

# POWER of the RIVER

The continuing legacy of the Bonneville Power Administration in the Pacific Northwest

Foreword by

**CONGRESSMAN  
NORM DICKS**





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*Norman "Norm" Dicks has represented Washington's 6<sup>th</sup> Congressional District, including the northwest corner of the state and most of Tacoma, since 1977. He is the Ranking Member of the House Appropriations Committee and has been influential on national security, environmental and economic development issues. He has worked closely with BPA on many issues such as securing the access to capital needed to operate and maintain BPA's transmission system. He is also a longtime champion of the value of the Columbia River system, guided by his mentors, former Senators Warren Magnuson and Henry M. "Scoop" Jackson, and former House Speaker Tom Foley. "You don't just go back there to vote," he says of Washington, D.C. "Maggie, Scoop and Tom Foley helped teach me that your job is to get things done."*

## FOREWORD

*By Congressman Norm Dicks*

# A Powerful Clean Energy Vision

Powerful vision may be one of the greatest gifts Americans can give coming generations. The first 75 years of the Bonneville Power Administration and the Columbia River hydroelectric system prove that, time and again.

The vision that took shape when President Franklin D. Roosevelt signed the Bonneville Project Act in 1937 was as powerful as it gets. In that time of national anxiety and economic despair, the nation and the Northwest set their sights high. As Roosevelt gazed at the footings of Grand Coulee Dam, he said, "Superlatives do not count for anything because it is so much bigger than anything ever tried before."

And President John F. Kennedy wrote 25 years later that the power of the Columbia River built the Northwest and the nation. The power spread through a grand transmission network, bringing light and prosperity to rural communities, running the shipyards and airplane factories of World War II and serving the public for what it cost to produce.

It was America's first great clean energy success.

In time the Northwest framed a new vision for the river, confronting the natural consequences of that success and rebuilding salmon by first rebuilding relationships between tribes,

communities and a nation with deep obligations to Native Americans. Innovation in energy efficiency backed up that environmental commitment, proving that the best source of new power is simply saving it for others to use.

The Northwest again pioneered clean energy in 1981 when NASA, Boeing and BPA assembled some of the largest-ever wind turbines on a hillside above the Columbia River. Nobody had seen a wind farm before; it was the world's first. Today legions of wind farms cover those hills and connect to an ever-smarter BPA grid, which supports the greatest concentration of wind capacity for its size in the country.

The visionaries did not know how it would turn out. But we do. We know they proved the power of a great river to transform a region and a nation. We know that their powerful thinking now propels the Northwest into the digital age with the lowest-emissions electricity in the United States. We can see for ourselves that the environment and the economy can and do work together.

Let us set our sights high once again: May the Columbia River inspire equally powerful vision for the next 75 years.

*Norm Dicks*





# About this Book

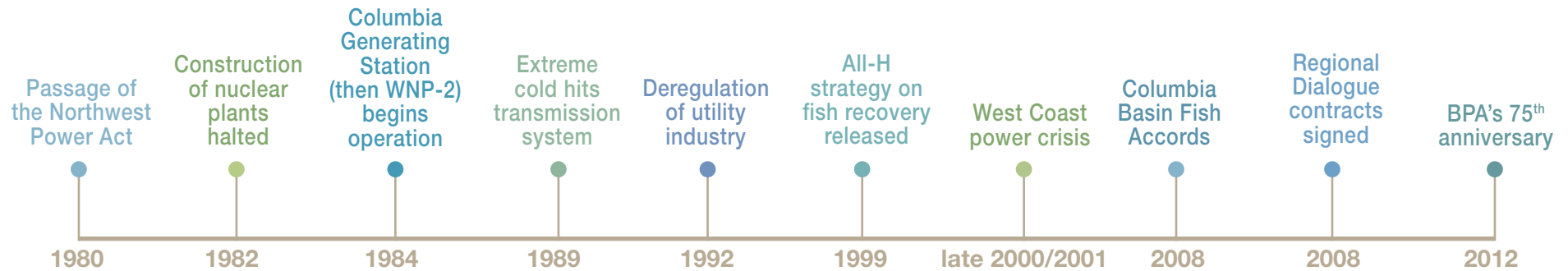
On the 50<sup>th</sup> anniversary of the founding of the Bonneville Power Administration in 1987, the agency published a history, “BPA & The Struggle for Power at Cost.” It covered the origin of BPA and the early days of electrical service in the Pacific Northwest to the mid-1980s.

This book, issued for BPA’s 75<sup>th</sup> anniversary, picks up roughly where that volume left off. It begins with the 1980 passage of the Pacific Northwest Electric Power Planning and Conservation Act, usually called the Northwest Power Act, a milestone that reshaped the region’s energy picture and has influenced BPA’s course ever since. The story then covers BPA’s march to the millennium and beyond. Along the way, BPA faced historic droughts, regional power shortages, blackouts, economic recessions, political upheavals, loss of market share and landmark environmental litigation. At one point, the agency even teetered at the edge of financial collapse.

But there is a priceless legacy in this story, not just a silver lining but a golden one. That legacy is a strong and resilient BPA, its dedicated staff as committed as ever to the stewardship of the Northwest treasure that is the Columbia River and the amazing power it provides. It is a trust BPA shares with Northwest states, tribes, customers, federal partners and many others. No matter how daunting the task, the people of BPA have held true to their charge of preserving, protecting and enhancing the environmental and economic value of the federal hydroelectric and transmission systems that grew from great national vision 75 years ago.

Though their names are too numerous to mention, their individual deeds too many to recount, each and every BPA employee had a hand in that success.

This book is dedicated to them.









A lush green forest with a flowing stream in the foreground. The water is blurred, creating a sense of motion. The forest is dense with various shades of green, including moss-covered rocks and ferns.

“When you help build a region,  
you help build your nation.”

— President John F. Kennedy,  
in a letter to BPA on the agency’s 25<sup>th</sup> anniversary



# 1 A New Course for BPA and the Pacific Northwest

**THE PETER T. JOHNSON YEARS**





**P**eter T. Johnson drove his Chevy Citation to Portland, Ore., with his wife, Carolyn, and after a night in a hotel, headed to the Bonneville Power Administration headquarters. The Idaho businessman with little experience in the public eye had left his Cadillac in his Boise driveway and purchased a used car, thinking the modest transportation more appropriate for a civil servant.

His new job leading BPA would make him one of the most influential civil servants in the region, entrusted with the power of the Columbia River in the form of hydroelectricity from 31 federal dams. The river's energy was the region's economic engine and BPA its steward, marketing the affordable electricity and maintaining transmission lines to carry it to more than 8 million regional residents.

On May 11, 1981, Johnson pulled his Citation up to BPA headquarters for the first time.

"I expected to be welcomed at BPA by a small group of employees, after which I would deliver a brief address to a larger group and take the oath of office as administrator," he wrote in a memoir. "Instead, when we stopped the car, a cluster of television cameras was thrust in my face."



*Incoming Administrator Peter T. Johnson passed many BPA transmission towers and The Dalles Dam on his way to Portland and his new job overseeing the agency.*

Reporters shouted questions like:

"Will you shift the benefits of BPA's low-cost hydropower to Idaho?"

