of specific activities.

Sue Hickey, assistant administrator for energy resources at Bonneville, spoke for many who commented on the proposed confirmation agendas when she told the Council, “The approach taken by the geothermal confirmation agenda—of voluntary collaboration by regional utilities—should be encouraged as a model for these kinds of activities. The confirmation agenda should encourage utilities to collaborate on resource projects of specific interest to themselves while also benefitting the region. This limits the project management to a focused group of participants who are providing the resources for the project.”

K.C. Golden, executive director of the Northwest Conservation Act Coalition, stressed in his comments the importance of the complete renewable resource agenda to the Council. “The proposed agenda may well prove to be the single most important action item in the 1990 plan,” he reasoned. “Because these actions may be preconditions to acquisition of some of our highest priority resources, they are every bit as critical as more direct resource acquisition strategies. ...Absent the Council’s leadership in this effort, we are apt to fall back on what we know best but want least. An aggressive confirmation agenda is our best hope of never getting into that situation.”

Debate on this issue will undoubtedly continue throughout the development of the new power plan. The research committee’s final recommendations on this issue and on the agendas for these resources will be included in the draft plan. Debate will continue after that, until the Council makes its final decisions later this year.
Commercial structures can be designed to use 30-percent less electricity for heating, cooling, lighting and other operations than most current building practices call for. In areas such as the Northwest’s Puget Sound, where the commercial sector is growing rapidly, energy-conscious design and construction can make a tremendous impact not only on the energy bills of the resident businesses, but also on the total energy needs of the area.

But it takes efficiency-minded designers, architects and engineers to dream up those energy-lean edifices. And it takes energy education to make good students into good designers, architects and engineers.

The Washington State Energy Office has taken that concept to heart by concentrating on getting the best energy conservation training for the state’s architecture, design and engineering students. Consider it an investment in the future.

Washington’s State Energy Office works with architecture classes to build efficiency for the future.

by Jim Erickson
Washington State Energy Office

STUDENT
ENERGY
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by Jim Erickson
Washington State Energy Office
David Scott, a Washington State University architecture professor and earth shelter advocate who has been preaching energy awareness in design for the past 20 years, says his objective is to produce graduates who have the savvy and discipline to routinely perform comprehensive energy analysis on the structures they design. He maintains that having architects and engineers who incorporate energy efficiency into their projects pays dividends for society as a whole. "Being able to look at energy options at the conceptual level produces more energy-efficient buildings. And that's good for the public, because you get better design for less money," says Scott.

"We've seen what can happen when buildings are designed and built right," explains Tony Usibelli, head of the State Energy Office's commercial and industrial energy section. He cites the Northwest's Energy Edge and Design Assistance programs sponsored by the Bonneville Power Administration as two demonstration programs. "Buildings in the Energy Edge program were designed to use 30 percent less electricity than ones that would have been built without Energy Edge features."

With that in mind, the energy office—­with funds provided by Bonneville—introduces students to the importance of energy-wise design by offering programs at universities, community colleges and vocational schools in Washington. This is done in a variety of ways.

The State Energy Office and Bonneville sponsor lectures at the University of Washington and Washington State University. The lectures are an opportunity for architecture and engineering students to hear nationally renowned authorities, such as William Lam, a lighting designer and author who teaches at Harvard's School of Design. The lectures often draw 100 to 200 students.

Through an energy fellowship program, architecture and engineering students can apply for energy office-sponsored internships with commercial design firms. The internships provide students with a chance to put to the test in the "real" world what they've learned. They obtain field experience and gain insights into energy-saving design strategies.

Through mechanical design projects in the classroom, seniors can employ their know-how to the realistic needs of a business. The energy office has helped bring practicing, professional engineers into the classroom to work with students. Recently, one team of University of Washington mechanical engineering students worked on the design for a hypothetical new corporate headquarters building.

Another team prepared a proposal covering the analysis, design and construction of a heating, ventilating and air-conditioning (HVAC) system for a hypothetical bank.

