Council Northwest Power and Conservation Council
QUARTERLY
Spring 2004

Striking a Balance Between Energy and the Environment in the Columbia River Basin

A Primer on the Fifth Power Plan: A Guide for Our Energy Future

The Northwest is unique in how it plans its energy future. Through the Northwest Power and Conservation Council's power plan, strategies to assure the adequacy of the power system are developed in an open forum where the public can voice its opinion.

Why is this so important? With the building of the region's first mainstem Columbia River dams in the 1930s, the Northwest would have access to inexpensive electricity for many years. But by the mid-1960s, increased demand led energy planners to believe that hydro-generating resources would soon be unable to keep up with the demand for electricity.

In the 1970s, the Bonneville Power Administration—the federal agency that markets the electricity generated at federal dams on the Columbia River—began working with public and private utilities in the region to develop major new generating resources, including several nuclear plants. But the projects proved to be hugely expensive and electricity rates, as a consequence, skyrocketed. Growth in electricity demand fell far short of earlier projections, in part because of the high rates. The region was left with an energy surplus in the early 1980s, eliminating the need for most of these new and expensive generating plants. Many of the projects were abandoned, and the region was left with the then-largest municipal bond default in U.S. history. Northwest customers continue to make payments on part of this debt.

Amidst the turmoil caused by this massive planning failure, Congress enacted the 1980 Northwest Power Act authorizing the states of Idaho, Montana, Oregon, and Washington to form the Council, an interstate agency. The Act gave the region a measure of control over Bonneville, which until then, was not directly accountable to the region it served. Prior to 1980, Bonneville did not have explicit authority to acquire new generating resources.

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What's Inside

Notes from the CHAIR

Judi Danielson

The Council expects to release its draft Fifth Power Plan for public comment sometime in early summer.

The power plan comes after the 2000-01 Western power crisis when wholesale electricity prices spiked dramatically. It also had serious consequences for fish and wildlife. In the spring of 2001, to make sure we would have enough power, the amount of water normally spilled at the dams to help fish migrate was reduced. The power plan recommends ways we can ensure the adequacy of the region's power supply, while also enabling us to fulfill our obligation to protect fish and wildlife. This edition of the Council Quarterly features a primer on the Council's power plan to explain the issues we face and how the plan addresses them.

Along with the release of the draft power plan this spring, communities throughout the Columbia River Basin will be submitting their plans for fish and wildlife to the Council on May 28. These subbasin plans are developed by local stakeholders and outline the fish and wildlife priorities for their watershed. The review of these subbasin plans will continue through the summer and fall, concluding at the end of the year when the Council makes its approval decisions.

The Council anticipates a particularly busy summer as we engage the region in our decisionmaking, and we'll be updating you on the status of both these processes in the months ahead. CQ

A Primer on the Fifth Power Plan: A Guide for Our Energy Future

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The Act gave Bonneville this new authority, but limited it to acquiring only those resources that were consistent with the Council's power plan. The Act requires the Council to develop a power plan to assure the Northwest an adequate, efficient, economical, and reliable power supply, and to develop a fish and wildlife program to protect, mitigate, and enhance fish and wildlife affected by the dams. The Council also involves the public in making these decisions. The Council doesn't set rates; it doesn't finance or build power projects. Its power plan lays the framework for the region's energy future. Twenty years later, as the Council prepares to unveil its Fifth Power Plan this summer, the importance of its message is as relevant today as it was in the beginning.

"The main message of the plan is a lot like the message of the first plan," Power Division Director Dick Watson observes wryly. "We're coming on the heels of the West Coast electricity meltdown that has left the region with a serious hangover."

Surplus resources and increased prices replay the scenario the region faced at the Council's inception. "In the near-term, it's unlikely we'll need to develop a lot of new resources," says Watson.

The question the plan tries to answer is: What should we be doing now to prepare for the future?

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>
> *Terry Morlan*
> *Manager, Economic Analysis*

Today's Power System

Not that long ago, deregulation was viewed as the future of the energy industry.

Electricity transmission and distribution, and until recent years, generation, has been what economists call a "natural monopoly." In other words, the cost of the product is less if one entity produces it. Imagine multiple sets of distribution wires and poles running side-by-side down residential streets—not a very efficient system. So to minimize the cost of delivered electricity in a given territory, it's best if one entity has a monopoly. But without competition, that entity could charge prices much higher than it costs. "How we deal with that," says Ken Corum, senior economist, "is we regulate it."

Twenty years ago economists began to argue that generation wasn't a natural monopoly. The emergence of relatively inexpensive natural gas combined-cycle technology made the prospect of a competitive generation market feasible, and political support for deregulation grew. Combined-cycle plants use the waste heat from gas turbines as heat energy for steam turbines.