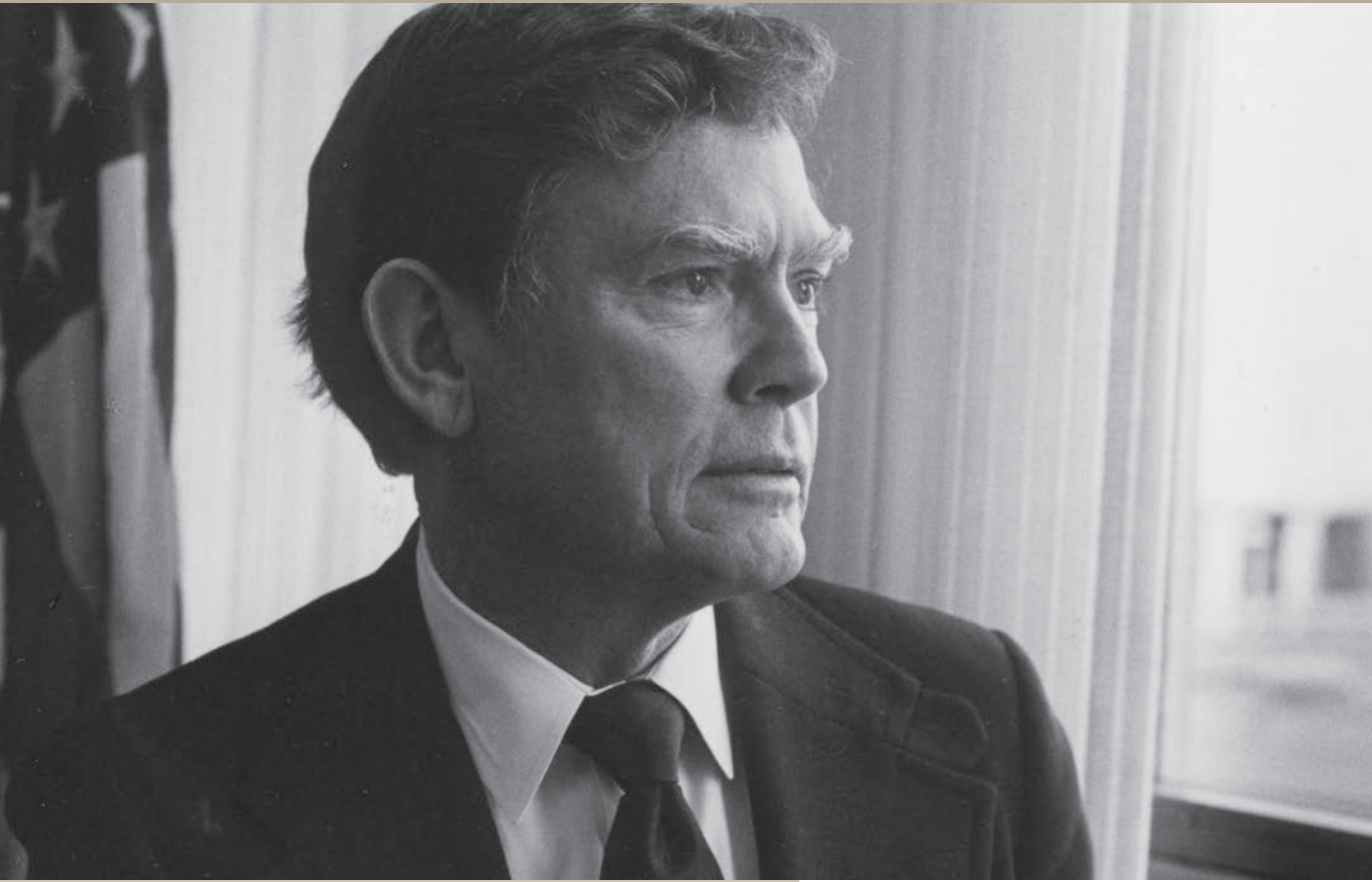
"Are you sure we need five nuclear plants in the Northwest?"

"Will the Regional Planning Council become BPA's board of directors?"

"What makes you think you are qualified to

lead BPA without any utility experience?"

Johnson stopped briefly to say he was honored to take the helm of BPA at a pivotal point. He then slipped into the building, where he understood he was to take the oath of office before U.S. District Judge Gus J. Solomon, with a few BPA executives watching. But once in the lobby he was escorted to an



“Thus began 5½ years of rich association with the most intelligent, most dedicated people I have ever had the privilege to work with,” he said.

Peter T. Johnson

auditorium filled with 400 employees. Another 1,000 listened on the agency’s internal, four-state telephone network.

“Clearly my assumptions had been very wrong,” he recalled. “My sense of tension and alarm intensified.”

Relying on notes he had prepared, Johnson spoke for 20 minutes of his management philosophies and his experiences with engineering, research and development, planning, and finance. Afterward, he listened to the audience’s concerns. He was warmly received.

“Thus began 5½ years of rich association with the most intelligent, most dedicated people I have ever had the privilege to work with,” he said. “But my assumptions that day of what the future held turned out to be mostly wrong. I would not wait long for some horrific surprises.”

It is said that BPA always gets the administrator it needs for the times. Historically, administrators had extensive backgrounds in the utility industry, but Johnson would be an exception. And this fact, as it turned out, worked to his and the agency’s advantage.

A graduate of Dartmouth College, he had served three years in the Air Force before joining MacGregor Triangle, a Boise construction company. He rose to director and executive vice president before joining Trus Joist Corp. As president and CEO of Trus Joist he led the company to rapid growth, introducing a new technology for manufacturing structural building components. When he had “accomplished my material goals,” he said, he wanted to give back to society through public service. In the 1979 election, Johnson chaired Northwest Businessmen for Reagan, which opened the door to a position with the Reagan





(Mark Reller/BPA)

administration and his appointment as BPA administrator.

Unlike the Tennessee Valley Authority and other large public and private corporations, BPA has no board of directors. But the Northwest congressional delegation long watched over the agency and wielded strong influence over its leadership.

With Republicans back in control of the White House and the Senate in 1981, Republican Sen. Mark Hatfield of Oregon had moved to fill the top post at BPA with his state's attorney general, Lee Johnson. But Idaho Sen. James McClure, who headed the Senate Energy Committee, wanted the privilege of filling the post. He nominated Johnson, the Boise industrialist. Idaho receives relatively little electricity from BPA, and Johnson would be the first administrator from that state.

The six tumultuous years to come would test his leadership skills, not to mention his personal endurance. BPA would have to implement the newly passed Northwest Power Act — a law he characterized as an experiment in political science — while simultaneously bringing to a soft landing a multi-billion-dollar nuclear construction program already in free fall.



*President Jimmy Carter signs the Northwest Electric Power Planning and Conservation Act Dec. 5, 1980, shortly before he left office.*

## The Northwest Power Act becomes a cornucopia

Roy Hemmingway, energy and environmental adviser to Oregon Gov. Victor Atiyeh, succinctly described the new law Johnson would be charged with carrying out. In December 1980, Hemmingway had just returned from Washington, D.C., after representing Oregon's interests in the drafting and passage of the Pacific Northwest Electric Power Planning and Conservation Act.