For approximately two years now, students at the University of Washington and Washington State University also have used computers purchased with Washington State Energy Office funds to do energy analysis in building design simulation. "We've got nine work stations," Washington State University's David Scott explains. "The software allows students to do energy analysis. I'd like to have 25 more, because then every student would have access to software. My goal is to get them to do energy analysis without anyone telling them to do it."

In other words, he wants it to become second nature. But he also would like more faculty members to think about energy conservation in their design curriculums.

"I'd say about one-third of the 22 faculty members are tuned in to this way of thinking," acknowled...
edged Scott. "What we're going to have to do is partially re-educate faculty, introducing them to the capabilities so they feel that energy is an important element in design."

Still, the students are really the key, as Scott noted. "Once a student knows how to run computer algorithms, regardless of what a faculty member values, students who believe in energy [conservation] always carry their values with them."

Normally, Scott conceded, the rule of thumb is it takes five to 10 years out of school for students to have an impact on society. He doesn't think it has to be that way. "With proper training that includes computer modeling, there's no reason they shouldn't start having an impact a month out of school," he asserted.

"That's what I'd like to see."

Creighton Depew, a University of Washington engineering professor, would like to see that, too. He is grateful to have a professional engineer, Keith Elder, visit the classroom to provide insights into energy and energy codes, because he (Depew) isn't as knowledgeable in that area.

"This is important information for students who, in a few years, are going to be the designers and implementors," said Depew.

One associate professor who has shed a lot of light, both literally and figuratively, on architectural design is the University of Washington's Marietta Millet. She helped create the Lighting Design Lab in Seattle, a Pacific Northwest regional facility set up to help designers, architects and commercial building developers incorporate efficient lighting into their structures. It is operated by Seattle City Light, and is sponsored by a variety of agencies, including the Northwest Power Planning Council, the Natural Resources Defense Council, Bonneville and the Washington Energy Office.

The lab features state-of-the-art lighting for office and other commercial uses, along with a variety of new lighting controls. Mock-up, computer modeling and daylighting areas may be set up.

Millet is encouraged by the lighting-efficiency developments, stating, "I'm seeing much more awareness of lighting design issues. The internship program has worked well. Some students who were placed as lighting designers have gone on to focus in that area."

One student who has "seen the light" and will be employing her knowledge in her work as well as teaching it to others is Mary Guzowski, a University of Washington graduate. Guzowski, who plans to teach at the University of Wisconsin in Milwaukee next fall, said she "got the full picture" during her architectural courses at the University of Washington, including classes in lighting and energy-use calculation.

"There were a lot of opportunities for students to apply what they learned," she recounted. "I was heavy into [computer] modeling. I think modeling is a valuable tool."
She served an internship through the State Energy Office program, and had the good fortune to work on lighting design, energy calculations and, of course, the usual architectural drafting.

While efficient lighting is her personal bent (she has set up her own lighting studio in her home), she recognizes that there's more to design than just lighting.

"Energy conservation is much deeper," Guzowski related. "It's how you select buildings, the size of openings, the actual design of the building, the relationship of landscape, whether a building is 'dense' or 'linear,' and so much more." She expressed excitement about teaching, noting, "I'll be passing on energy-design knowledge to other students. I feel good about that."

While efforts are being made to educate prospective architects and engineers, there appears to be more that could be done among those already immersed in their chosen careers.

Paul Rising, a 1974 Washington State University graduate and a partner in the Tacoma architectural firm of Burr, Lawrence, Rising, certainly believes that. "I'm a bit disappointed that a lot of architects who seem to be energy-wise when it comes to HVAC systems still design buildings that tend to sprawl, are less compact, have more surface area than optimum and aren't taking full advantage of daylighting as a resource," said Rising.