"During the mid-1990s," says Senior Resource Analyst Jeff King, "many in the industry believed that deregulation, by introducing the risks and rewards of the marketplace, would largely replace the need for 'centralized' resource planning." When the wholesale market was deregulated by federal legislation in 1992, competition was expected to increase consumer choices, generation efficiency, and lead to greater innovation. It was also expected to contribute to better management and sharing of the risks involved in power plant construction. But the unpredictability of factors like weather and fuel prices greatly affect the market price of electricity; and uncertainties about the pace and nature of deregulation inhibited generation development—one of the important factors leading to the 2000-01 electricity crisis.

Today the power system is a hybrid. "Right now, we have a mixed market, and it's likely to stay that way for the foreseeable future," says Terry Morlan, manager of economic analysis.

"We have a deregulated wholesale power market with independent power generators operating in the market, and a largely regulated retail market, to varying degrees, depending on the state," explains Morlan.

It was the wholesale power market that experienced extreme price volatility during the energy crisis. Although local consumers and small customers were largely protected from those high prices, increased costs for utilities eventually translated into higher electricity rates for everyone.

The mixed structure of the market poses concerns about the balance of supply and demand. For utilities or independent power producers, it's not clear who is responsible

for new generation. Building a new generation plant can be a costly and lengthy process. Unless a utility or independent developer is convinced of a reasonable financial return on the investment, it's unlikely to make that commitment. Because incentives to build are weak, the region can be at risk of not building enough capacity.

"The main concern is how this mixed market works. There's concern that the lack of clarity about rules and responsibilities can discourage needed investment in generation," says Morlan. This problem contributed to the shortage of supply, along with dry weather and low river flows.

The electricity crisis was made worse, and was prolonged, by the fact that consumers didn't see the problems manifested in high retail prices, and as a result, didn't change their consumption. This allowed wholesale prices to escalate to extreme levels. One of the issues the Council's power plan tries to address is this weakness in the current market structure: the gap between wholesale market conditions and electricity use.

"Consumers need to respond to shortages in the wholesale market," says Morlan. "And yet, there's no direct connection between conditions in the wholesale market and consumers."

The plan identifies demand response as a potential tool to achieve this.

Demand Response: Bridging the Consumer, Wholesale Price Gap

Demand response," says Corum, "is when people voluntarily adjust their use of electricity in response to changes in the cost of power." Under our current power system, consumers have little incentive to make these adjustments because they don't see the wholesale price of the electricity they are using. Consumers prefer stable retail prices, but they provide little, if any, motivation for demand response.

A few years ago, many planners expected a deregulated retail electricity market to provide adequate incentives for demand response. While the Western power crisis has made people more cautious about how we would go about instituting deregulation, there are other ways to connect the consumer with the actual cost of electricity and achieve demand response.

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>
> *Ken Corum*
> *Senior Economist*

For example, on a hot August afternoon during the energy crisis, high demand and scarce supply caused wholesale market prices to spike more than 10 times above normal. But a utility can't cut off a customer's electricity just because wholesale prices are high. One way to achieve demand response is for a utility to offer payments to customers willing to reduce their load at the hours when wholesale prices are highest. The overall cost of service is reduced, mostly because of reduced investment in generators and the moderating effect on market prices. We've already seen demand response in the form of payments to large businesses that have the ability to shift or curtail their load during times of tight supply.

There are a few programs currently in place in some parts of the region. Milton-Freewater Light and Power has a program that allows the utility to control residential water heaters directly, and Puget Sound Energy ran a pilot program to directly control the thermostats of residential heating systems.

"We have pretty good indicators that suggest if we can get a reasonable amount of demand response—people taking load off the system voluntarily when supplies are tight—it may not cost all that much to achieve compared to the alternative of adding generation that runs very infrequently, and it's something we need to do to moderate high prices," says Watson.

Although it may not be something that can be put in place immediately, Watson believes we should continue to assess the availability of demand response; how much there may be and at what cost; how it could be achieved; and what approaches make sense so that in the future, when we need it, we can implement it fairly quickly.

Considering Risk

Hard at work in the Power Division are 10 personal computers, simulating the Northwest's power system. Michael Schilmoeller, senior power systems analyst, describes the model he built as a way to determine a plan that will help assure the region's power supply at a reasonable cost.

Throughout the day, the computers model hundreds of "futures" containing varying projections on such risk factors as natural gas prices, load, hydro generation, global climate change policies, and wholesale electricity market prices. What the model tries to quantify are the costs of alternative plans and their associated risks. It enables us to see the trade-offs between cost and risk for different plans of action.

"The portfolio model, as we call it, looks at a mix of resources as a way of managing risk," says Schilmoeller. Using Schilmoeller's model, the Council was able to determine two valuable methods for securing the region's power supply.