*John Day Dam has the greatest generating capacity — 2,160 megawatts — of the four federal dams on the lower Columbia River.*

“How did we do?” Gov. Atiyeh asked his aide at a staff meeting.

“Well, the good news is, we got everything we wanted,” Hemmingway reported.

“And the bad news?” Atiyeh persisted.

“The bad news,” Hemmingway replied, “is, so did everyone else.”

The Act constitutes what is arguably the most delicate balancing of diverse regional interests ever attempted in federal legislation. It is certainly one of the most complicated. From an initial draft that dealt specifically with power issues, the bill morphed to embrace everything from purchasing new power

resources, to mandating energy conservation and renewables, to requiring fish and wildlife programs. Its fundamental purpose, the goal that BPA would strive for years to fulfill, was to spread the value of the Columbia River’s power across the region.

The river was the nation’s largest source of clean and inexpensive hydropower. It carried the legacy of President Franklin D. Roosevelt, who defined it as a public resource.

With a powerful Northwest congressional delegation in Washington, D.C., the moment had been right for new regional legislation. Every energy and environmental interest in the Northwest wanted a piece of the action. Hemmingway and Atiyeh had been after access to low-cost federal hydroelectric power for Oregon residents, two-thirds of whom were served by the state’s investor-owned utilities (IOUs).

The Bonneville Project Act of 1937 directed the administrator to give preference in the sale or marketing of federal power to public and cooperative utilities. Over time, these so-called preference customer utilities multiplied, especially in Washington. For many years federal hydroelectric projects provided enough power for BPA to serve preference customers as well as IOUs and direct-service industrial

### Proposed Plants Under the Hydro-Thermal Power Program

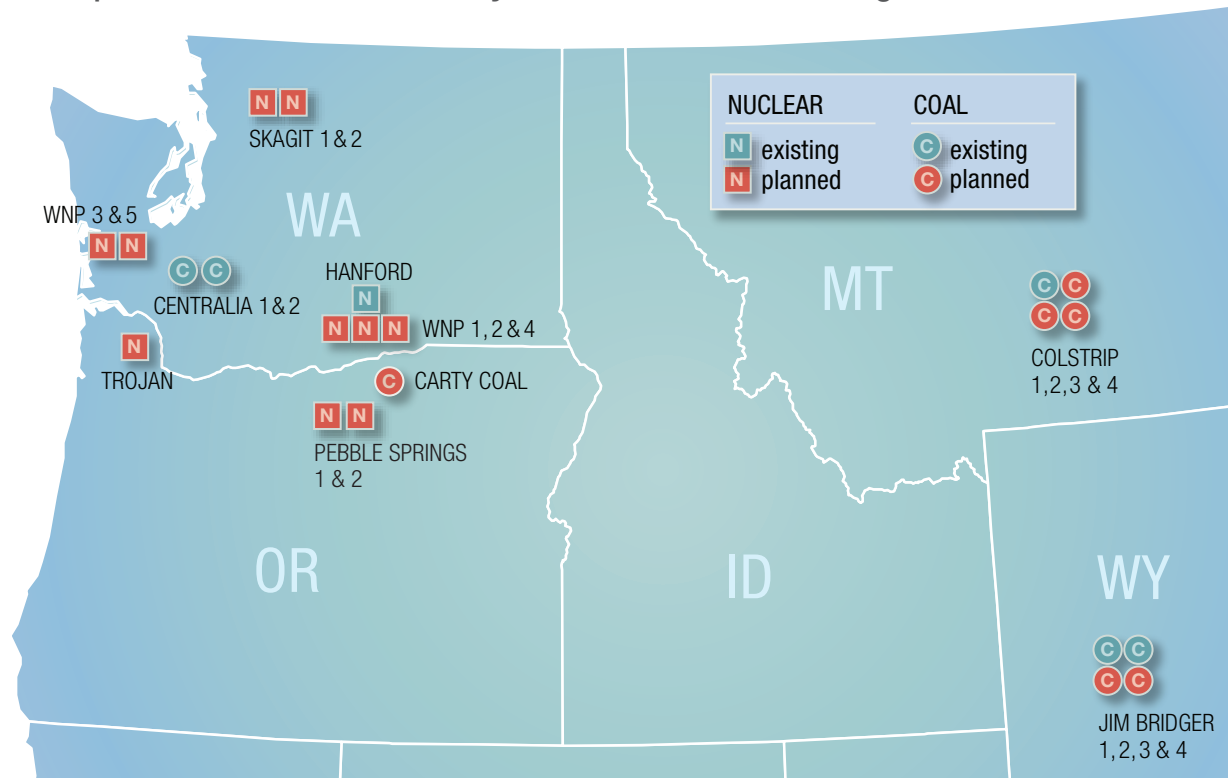
(DSI) customers such as aluminum smelters.

By the 1960s, though, demand for low-cost federal power consumed most of the capacity. BPA warned IOUs that their expiring wholesale power contracts would not be renewed.

At the same time the region began to wonder where it would find additional power. The federal power system had a firm energy capability of about 9,000 megawatts in the 1970s. Spurred by economic and population growth in the Pacific Northwest, loads in the region had risen 7 percent a year through most of the decade.

“That means you double the load every 10 years,” said Walt Pollock, a veteran of Admiral Hyman Rickover’s nuclear Navy. Pollock, who joined BPA’s fledgling forecasting department in the late 1970s, crunched the numbers. They were overwhelming: “If you go from 9,000 to 18,000 megawatts, that’s nine nukes you’ll need in a decade,” he said.

Some utility officials feared the region could end up with blackout-causing deficits of as much as 3,000 to 4,000 megawatts in any year the river ran low in the 1980s (1,000 megawatts is enough to serve a city the size of Seattle). Regional utilities began to plan new generation under what they called the Hydro-Thermal



*In the early 1970s, Northwest utilities planned up to 10 nuclear plants in the Hydro-Thermal Power Program. Only two were finished: Portland General Electric’s Trojan nuclear plant and the Washington Public Power Supply System’s WNP-2, now known as the Columbia Generating Station. Many of the coal plants planned by regional utilities were completed and still operate.*

Power Program (HTPP). Since coal was king it included several joint ownership coal projects: Centralia in Washington, Colstrip in Montana and Boardman in Oregon. Utilities also began pursuing nuclear energy, touted as too cheap

to meter. The region’s first nuclear plant was Trojan, located in Rainier, Ore. Not to be left behind, the public agency customers of BPA launched one of the most ambitious nuclear construction projects in the nation.





*Sen. Henry M. "Scoop" Jackson, left, joins President John F. Kennedy at the 1963 dedication of the dual-purpose N reactor that produced plutonium for weapons and steam for generating electricity. BPA would market the electricity.*

This frenzy of plant construction posed such huge environmental and economic risks that Northwest governors and constituent groups urged their congressional delegations to pass a law that would give the states some control over energy policies and decisions. This became another central element of the new legislation targeting the Northwest.