Rising is hopeful that things will change, however. The Washington State Energy Office is doing its part to push that along, with help from such professional associations as ASHRAE, the Illuminating Engineering Society and the American Institute of Architects. Together they are sponsoring professional development seminars for practicing architects, HVAC engineers and lighting designers. The training covers new approaches in commercial design, as well as retrofit strategies for business space.

Trying to help out in his own way, Rising has taught a couple of classes at his alma mater. Furthermore, his firm has had summer interns who have gotten hands-on experience, which included working on daylighting and building design strategies. Burr, Lawrence, Rising is on the leading edge, gaining particular expertise in the design of energy-efficient educational facilities. The firm won a national award for its design of Ocosta Junior and Senior High School in Westport, Washington.

"Energy has to be an integrated element in any design," he observed. "Let's not beat it to death, but energy has to serve a function."

Moreover, he and others believe it is worthwhile to educate future architects and engineers so they will be more versed in the values of well-designed, energy-efficient buildings.

"Students who believe in energy conservation always carry their values with them."
The Bonneville Power Administration plans to clean its electrical equipment in western Oregon and western Washington with biodegradable cleaners made from citrus and mint plants rather than with toxic solvents.

The federal power agency in the Northwest will test new environmentally safe cleaners at 143 power substations in the two states. Electrical equipment runs best when it is clean, and for years chlorinated solvents—some of which contaminate groundwater supplies or have been linked to cancer in laboratory tests—have been the preferred cleaners at Bonneville and utilities. Successful tests may prompt Bonneville to use the new solvents throughout the region, the agency said. [Source: Bonneville Power Administration, News Release, 4/17/90.]

The proposed agreement calls for a halt to the “irrational and wasteful” catch of Pacific salmon and steelhead on the high seas by fishing fleets. Fishing boats from Japan, Taiwan and South Korea—using huge monofilament drift nets 30 feet deep and miles long to catch squid on the high seas—have long been accused of decimating salmon and steelhead populations.

The proposed agreement, which also must be approved by Japan and Canada, would be the first step toward protecting ocean-migrating fish that spawn in each country. [Source: The (Portland) Oregonian, 3/25/90.]

The Bonneville Power Administration has set up toll-free hotlines to inform building professionals about new energy-efficient products and technologies.

The hotlines, run for Bonneville by the Washington State Energy Office, will give utilities, architects, designers and engineers access to up-to-date information about products and technological breakthroughs, as well as access to technical experts. The service can be reached at 1–800–872–3568; computer users can tap into the service’s electronic billboard via modem at 1–800–762–3319. [Source: (Bonneville Power Administration) Journal, 4/90.]
Billionaire industrialist J.R. Simplot plans to install cogeneration facilities at up to 20 of his company's Idaho facilities. The head of the Idaho company bearing his name says that the first equipment will go into Simplot's food processing plant in Caldwell within the next five years. Depending on power demand, it will produce as much as 100 megawatts of electricity using waste heat produced from gas turbines that provide steam for food processing. [Source: The (Boise) Idaho Statesman, 4/3/90.]

The Bonneville Power Administration and Oregon State University opened the region's newest fish-disease laboratory in April. The 9,300-square-foot facility on the Willamette River in Corvallis will study how to detect, prevent and control diseases that infect wild and hatchery-bred salmon in the Columbia River Basin. [Source: (Bonneville Power Administration) Journal, 4/90.]

Indian tribes in Washington will jointly manage with the federal government public lands behind Grand Coulee Dam.

Under an agreement negotiated this spring, the Colville Confederated Tribes and the Spokane Tribe will become full partners with the U.S. Bureau of Reclamation, the National Park Service and the Bureau of Indian Affairs in managing land behind the central Washington hydro-power dam.

This is one of the first times that tribes will help manage non-Indian public lands. In the past, the Park Service oversaw non-Indian reservation land along 151-mile-long Lake Roosevelt behind the dam, while the tribes managed the reservation property. [Source: Tri-City Herald (Pasco, Washington), 4/15/90.]