"Demand response looks promising," says Schilmoeller. "There is more to learn about its costs and how it lowers risk, but it makes sense to continue researching its potential and to identify what industries might be candidates for demand response."

The second important element continues to be conservation. "Conservation has as much value as we've identified in the past, and its average cost is below market, making it less expensive than traditional resources," says Schilmoeller. "What looked like expensive conservation 10 years ago would look like a bargain today, and might have paid for itself during the energy crisis."

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The third message of the plan is that, as a region, it doesn't look like we'll need conventional resources until after 2008. Individual utilities may have different situations.

"Ultimately," says Schilmoeller, "decisions about what gets built in the region are not made by the Council or Bonneville; they're made by individual load-serving entities."

One of the products of the plan will be a new computer application, developed by the Council, that will help individual entities build portfolio models for their own systems so they can assess their risks. Both public and investor-owned utilities will be able to incorporate risk into their energy planning.

"Good planning, to really know what resources are needed and when, is not that simple," says Watson. "Utilities can use different assumptions, and there is a need for consistent indicators and planning that incorporates risk."

"Modeling has been done in the past, but it was a rather ad hoc affair, with variation from utility to utility," says Schilmoeller. "There's also a subjective element to all this; consequently, it's very hard for utilities and regulators to communicate because we haven't had a standard method and approach to deal with this."

The Council's model, OLIVIA, should help to address this need. "It's a starting place, but at least we'll have a framework to help us get a better picture of the power system," says Schilmoeller. "This level of modeling can be very complex, and people don't have the opportunity to spend the amount of time to build these models or master these concepts," concludes Schilmoeller. "The Council's model could be the first step in getting everyone on the same page."

Where Power and Fish and Wildlife Meet

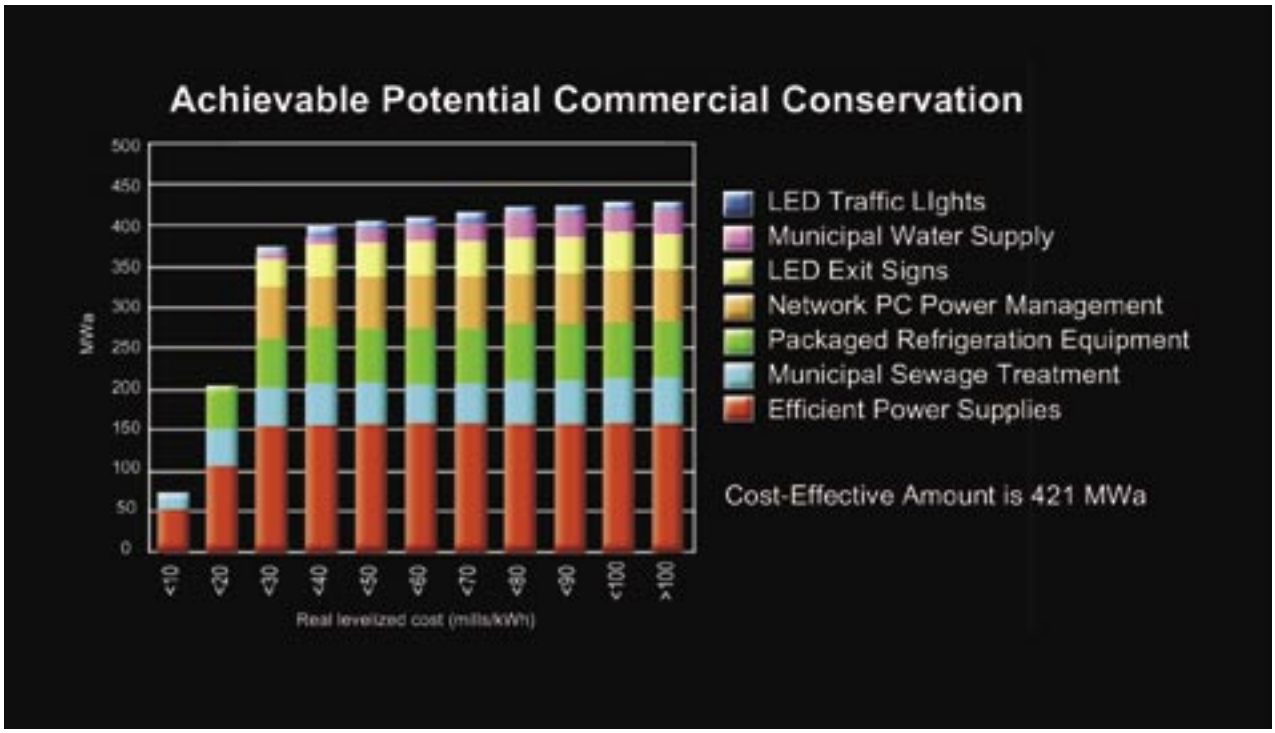
In an effort to know when power and fish and wildlife needs are out of balance, the plan attempts to quantify the relationship between power planning and fish and wildlife management. One of the issues Council members wanted to explore was how to better integrate power planning and fish and wildlife planning. In the past, says Senior Power Systems Analyst John Fazio, it has always been an informal process. He believes one key to achieving greater integration is through a better flow of information between power planners and fish and wildlife managers. "We need a direct line of communication; we've never had a direct link between the two groups before," says Fazio.