## A Northwest 'civil war' over electricity

Scrambling to bring their own higher-cost coal and nuclear plants on line, IOUs raised rates to pay for the construction. Residents of Portland

served by Portland General Electric, for example, ended up with electric rates double those of Clark County PUD across the river in Vancouver, Wash. The state of Oregon demanded access for its citizens served by Oregon IOUs to the benefits of the low-cost federal hydroelectric power.

"If the preference clause isn't changed, then we'll bust it in a lawsuit. The people of the Northwest, all of the people of the Northwest, are entitled to similar energy rates, and they should share the burden of those costs," said Rep. Robert Duncan, an Oregon Democrat. In 1977, under Democratic governor Bob Straub, the Oregon legislature authorized a state "Domestic and Rural Power Authority" to claim preference to federal hydroelectric power for the whole state if no federal energy bill addressed the problem.

Washington's governor, Dixy Lee Ray, described the tension over allocation of federal power as "regional civil war."

To avoid a legal war, the Northwest congressional delegation, led by Sen. Henry "Scoop" Jackson and Rep. Tom Foley of Washington and Sen. Mark Hatfield of Oregon, pushed through legislation now known as the Northwest Power Act. It included complex legal and economic mechanisms to protect the longstanding preference the public agency

customers enjoyed by law, while extending rate relief to the residential and small-farm customers of the investor-owned utilities through what was to become known as the Residential Exchange Program. The legislation brought an even more fundamental change by granting BPA authority to acquire the output of non-federal power resources. BPA could now expand its power supply beyond the federal system to meet all regional needs.

Legend has it that the law was written on Jackson's kitchen table, but this is no doubt apocryphal. His kitchen wouldn't have been large enough to seat everyone wanting a place at the table. The bill that emerged after several years of debate won support from almost the entire Northwest congressional delegation.

Standing out among many unique features was a requirement that BPA seek energy conservation first, renewable resources second, efficient power such as cogeneration third, and thermal power from oil, gas or nuclear plants only if the others proved insufficient. This was revolutionary in the utility industry. The whole idea of a utility buying energy conservation as a resource was new and untried. Renewable resources other than hydroelectric power were only in the research and development stage.

To satisfy the governors' concerns, the Act also provided for a planning council of two



## Breaking new ground: The Council's First Power Plan

The Northwest Power Planning Council's First Power Plan, issued April 27, 1983, contained a menu of power resources to meet the demand indicated by its forecast. It broke ground in several places. First, it rejected the idea of one load-growth projection, and instead offered a range of potential load growth depending on how the economy grew. Second, the Council's plan, based on the forecast, took energy conservation seriously as a power resource.

The whole idea was still revolutionary in the utility industry.

Of traditional coal and nuclear plants, the Council said, "If the region experiences very high economic and population growth, or if conservation and renewable resources do not perform as well as expected, the plan includes new thermal plants in the resource portfolio for the late 1990s." The Council also provided a two-year action plan outlining how to achieve its recommendations, which BPA largely followed.





*Work begins on Washington Nuclear Plant 1, developed by the Washington Public Power Supply System with financial backing from BPA.*

members from each state. Appointed by the governors, the members would oversee the drafting of a power plan for the region as well as a fish and wildlife program.

Sen. Jackson had used his clout to have his top administrative assistant, Sterling Munro, appointed BPA administrator in 1978. Munro was a master of the legislative process on Capitol Hill, and his charge from Jackson was to rally the region around the new law to redistribute federal power benefits on a

more equitable basis. Munro and his staff succeeded, but no sooner did the bill become law in December 1980 than Republican Ronald Reagan took office, and Munro, a Democrat, was on his way out.

Munro predicted the Act would “probably establish the Northwest as a demonstration of what can be done in terms of energy conservation and renewable resources.” But he also worried that those same responsibilities would open a Pandora’s box of proposals that

BPA would be asked to support financially. He was right on both scores.

Ronald Reagan froze federal hiring the day he was inaugurated. Meanwhile, BPA was hiring fast to implement the new Northwest Power Act. The agency had just issued job offer letters to 49 people. They were not yet on board but had accepted, quit their jobs and were preparing to move. Munro refused to cancel the job offers, and sought waivers from the Office of Management and Budget for all 49.

Among the staff members whose jobs Munro saved was one analyst fresh out of graduate school at the University of Oregon, future Administrator Steve Wright.

Munro prevailed, but he recognized in so doing that it would be his last act as administrator. His resignation was accepted Feb. 2, 1981.

## A bad moon on the rise

In 1969, the rock group Creedence Clearwater Revival released “Bad Moon Rising.” It could have been the theme song of the region’s public and investor-owned utilities as they worked



*A nuclear reactor vessel slowly crawls toward WNP-2, now the Columbia Generating Station, during construction in April 1976. The vessel holds nuclear fuel rods that drive the nuclear reaction to produce energy.*



*Utility leaders, from left, Jean Reeder of Eugene Water & Electric Board, Mark Crisson of Tacoma City Light, Robert Moench of Pacific Power and Robert Short of Portland General Electric. (Pacific Northwest Utilities Conference Committee)*

together in the 1970s to add coal and nuclear plants under the Hydro-Thermal Power Program.

To help BPA support the development of the new thermal generation, Congress passed the Federal Columbia River Transmission System Act of 1974. This law made BPA self-financing so that it could construct transmission lines connecting the region's new generation without relying on congressional appropriations.

While investor-owned utilities raised money from investors for new power plants, the region's publicly owned utilities authorized the Washington Public Power Supply System to issue municipal bonds on their behalf. With this bond money, the Supply System

began building five nuclear projects.

Under Administrator Don Hodel, who preceded Munro, BPA agreed to underwrite the bonds, obligating BPA to cover principal and interest through a financial device called "net billing." Eventually, when the plants were completed and operating, the power would be taken into the federal system. So while not owning plants, BPA enabled WPPSS to issue bonds at favorable interest rates — with the implicit guarantee that BPA would stand behind the bonds even if the plants were never completed.

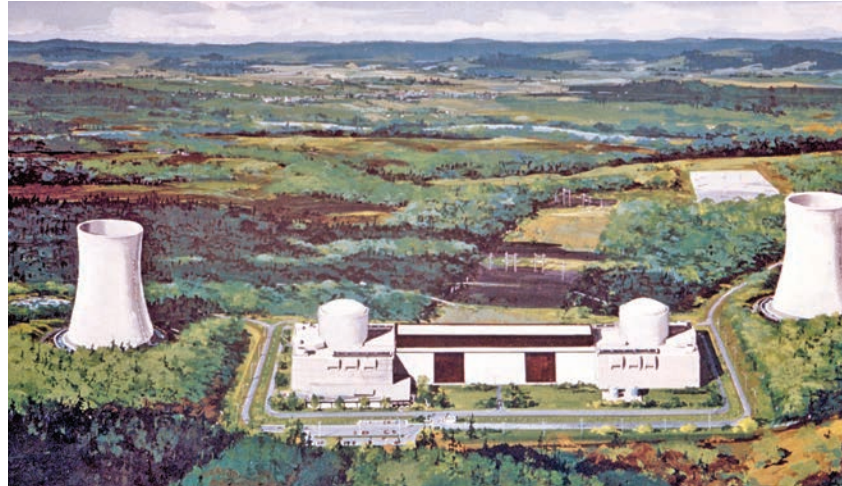
Ominously, these instruments became known as "hell or high water bonds."