The West leads the nation in new job creation, according to a panel of western economists surveying U.S. Bureau of Labor Statistics. Nevada is well out ahead of the nation with 8.32-percent growth. Idaho, Washington and Oregon are in the top seven states, with non-agricultural jobs increasing at 5.42 percent last year in Idaho, 5.25 percent in Washington and 4.38 percent in Oregon. Montana, with only 2.67-percent job growth, still lags behind the region, falling in the twenty-fifth slot. Nonetheless, even Montana is only slightly behind the national average of 2.84 percent.  [Source: Western Blue Chip Economic Forecast, Volume 4, Number 4, 4/90.]

—Compiled by Gordon Lee

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<th>Nonagricultural Job Growth (Percent change: 1989 over 1988)</th>
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<td>Montana</td>
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Source: U.S. Bureau of Labor Statistics
CALENDAR

July 11–12—Northwest Power Planning Council meeting at the Outlaw Inn in Kalispell, Montana.

July 23–27—“Goodwill Games: Energy Conference” at the Stouffer-Madison Hotel, 515 Madison Street, Seattle, Washington. U.S. and Soviet Union energy experts meet to discuss energy conservation and least-cost planning. For more information: Judi Hertz, Northwest Power Planning Council, at the numbers listed below.

July 29–August 3—“Indoor Air ’90: The Fifth International Conference on Indoor Air Quality and Climate” in Toronto, Canada. Sponsored by the Building Owners and Managers Association International, the Center for Indoor Air Research, U.S. Department of Energy and others. For more information: Indoor Air ’90, c/o Canada Mortgage and Housing Corporation, 682 Montreal Road, Ottawa, Ontario, Canada K1A 0P7, 613-748-2714 or 748-2715.

August 8–9—Northwest Power Planning Council meeting in Oregon.


August 20–24—1990 International Symposium on Geothermal Energy in Kailua Kona, Hawaii. For more information: Geothermal Resources Council, P.O. Box 1350, Davis, California 95617-1350, 916-758-2360.


September 12–13—Northwest Power Planning Council meeting at Templin’s Hotel in Post Falls, Idaho.


A more detailed calendar of Council committee meetings and consultations is carried each month in Update! See order form on back cover.

—Compiled by Ruth L. Curtis

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NORTHWEST ENERGY NEWS

Reprinting is encouraged. Please credit the Northwest Power Planning Council.

The Northwest Power Planning Council is required to develop a program to restore the Columbia fisheries and a regional electric energy plan emphasizing cost-effective conservation and renewable resources.

Executive Editor: Carlotta Collette
Art Director: Stephen Sasser
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Production: Judy Gibson

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COUNCIL PUBLICATIONS ORDER FORM

Please send me a copy of the following publications of the Northwest Power Planning Council. (Note: not all publications are available immediately, but they will be sent to you as soon as possible.)

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<tr>
<td>□ Draft Power Plan (available midsummer)</td>
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<tr>
<td>□ 1986 Northwest Power Plan</td>
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<td>□ 89-1 1989 Supplement to the 1986 Northwest Power Plan</td>
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<td>□ 1987 Columbia River Basin Fish and Wildlife Program</td>
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<td>□ 1990 Directory of Organizations</td>
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<tr>
<td>□ 90-9 Yakima Production Project: Review of Preliminary Design Report</td>
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<tr>
<td>□ 90-11 Draft Tenth Annual Report of the Northwest Power Planning Council</td>
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Mailing Lists

Please add my name to the mailing lists for the following newsletters. (Note: do not check if you already are receiving them.)

□ *Northwest Energy News* (this bimonthly magazine)
□ *Update!* (monthly public involvement newsletter that contains the Council meeting agenda, deadlines for public comment and a more detailed publications list)

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(Or call Judi Hertz at the Council's central office, 503-222-5161, toll free 1-800-222-3355 in Idaho, Montana and Washington, or 1-800-452-2324 in Oregon.)