Power planners need to convey to fish managers physical data, potential reservoir elevations and river flows; and economic data, changes in generation and costs of various river operation scenarios. With this information, fish managers can better evaluate where to spend research money, develop a fish and wildlife operations curtailment plan (in the event of power emergencies) and, whenever biologically appropriate, design more cost-effective measures. Fish managers must convey to power planners fish survival data and a set of constraints or measures that will guide the operation of the hydroelectric system during crucial phases in the fish's life cycle.

It's also important, adds Fazio, to be able to assure fish and wildlife managers that the power supply we build will provide adequate levels of bypass spill and flow augmentation to aid fish migration and survival.

"Earlier plans were focused on keeping the lights on at the least cost," says Fazio. "What we're also concerned with now is protecting the region from the kind of price spikes we experienced during the power crisis; that's what Michael Schillmoeller has been working on."

One way to keep costs low and minimize the likelihood of price spikes during



Potential conservation savings in untapped commercial areas.

winter months is to draft reservoirs harder. Reservoir operations are generally guided by pre-calculated drafting and filling limits based on forecasted temperature and water conditions. During power emergencies, reservoirs can be drafted below these preset limits in order to "keep the lights on." But the more aggressively the region uses this "emergency" hydroelectric power, the less likely it is of having reservoirs at desired elevations at the beginning of the fish migration season. In order to ensure that fish and wildlife operations are not sacrificed for the sake of cost, the plan is exploring a new measurement that forecasts the probability of reservoirs reaching their desired elevations by spring. This measurement can be used to limit the region's use of "emergency" winter hydroelectric power so that fish and wildlife operations are not curtailed.

Explains Fazio, "We want to be able to have reliable electricity service, with minimal risk of price spikes and high costs, and we want to ensure adequate operations for fish and wildlife." Power planners and fish managers, working together more directly, should help in developing a plan for a power system that adequately provides for the physical, economic, and biological needs of the region.

Conservation Makes More Sense Than Ever

Developing cost-effective conservation is still one of the primary actions in the Fifth Power Plan," says Charlie Grist, senior analyst. "Conservation has always played a key role in previous plans, and we're finding more cost-effective conservation than in the last plan." The plan also looks at the ways conservation may reduce risk compared to developing generating resources.

The Council's past power plans have called for developing conservation that costs less than buying or developing new generation, transmission, and distribution. The Northwest Power Act directs the Council to give conservation a 10 percent advantage over generating resources when assessing which options are "cost-effective."

The Council's first power plan called for the development of between 660 and 4,790 average megawatts of conservation in the region between 1980 and 2000. Over that time, the region did achieve over 2,600 average megawatts of conservation savings through Bonneville and utility programs, state building codes, and federal appliance standards. This saved the region billions in power costs and undoubtedly helped to cushion the Northwest from even greater pain during the power crisis.

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The Fifth Power Plan estimates that an additional 2,800 megawatts of cost effective conservation can be achieved over the next 20 years—nearly double the amount estimated in the last power plan. It is a resource with no fuel cost or environmental impacts, and its average cost is lower than building new generation. Its disadvantage is that it is a one-time, upfront financial investment. A big initial payment can discourage customers and utilities from making the long-term commitment, even when, over time, it has many benefits.

One of the biggest challenges, says Watson, is to get people to make the kind of investments today that will help maintain the adequacy of the power system before we have another crisis.

"From a utility standpoint, their rates are high and customers are complaining. There's little immediate incentive to direct resources to potential long-term benefits when they're concerned with keeping rates from going up." But, he adds, "It's like the man says, 'pay me now or pay me more later'."

Where will conservation make gains? New technology will increase efficiencies in untapped areas. The plan looks at hundreds of conservation measures and assesses which ones could be developed to save the region money. In the process,

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Crew member from Home Visions West blows insulation into an attic.

new measures and applications are "discovered." For example, the plan has identified significant savings in commercial refrigerators, the kind used in restaurants, schools, and hospitals. So-called "packaged refrigeration"— vending machines, icemakers in hotels, and reach-in coolers in grocery stores and delis—also have conservation potential. Such appliances are currently not subject to federal efficiency standards. The average vending machine uses between 3,000 - 4,000 kilowatt hours a year, and that includes its lighting which is often inefficient. Simple low-cost measures can save 1,000 kilowatts per year in vending machines, and about 40 percent of that from lighting alone.