Such financing was used for Washington Nuclear Projects (WNP) 1, 2 and 3, but not for units 4 and 5, which were funded by the utilities without BPA's participation. So with BPA obligated to stand behind the bonds issued to cover the rising costs of three nuclear plants under construction in 1980, and with the agency taking on additional financial responsibilities under the newly passed Northwest Power Act, a shadow fell on BPA and the Federal Columbia River Power System.

At first, it was as if no one noticed.

The main peril utility executives could see was to do nothing. They had dealt with power shortages repeatedly in the 1970s. The





Artist's rendering of the "twin" Washington Nuclear Projects 3 and 5 at the Satsop site near Elma, Wash. BPA backed WNP-3 while WPPSS backed WNP-5. The plants were built together to save money by sharing facilities.

drought years of 1973 and 1977 encouraged early energy conservation programs at BPA, and conservation measures passed in both the Oregon and Washington legislatures. But the executives and their boards had zero faith in conservation to meet growing loads. They remained committed to large central generating stations.

A new BPA administrator with no utility background and no record of decision making was about to challenge their view of the realities confronting them.

## A runaway train with BPA along for the ride

As Peter T. Johnson assumed leadership of BPA in May 1981, he knew implementation of the Northwest Power Act would require his immediate attention. But he later said he didn't begin to appreciate the time and energy "the unraveling of the WPPSS \$24-billion



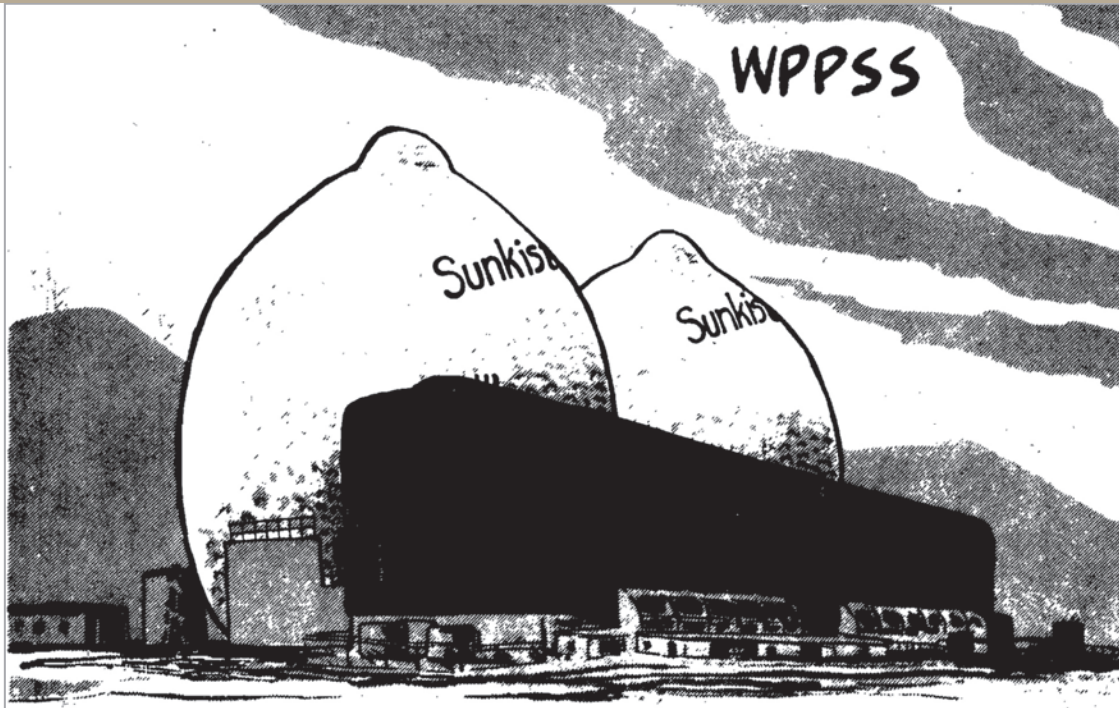
Construction began on WNP-3 and WNP-5 but was never completed. BPA Administrator Peter T. Johnson declared WNP-3 must be mothballed and the WPPSS board adopted a resolution terminating WNP-1 and -3 May 13, 1984.

nuclear fiasco" would consume. Soon WPPSS would come to be known by the unfortunate nickname, "Whoops."

"When I arrived at BPA, I expected my construction management background would prove useful in helping complete three nuclear plants," Johnson said. "All of them were more than half finished and I had no reason to believe they weren't healthy projects."

But the man who had hoped to be a builder was about to turn rescuer. Johnson had been in office only days when the crisis — and its multi-billion-dollar magnitude — became dangerously evident. On May 29, 1981,





*The nuclear furor provided rich material for editorial cartoonists.*

WPPSS Executive Director Bob Ferguson announced that, with construction changes required after the Three Mile Island nuclear accident on the East Coast, and current inflation rates, the five plants would cost \$23.9 billion, \$5 billion over the last estimate.

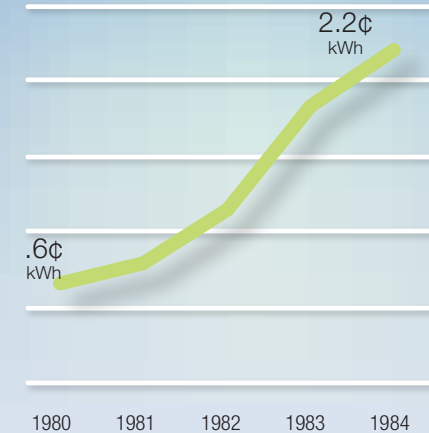
Questioned by a reporter about the runaway costs, a senior executive at WPPSS headquarters in Richland, Wash., quipped, "Don't let the zeros scare you."

But Ferguson was more than scared. In desperation, he informed Johnson he needed an immediate infusion of cash. Washington Nuclear Project (WNP) unit 3, backed by BPA, was a twin of WNP-5 at Satsop, Wash. WNP-1 was twinned with WNP-4 at Hanford, Wash.

The twin projects were designed to share the costs of central facilities, fuel purchases and other common needs. So though BPA had no financial responsibility for units 4 and 5, their status would affect the BPA-backed plants. Johnson agreed to purchase nuclear fuel for 4 and 5 for \$100 million, to be used by 1, 2 and 3.

"But within days, Wall Street slammed the door on any further debt financing of units 4 and 5," Johnson said. On May 31, 1981, Ferguson recommended an immediate moratorium of construction on units 4 and 5 because he didn't think the money could be raised to complete them. The board angrily complied, swallowing its first dose of economic reality.

## Customer Rates



*Rising BPA rates.*

Soaring nuclear project costs were driving unprecedented rate increases at the same time as demand for power was beginning to falter. Rates for BPA's publicly owned preference customers rose sharply, nearly quadrupling from 6/10 of one cent in 1980 to 2.2 cents per kilowatt-hour four years later.

Johnson figured the nuclear program was occupying 60 percent of his time, and employee morale at BPA was suffering badly. One staffer told Johnson he once took pride in working for BPA, but "anymore, I don't dare tell anyone where I work." No wonder. BPA was getting the



*Workers pour concrete for the containment dome at WNP-2. Now known as the Columbia Generating Station, it was the only nuclear plant completed. Energy Northwest (formerly WPPSS) owns and operates the plant and BPA purchases and markets its output.*

blame for conditions over which it had limited control. The arrangement between BPA and WPPSS couldn't have been worse, Johnson said.

BPA engineers providing liaison with WPPSS were not invited to important meetings, nor was the administrator invited to board meetings. In fact, BPA had no authority to oversee construction of the projects. It had only the power of the purse — its approval was

required for budgets, a hammer considered too heavy to wield.

Utility executives feared that stopping work on WNP-1, -2 or -3 would indicate to Wall Street that the nuclear program in the Northwest was completely unraveling. Moreover, such enormous failure would sully their careers. Johnson, however, was convinced that continuing to fund all three

so-called “net-billed” projects would bankrupt BPA and take the region’s public agency and investor-owned utilities down with it.

“If a madman had deliberately set out to create the worst possible situation, he couldn’t have done better,” Johnson said. Nevertheless, with billions of dollars already invested and thousands of jobs at stake, the projects had economic and political momentum. Johnson went to Wall Street and sold another \$2 billion in bonds in 1981. Interest rates spiked to 15 percent on bonds that were tax exempt and backed, many believed, by the full faith and credit of the U.S. government.

## Johnson introduces strategic planning

Clearly, if BPA was to rescue itself and the region from the developing peril, its staff would need to be cohesive and of one mind. To that point, BPA had never engaged in formal strategic planning. Johnson called a man who had previously helped him with planning, a management guru at Harvard named Hugo Uytterhoeven. Booked up at the time, Uytterhoeven recommended a





*Construction continues on WNP-3, providing employment for thousands of workers.*

“If a madman had deliberately set out to create the worst possible situation, he couldn’t have done better.”

Peter T. Johnson

student of his, Ram Charan, to facilitate in a planning exercise. Charan is now known worldwide as a business consultant.

Johnson hosted 24 of BPA’s top executives at his cabin on the shore of Payette Lake in Idaho in early September 1981 under sunny skies. They hammered out BPA’s first mission statement, then turned to the burning issue: WPPSS. They debated the load forecast

for the region, which had recently dropped from 7 percent per year to roughly 4 percent. Rates were rising, hostage to WPPSS costs, and the group discussed the likelihood that higher rates could erode demand.

They came to a conclusion to that point publicly unspoken but widely believed: Load growth would fall between 1 and 1.5 percent annually in the decade. If so, two of the 1,000 megawatt plants supported by BPA would not be needed before 2000, nearly 20 years in the future.

Just as important was their agreement on collectively crafted strategic choices for the agency, a discipline that continues today. Johnson introduced the concept of “Best Value” he had developed at Trus Joist and the conjuring up of “phantom competitors” to introduce market forces in a federal monopoly — an idea he later described in the Harvard Business Review.

“I urged my managers to look at every decision as though it were a bid opening where they either won or lost the privilege to continue,” he wrote. “And I told staff members that whenever they presented a program or policy, they would have to be prepared to explain how their phantom counterparts would assess its merits and risks.”



## The firestorm over halting construction of nuclear plants

With the strategic objective of getting runaway costs under control, BPA rushed to set up a state-of-the-art forecasting arm. BPA had relied earlier on the “sum of the utilities” forecast by the Pacific Northwest Utilities Conference Committee (PNUCC), a consortium of public utility districts and IOUs. But with new responsibilities to acquire resources under the

Northwest Power Act, BPA needed its own forecasting capability.

The new forecast would be a radical departure. Rather than merely projecting trend lines into the future, the new forecasts would analyze end-use data — how much energy the various sectors of the economy would likely require, given prevailing economic conditions. “Peter was a very strong proponent of doing excellent, comprehensive analysis and then taking action based on that analysis,” recalls Steve Wright, then a young analyst who would become BPA administrator. “This was a case where he demanded load forecasts, supply curves and financing information to make the

strongest and best decision that he could.”

With forecasts elsewhere running as high as 7 percent per year, the new numbers would not go down easily with executives, who were plowing billions of stockholder and ratepayer funds into the enormous nuclear projects. “From that point on, I knew for sure we were in trouble,” Johnson said.

In spring 1982, the BPA forecast was done. It “showed no [power] shortages. In fact, it showed a very significant surplus. We had been over-forecasting for some time and had failed to take into account market changes, primarily price elasticity, particularly in the direct-service [aluminum] industries,” Johnson said.

Johnson and his staff spelled out the situation in stark dollars and cents.

“We are paying 90 cents out of every revenue dollar [of BPA] to a fixed charge over which we have no control. Something like 60 cents of every dollar went to interest alone on outstanding debt,” Johnson said. With no way to control costs and no end of the debt accumulation in sight, something had to change, and soon.

Johnson decided that construction of one of the three WPPSS plants associated with BPA participation, unit 1 at Hanford, would have to be halted and the physical assets “mothballed.” It was a decision fraught









with unpredictable consequences, but he figured nothing could be as bad as letting the construction program “hit the wall,” as some outside the agency had advised. He was about to pull the plug on a project that supported thousands of workers. Elected public agency utility boards would have to explain to voters how things had gone so wrong.

The first thing he would do was inform his boss, Secretary of Energy James Edwards.

In a briefing in Washington, Johnson told Edwards 6,000 workers would lose their jobs. “Suddenly, without warning, the secretary threw up his hands and said, ‘This is an unbelievable mess, a political nightmare. I’m not touching it with a 10-foot pole.’” With that he stormed out of the meeting, went into his office and slammed the door.

The Northwest Congressional delegation, no more eager to step into a political tar pit,





offered little public support for the decision.

The word was out that Johnson was about to make a major announcement. He collected himself as he rode the elevator to the WPPSS boardroom high in a Sea-Tac office tower in mid-April 1982. He would tell the executive board he would not approve the budget for unit 1, a massive project about half finished at Hanford.

The press was waiting for him. Troubled nuclear projects were big news and all three national TV networks sent camera crews and reporters. Seattle TV channels were there too, along with radio and print reporters from around the region. Cameras and lights were everywhere. A podium bristled with microphones. In the rear of the packed room waited a large delegation of anti-nuclear activists, including the Seattle Light Brigade.

When the board chair handed over the microphone to Johnson, the BPA administrator told the board the world had changed and lower demand for power dictated that construction of unit 1 be halted. He would not approve a budget for continuing the project. Reporters rushed from the room to find phones. Activists in the rear of the room cheered and popped corks on champagne bottles. Board members sat in stunned silence.



*Building materials at the idled construction site of WNP-4 in 1982.*

The board reluctantly voted to accept Johnson's decision: It had no choice. Johnson went to the next full board meeting of WPPSS at its headquarters in Richland, Wash., to discuss the ramp down of the program. There the WPPSS board and management, eager to express sympathy with 6,000 workers losing their jobs, had arranged a hot reception for him. A protective police escort met Johnson

and his aides at the airport on their arrival in the BPA aircraft on April 23, 1982.