Even the tiny, ubiquitous plug-in transformer used for everything from cell phones to computers could be up to 50 percent more efficient. Increasing their efficiency could save, over 20 years, 140 average megawatts of electricity.

The Council's plan also examines how developing conservation may reduce risk. The Council hopes to identify and quantify any risk avoidance and risk management benefits that may be unique to conservation.

Power Supply Adequacy

An adequate power system has extra capability in order to cover times when the region experiences a poor water year, unexpected load growth, or the failure of new resources to be developed as planned. It means we have a cushion of surplus power when an unexpected event occurs.

Prior to the early 1990s, utilities, sometimes working together, determined what specific resources would be needed in order to meet load. This oversight process involved regulators and local boards, and the Council, in the case of Bonneville. The Pacific Northwest Utilities Conference Committee, among others, also conducted annual assessments. In the move toward deregulation, this process was largely abandoned, partly because of uncertainty about deregulation, but mostly because people expected the market to provide an adequate power supply. After some early success in the mid-1990s, this approach began to lead to problems. The failure to construct needed generating capacity, in part because of this planning gap, contributed to the 2000-01 energy crisis. Establishing resource adequacy standards, monitoring the status of the power system, and maintaining adequate reserves are ways we can ensure the region's energy supply in the future hybrid market environment.

The power plan includes analysis that evaluates alternative regional adequacy standards and how they would interact with the Western system, with the goal of establishing an effective regional adequacy standard.

The Future Role of Bonneville

Since its beginning in the 1930s, the Bonneville Power Administration has played the dominant role in supplying electricity to the region. But over the years, ill-fated attempts to acquire new generating resources, and controversy over how they would be paid for, prompted Bonneville customers to discuss the agency's future role in marketing power.

In the current debate, two recommendations consistently expressed in public processes on this issue are:

1. Bonneville should sell the federal power through long-term, 20-year contracts to reduce uncertainty and secure the region's hydropower for regional customers; and
2. Limit Bonneville's—and the region's—exposure to the risks of the wholesale power market by preventing Bonneville from acquiring new power supplies beyond the capability of the existing federal system, except for those customers willing to bear the cost and risk of those acquisitions.

If the region agreed to this, it would be the most significant change in the region's power system since Congress passed the Northwest Power Act in 1980.

"This is an ongoing question," says Watson. "But I think customers are ready to take on the responsibility." Another important aspect to this change is that the customer would see clearer economic signals regarding the cost of new energy resources. Because Bonneville's prices reflect inexpensive electricity from the hydrosystem, plus a little bit of higher cost wholesale market power, utilities see a melded price that often does not reflect the state of the regional power system. "It dilutes the price signal," says Watson. Consequently, utilities may not invest in cost-effective conservation or local generation opportunities that meet growing demand less expensively.

Watson believes this is the time to make the kind of institutional changes that give utilities greater responsibility for load growth. The Council has worked with Bonneville and the region to resolve this issue and released its draft recommendations on Bonneville's role in April.

Transmission

Another major issue that has far-reaching implications for the stability of the region's power system is the operation and management of the transmission system. The move toward deregulation and the opening up of wholesale electricity markets, along with changes in technology, changed the character of the traditional transmission system.

The growth of independent power producers, increased wholesale electricity trading, and the Federal Energy Regulatory Commission's (FERC) efforts to separate utility transmission and generation functions to prevent self-dealing, have made governing the transmission system more difficult. Issues of how to best manage actual power flows for reliability and economy have become increasingly troublesome. The problem of planning for, and implementing, transmission system expansion has also become much more complex. In the past, a single company or consortium linked its generation and loads to the transmission system. Today, the scenario includes an array of players—traditional utilities, independent power producers, other load-serving entities, and even some consumers—who are part of this vast, inter-connected system. The questions we need to address are: How do we make coherent decisions about what, where, and how to build? And how do we pay for it?

"One of the biggest steps to addressing these issues is the ongoing effort to create an independent transmission entity," says Wally Gibson, system analysis and

generation manager. A group of regional representatives, including Bonneville, other utilities, and regulators have been working to correct the growing problems in the regional power system. In part, their efforts are in response to FERC's proposed solution for the nation, which happens to be a bad fit for the Northwest's system. The regional group's current proposal outlines a staged process in which the independent entity takes over a limited number of functions in the beginning.

"Eventually, the structure could evolve, if it had regional support, into a more comprehensive organization," explains Gibson. "The proposal to work toward the initial stage has a fair amount of regional support, but the details need to be worked out, which we're in the process of doing."

The other important area stakeholders are working on is the need for a transmission planning organization. The 1992 federal electricity restructuring law separated transmission from generation in order to improve access to the transmission grid for non-transmission owners. But it also made integrated planning for adding generation and developing new transmission more difficult.

Efforts to establish an organization to assess the long-term requirements of the transmission system and a mechanism to encourage investments to meet those requirements are underway. "Currently, there is a group called the Northwest Transmission Assessment Committee that is exploring this issue," says Gibson. "The purpose of this kind of planning is to see what the system's future needs may be, what might be of interest, and suggest proposals that might fulfill a lot of needs.

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>
> *Dick Watson*
> *Division Director, Power*

"Not only would it be forward-looking and broad in its scope, but it would consider other options besides expanding transmission infrastructure, such as demand side programs, conservation, and building generation near load."

The Council supports the work to resolve these problems and is an active participant in improving the regional transmission system.

Future Generation

If we prove as successful in achieving conservation as we have in the past, it's unlikely we'll need additional generation development over the next few years. What resources look promising in the future? At the moment, wind, natural gas combined-cycle, and possibly coal appear to be likely candidates. To be prepared should the region require additional resources five or more years from now, the plan recommends maintaining an inventory of permitted sites for such resources, maintaining partly completed projects in a state to permit completion, and preparing for the development of the necessary transmission.

One interesting development to come out of the reduction in natural gas supplies, is the prospect for liquified natural gas as a potential alternative to traditional gas. "We may start to rely more on imported natural gas, which has historically been a regional resource," says Morlan.

Many Middle Eastern and African countries have large reserves of natural gas, often produced as a byproduct of oil production. Because these countries lack a large local market for the natural gas, it is often simply burned away. But with the rise in natural gas prices, importing it from other countries has become attractive. The gas can be collected and compressed into liquified natural gas (LNG), loaded onto specially designed LNG tankers, and shipped to LNG receiving terminals where it is re-vaporized and released into natural gas pipelines for delivery to consumers. Currently, there are four terminals on the East Coast and the Gulf of Mexico. Many new terminals are being pro-

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posed to supplement natural gas supplies in the United States.

"It seems to be the wave of the future," says Morlan. "The natural gas industry is on the verge of changing, and LNG, although its price will still be higher than what we've been used to, appears to be the most cost-effective choice for expanding natural gas supplies."

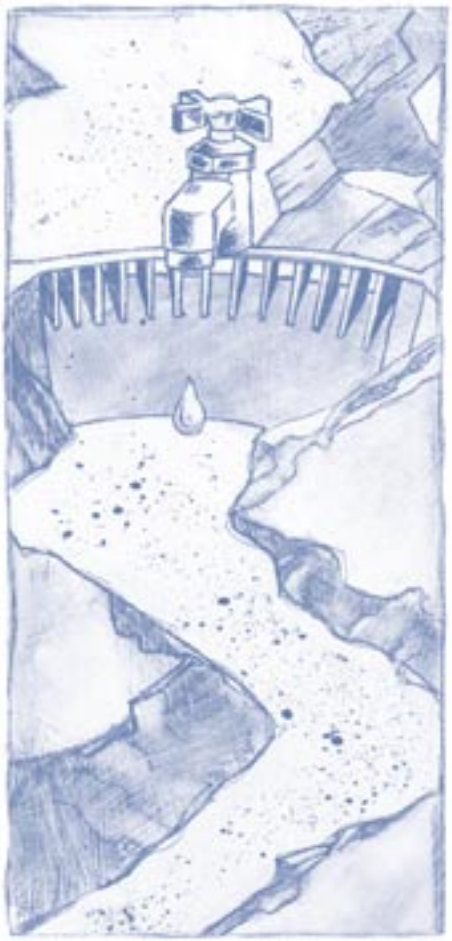
The message is still the same. "We have a potentially riskier future. Natural gas prices are more volatile than in the past, and it's now a major fuel source for electricity generation. The way the energy market operates, there are more risks, and we have to plan for those risks," says Watson.

"Insurance costs money, but it protects you from the unexpected catastrophe." CQ

A Power Plan That Meets All Our Needs

Anticipating the future is never easy, but there are methods that can help protect the region from unwanted shocks. According to Watson, it makes sense to develop low-cost resources that will save money in the near-term and provide a hedge against risk in the long-term.

Drought, Low River Runoff Could Boost Power Prices, But Not to Levels Experienced in 2001



The spring of 2004 is shaping up as warm and dry, and while that is good news for outdoor recreation, it may prove to be bad news for Northwest electricity ratepayers. That's because below-average snowpack and river runoff could reduce the amount of hydropower that can be generated. If so, electric utilities will have to turn to more expensive generators, such as natural gas-fired turbines, to meet the demand for power.