At the headquarters, Johnson was led to the roof of the building where he could safely see and soak up the anger of men and women about to lose their livelihoods. In many cases, they would have to pull their kids out of school, sell their homes and leave the Tri-Cities. Several thousand converged at the building's



POWER OF THE RIVER







*BPA Administrator Peter T. Johnson and other leaders, standing atop the WPPSS headquarters, look out over thousands of workers, reporters and others in April 1982. Johnson was visiting Richland to discuss the ramp-down of nuclear construction. (Energy Northwest)*

entrance carrying placards declaring Johnson to be Darth Vader and bearing a mannequin hanging from a noose. They jeered, shouted epithets and demanded he be fired.

Later they burned his effigy and invited him to come and collect the ashes.

## Unit 3 and the pleas of children

Johnson knew, as tough as it was, that the same fate awaited WNP-3 at Satsop, Wash. With ratepayers up in arms over rate increases, the economy sliding deeper into recession and forecasts sagging, the BPA staff provided Johnson



*The human cost of halting nuclear construction was real, affecting many workers who had moved their families in search of good jobs.*

with an analysis that gave him no other sound business choice. He had to suspend work on that plant as well.

More than 300 incensed and belligerent union craftsmen crowded into an auditorium in Seattle and insisted Johnson accede to their demands. Speaker after speaker stepped to the podium to excoriate him. Testimony went on for several hours and closed with piles of letters written by children placed before him. The colorful, crayoned stick figures of families with sad faces, some with tears, were captioned with messages like, “Mr. Johnson, please don’t fire my daddy.”

During a break, Johnson left the dais and disappeared into the crowd of men in

“Mothball Peter”

“Want to kill a city?  
Call BPA.”

“The BPA prefers the  
Dark Ages.”

— Signs of protestors

work clothes. His aides, Roy Eiguren and Ed Mosey, lost sight of him and worried for his safety. When they found him again he was surrounded by grim-faced workers, engaged in animated conversation about the necessity of his decision. When the meeting was over, the stress overcame Johnson.

“I simply lost it — completely. My knees buckled,” Johnson remembers. Pollock, Ed Sienkiewicz, Mosey and several others on hand helped him to a chair to recover.

Pollock says, “Mothballing WNP-1 and -3 were the hardest issues I dealt with in my working life. People had invested billions in those projects. Thousands of people were working on them. We did it because we were convinced it was a life-or-death issue for BPA. BPA was hemorrhaging money.”

Public agency customers went ballistic, investor-owned utilities sued for breach of contract (later settled), and even Johnson’s own mentor, Sen. McClure, wanted to keep the projects going. The chief executive officer of Washington Water Power (now Avista) accused Johnson of “condemning the region to economic ruin.” But Johnson believed that pushing the financing string further would have set the Northwest’s economy back years and potentially bankrupted major utilities.

Ultimately, only WNP-2 at Hanford would



*BPA funds and markets the power from the Columbia Generating Station, originally called WNP-2. The plant’s reliable and emission-free power complements the federal hydroelectric system.*

be completed; it remains in operation as Columbia Generating Station. WNP-1 and -3 would be mothballed and then scrapped, as would WNP-4 and -5. The Washington

Supreme Court concluded that the public utilities that had backed the bonds that funded WNP-4 and -5 lacked authority to assume the cost of the plants if they did not produce



electricity. Since the utilities could not guarantee the bonds, they were not obligated to repay bond holders. The \$2.25 billion in bonds became nearly worthless, turning into one of the largest municipal bond defaults in U.S. history. However, the net-billed bonds backed by BPA were found valid and BPA continues to make payments on those WPPSS bonds today.

## The second front: implementing the NW Power Act

“The purchase authority which this legislation would add to BPA’s present role as a regional power supplier is, in my judgment, the glue that holds the package together,” BPA Administrator Sterling Munro had told the Senate Energy Committee in May 1979. “Only to the extent that BPA can realistically expect to acquire additional amounts of power can we avoid the difficult and onerous task of trying to divide fairly among new and existing preference customers a limited amount of low-cost federal power.”

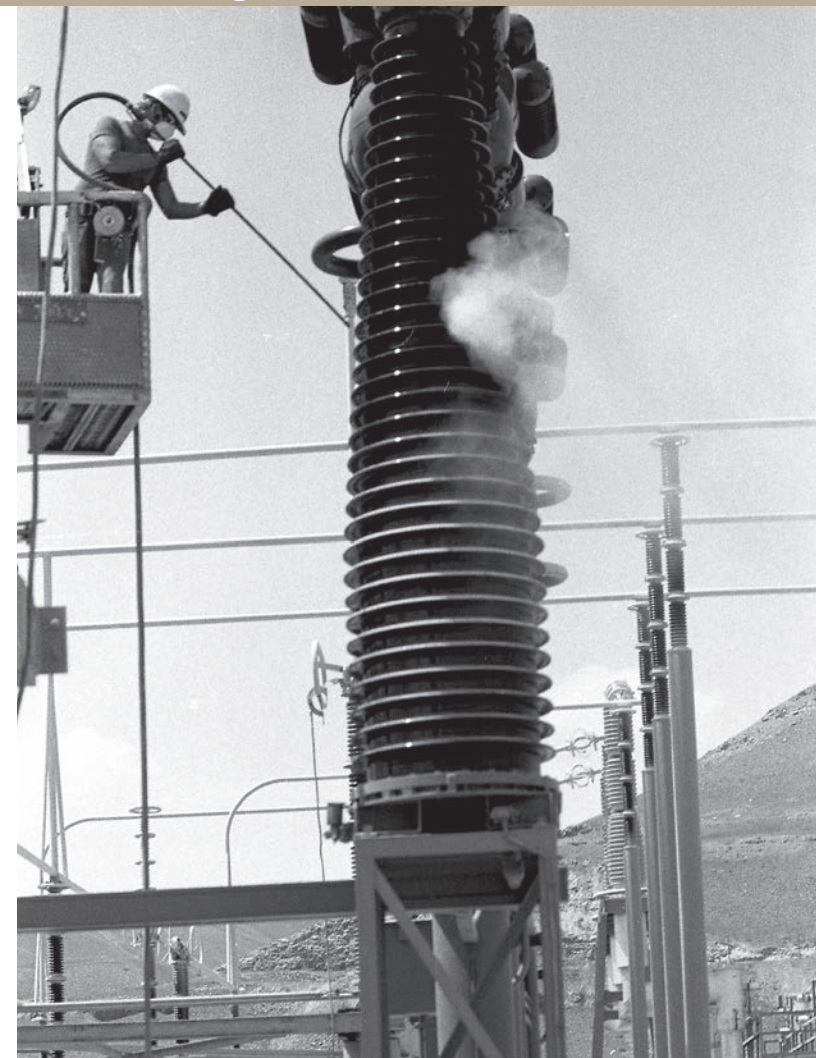
The Northwest Power Act has guided virtually all of the power resource decisions of BPA for the past 30 years and does so

today. The legislation gave BPA the authority to acquire, on a long-term basis, the capability of generating plants via contract to meet its obligation to supply regional customers’ loads. It did not give BPA the authority to actually build or own the generators, only to contract for purchase of their output. By melding the cost of the purchased power with that of low-cost federal hydroelectric power, everyone’s rates could be held down as demand grew. It seemed an elegant solution.