While the specter of possibly higher prices is not welcome, the good news is that thanks to the rapid construction of new power plants in response to the West Coast energy crisis of 2000-01, the region has an adequate and reliable, if potentially slightly more expensive, power supply.

According to the Northwest Rivers Forecast Center, March was extremely warm and dry throughout the West. This caused the mountain snowpack to melt and run off earlier than usual. Following on a drought, much of the runoff will be absorbed by dry soils. Reservoir storage was below the normal April average in all western states except California, the Forecast Center reported.

The April snowpack was below average throughout the West, with the exception of the Oregon and Washington Cascade Mountains, where it was about average. The upper Columbia and upper Missouri river basins were the only places in the West where the water content of snow increased in April, and even in those areas the snowpack was below normal. With only a few exceptions, the water content of snow in the Columbia River Basin ranged from 56 percent of normal in north central Washington to 77 percent of normal in the Willamette River Basin of Oregon.

Meanwhile, the Forecast Center predicted that runoff in the lower Snake River would drop to just 66 percent of normal in May. The Columbia River forecast for the January-July timeframe was revised downward in mid-April to 76 percent of normal. In contrast, the 2001 January-July runoff was 56 percent of normal, the second-lowest in more than 70 years of record-keeping.

Dick Watson, director of the Power and Conservation Council's Power Division, said that if this year were 2001 and not 2004, the runoff predictions would be ominous. CQ

Success Stories — Kootenai River

Kootenai Tribe is Working to Recover Dwindling Sturgeon Population

In Mead Idaho, the Kootenai Tribe is racing against the extinction clock to save a unique white sturgeon population that has inhabited the Kootenai River for millenia but that has not reproduced in sustainable numbers in at least 30 years. Sturgeon can live to be 100, but the Kootenai population is aging and unless more young fish live to spawning age the species likely will be extinct in as few as 20 years.

The U.S. Fish and Wildlife Service listed Kootenai River white sturgeon as an endangered species on September 6, 1994. Four years earlier, the tribe initiated the Kootenai River White Sturgeon Study and Conservation Aquaculture Project to preserve the genetic variability of the population, begin rebuilding natural age class structure with hatchery-reared fish, and prevent extinction while measures are implemented to restore the natural production of fish. Consistent with the project's breeding plan and the Fish and Wildlife Service's recovery plan, the tribe has been successfully incubating, hatching, raising and releasing sturgeon using the eggs and sperm of adult fish taken from the river and later returned. Subsequent monitoring shows the juveniles are surviving. But sturgeon don't reach spawning maturity until about age 20. Meanwhile, mature fish have spawned naturally in the Kootenai, but the eggs or the resulting juveniles don't appear to be surviving in numbers sufficient to rebuild the population.

Many changes to the natural ecosystem have occurred over the past decades, but one of the most significant changes was the construction and operation of Libby Dam, which altered the historic flow pattern in the lower Kootenai River, reducing the annual spring flows by half. The spring flows apparently were important for sturgeon spawning and recruitment, as successful recruitment has not been recorded since 1974 — one year before the dam became fully operational. Other changes to the ecosystem include diking and diversions resulting in the loss of riparian, slough and side-channel habitat, as well as the loss of productivity.

Susan Ireland, fish and wildlife program manager for the tribe, said the goal of the aquaculture project is to protect the sturgeon from extinction until suitable habitat conditions are re-established in the Kootenai River ecosystem so that sturgeon survival can improve beyond the egg/larval stage and natural recruitment of juvenile fish into the population can be restored. The program is designed to produce four to 12 separate sturgeon families per year and up to 100 adults per family that survive to breeding age. The work is being coordinated with U.S federal and state fish and wildlife agencies, and also with counterpart agencies in British Columbia, as Kootenai River sturgeon migrate back and forth across the border.

During the 11 years between 1992 and 2003, the conservation aquaculture program has released over 40,000 juvenile sturgeon of ages between 1 and 4 years. Subsequent studies showed that survival was about 60 percent for the first year in the river and 90 percent after that. The studies also showed that most of the fish in the river were bred in the hatchery. Recent capture of 659 juvenile fish by Idaho Department of Fish and Game showed that only 39 were of wild origin.

In light of the low number of wild juvenile fish and the decline in the wild adult population, the tribe and its partners in the recovery effort decided to revise the breeding program. The new program, issued in March, calls for spawning more fish and releasing more families, representing 3,000 - 4,500 fish per family annually — about double the previous amount — and releasing them at smaller sizes and younger ages. This is appropriate, Ireland said, because the next generation of fish will be almost entirely of hatchery origin. Producing more families and releasing larger numbers of fish per family should ensure that genetic diversity of the species is maintained and that sufficient numbers of fish survive the 20 or more years to spawning maturity, she said. The revised program also calls for releasing fish at more locations to take advantage of suitable habitat.

"We're taking an adaptive approach so that we can modify the plan as necessary, based on analysis of data," Ireland said. "We are in a race against extinction."

Council seeks Comments on Recommendations for Future Role of Bonneville Power Administration

To improve the long-term economic stability of the Bonneville Power Administration and its customers, the Northwest Power and Conservation Council recommends that the federal power-marketing agency fundamentally alter the way it sells electricity by allocating the output of the Federal Columbia River Power System among its customers and lengthening the terms of power-sales contracts. The Council intends its recommendations to assist a public process Bonneville will conduct this summer that could lead to changes in the agency's role in regional power supply.

The federal power system includes 31 dams and one non-federal nuclear power plant. Bonneville is required by law to sell power first to publicly owned utilities and to meet all of the demand placed on it by those customers. Because the existing federal power system cannot meet all of the demand of Bonneville's customers, the agency can acquire the output of generating resources and buy power on the wholesale market, where prices can be volatile, to make up the difference. Bonneville's customers currently pay a melded rate that reflects the cost of the purchased power and the cost of power from the existing federal system.

The Council's recommendations would have Bonneville market the output of the existing federal system to eligible customers at rates reflecting the embedded costs of the system. Service beyond the capability of the existing federal system would be provided in such a way that customers requesting that additional service bear the costs and risks of providing it. This should be implemented through long-term (20-year) contracts guided by a clear and durable statement of policy, the Council recommends. Bonneville also should continue to pursue cost-effective energy conservation and renewable resources, the Council believes.

The Council also recommends that Bonneville provide a limited amount of power for a limited period for its direct-service customers, primarily Northwest aluminum smelters. This could involve Bonneville purchases of market power. To minimize the cost to other customers, Bonneville should sell surplus power to the industries through contracts that allow the power to be interrupted in emergencies.

> "The Council intends its recommendations to assist a public process Bonneville will conduct this summer that could lead to changes in the agency's role in regional power supply."

The Council made similar recommendations in 2002, the last time Bonneville took up the issue of its future role in power supply. That process slowed, however, as the agency dealt with a financial crisis. The financial crisis resulted, coincidentally, from Bonneville's extraordinary power purchase costs during the energy crisis the previous year.

The Council's recommendations, and the public comments it has received, are posted on its website, www.nwcouncil.org. CQ

Calendar

Calendar of Council Meetings and Other Events:

May 17-20:	Affiliated Tribes of Northwest Indians mid-year conference. Chinook Winds Casino, Lincoln City, OR. Information at www.atnitribes.org.
June 2-3:	Fish Forum: A Forum on Better Results. Wenatchee, WA. Information at www.chelanpud.org/forum
June 7-10:	Wetland Plants of the Pacific Northwest. Portland State University. Information at www.esr.pdx.edu or e-mail to wmpp@pdx.edu.
June 8-10:	Northwest Power and Conservation Council. Clarkston, WA. Information at www.nwcouncil.org.
June 14-18:	Perspectives in Watershed Health in the Grande Ronde River. Portland State University. Information at www.eli.pdx.edu/watershed.
July 13-15:	Northwest Power and Conservation Council. Spokane, WA. Information at www.nwcouncil.org.

Northwest Power and Conservation Council Members

Central Office
Northwest Power and
Conservation Council
851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
Telephone: 503-222-5161
Toll Free: 1-800-452-5161

Idaho
450 West State
Boise, Idaho 83720-0062
Telephone: 208-334-6970
Council Members:
Judi Danielson, Council chair
Jim Kempton

Montana
1301 Lockey
Helena, Montana 59620-0805
Telephone: 406-444-3952
Council Members:
Ed Bartlett
John Hines

Oregon
Milton-Freewater:
410 N. Main
P.O. Box 645
Milton-Freewater OR 97862-0645
Telephone: 541-938-5333
Council Member:
Melinda S. Eden, Council vice chair

Portland:
851 S.W. Sixth Avenue, Suite 1020
Portland, Oregon 97204-1347
Telephone: 503-229-5171
Council Member:
Gene Derfler

Washington
Vancouver:
110 "Y" Street
Vancouver, Washington 98661
Telephone: 360-693-6951
Council Member:
Frank L. Cassidy Jr. "Larry"

Spokane:
W. 705 First Avenue, MS-1
Spokane, Washington 99201-3909
Telephone: 509-623-4386
Council Member:
Tom Karier

Council Quarterly
is produced four times a year by
the Public Affairs Division
of the Northwest Power and
Conservation Council.

Northwest Power and Conservation Council

851 S.W. Sixth Avenue
Suite 1100
Portland, Oregon 97204

Telephone: 503-222-5161
Toll free: 800-452-5161
Web site: www.nwcouncil.org

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