Public agency utilities got a guarantee that no additional costs incurred by BPA would push up their rates more than would otherwise be the case without the Act. Key to the bargain was an agreement that the DSIs would pay somewhat more for their service to help support that guarantee. In return, the industries got new 20-year contracts with BPA.

It was, as Munro put it, a “win-win-win” deal; a better expression might be a deal as delicately balanced as a Swiss watch. Some called it full employment for attorneys, because if any component went haywire, the entire system could fall out of balance and seize up the courts. Remarkably, though lawsuits did fly over the years, BPA has managed to make it work.

Not wanting to distract the agency’s employees with a re-organization to address BPA’s evolving role under the Northwest Power



### Standing up to an eruption

Mount St. Helens erupted in 1980, taking almost everything in its path. But BPA’s high-voltage transmission system stood strong. BPA crews worked around the clock dusting, blowing and washing ash from equipment. There wasn’t a single outage, and no equipment was damaged.



*Dan Evans, left, the first chair of the Northwest Power Planning Council, with BPA Administrator Peter T. Johnson. Evans, a former Washington governor, would go on to serve in the U.S. Senate.*

Act, Johnson set up task forces to deal with specific issues. The Conservation staff geared up to implement programs. Others began the demanding job of negotiating and offering new power sales contracts within nine months as mandated by the Act, a task that normally took longer.

Still others in the agency prepared to work with the new Northwest Power Planning Council, formed on April 28, 1981. Inaugural Council

members included a former governor and future U.S. senator, Dan Evans, and others who had helped write the Northwest Power Act.

“The first Council was a force to be reckoned with,” said Pollock. “Hemingway, Chuck Collins, Dan Evans. They felt the promise of the Act needed to be delivered.”

Congress had never created anything like the Council and its relationship with a federal agency immediately became an issue. Was it merely advisory? Or were its directives mandatory? The Northwest Power Act directed that BPA and the administrator act consistent with the Council’s fish and wildlife program and its power plan. Johnson and his political adviser, attorney Roy Eiguren, recognized that the Council had enormous political clout when it acted in unison.

Johnson promised to work with the Council to make it “strong, effective and respected.” But he said separating planning decisions from responsibility to implement them was fraught with risk. He reserved for the BPA administrator the exclusive right to determine whether the Council’s decisions were in the best interest of BPA and its customers. “In the end, BPA was legally accountable for its decisions and actions, not the Council,” he asserted.

Dan Evans, a Republican who had served

three terms as governor of Washington, became the Council’s first chairman. He was a highly respected leader with a strong environmental protection ethic, having established the state Department of Ecology. It later became the model for the Environmental Protection Agency set up under President Richard Nixon. Evans characterized the relationship between BPA and the Council as one of “creative tension.”

Evans and Johnson realized that the only road to success was one of mutual respect and collaboration.

## Race to sign new power sales contracts

Writing, reviewing and offering complex 20-year contracts in nine months would be difficult in any circumstances, but applying the new law to contractual terms and conditions made for a monumental task. Nevertheless, in June 1981, six months after the Act’s passage, BPA circulated draft contracts for public review.

“We were totally overwhelmed with the work that needed to be done on a short order. I had five division directors involved,” said





*BPA's first resource acquisition under the Northwest Power Act was the output of a City of Idaho Falls hydroelectric project called the Bulb Turbine Project on the Snake River. (Kevin Getsinger/Idaho Falls Power)*

Ed Sienkiewicz, assistant administrator for power management at the time.

BPA drafted an environmental report on the contracts and circulated it for public review.

On Aug. 28, 1981, BPA offered customer-specific contracts to 154 utilities, federal agencies and direct-service industries. Customers had a year to accept. All but seven signed up by the deadline. Six public utilities remained customers under their previous contracts and one industry opted for service by its local utility.

## On your mark, get set ... wait

The Council's plan built flexibility into resource planning to "enable Bonneville to be in a position to acquire the most cost-effective resources throughout the 20 years of this plan." It called for conservation; development of small, dispersed renewable resources; and actions to shorten the lead time for acquiring major power resources.

In April 1982, BPA acquired the output from its first resource under the Northwest Power Act, a small, 20-megawatt municipal hydroelectric project owned by the City of Idaho Falls, Idaho. But as the recession took hold, BPA's customer power loads shrank. With surplus power and rising rates, BPA canceled further evaluation of resource



*Grand Coulee Dam is the largest power plant of any kind in the United States. The dam's generating capacity of about 7,000 megawatts is nearly double that of the next largest power plant, according to the Energy Information Administration. (© Gary Weathers/Tetra Images/Corbis)*

acquisitions. Aside from research projects, BPA's renewable resource programs essentially went dormant until the surplus disappeared at the end of the decade.

The Northwest Power Act itself called on BPA to develop another approach to securing power resources through billing credits. These are credits on a customer's BPA bill that provide an incentive for customers to develop their own conservation or new resources that reduce BPA's need to acquire power resources.

## Launching the Residential Exchange Program

The Northwest Power Act's residential exchange provision addressed the problem of rate disparity between investor-owned utilities and public retail ratepayers. The term "residential exchange" is a bit confusing. In theory, any utility with high-cost resources, but

namely investor-owned utilities, may request BPA to exchange power at the utility's "average system cost" for lower-cost federal power. But in practice, BPA paid utilities the difference between the average cost of their generation and the lower cost of federal power. This payment, by law, must be passed on to reduce rates to residential and small-farm consumers of the utilities.

Through complicated calculations, this "residential exchange" was designed to retain public preference and share federal hydropower benefits with consumers served by Northwest investor-owned utilities. However, according to Pollock, it turned out to divide the region and sow "angst and discontent" for more than 30 years.

Utilities argued with BPA over the method of determining the payment going to the participating utilities which, by 1982, included 101 publicly owned utilities as well as the region's eight investor-owned utilities. By 1983, the direct-service industries, which the Act relied on to pick up the tab for increasing residential exchange costs in a sinking economy, complained that the average system cost methodology was flawed.

BPA consulted with its customers and revised its methodology, which held up in court, but was never fully accepted by exchanging





*The Columbia River is the fourth largest river by volume in the United States, but its steep descent makes it the largest producer of hydroelectric power.*





*Alcoa's Vancouver, Wash., aluminum smelter, built in 1940, was the first to use power from the Columbia River. It operated until a 1986 labor dispute. Private investors bought the plant in 1987 and operated it as Vanalco until the West Coast power crisis in 2000.*

utilities. Calculating average system costs for so many utilities on so many grounds grew costly in itself, at one point occupying 50 full-time BPA staff members and many utility staff.

However fractious, benefits did flow as Congress intended, spreading more widely the benefits of BPA's low-cost federal system to millions of residential and small-farm consumers across the region. By 1987, BPA had already distributed \$1 billion in residential exchange benefits to Northwest investor-owned utilities' small-farm and residential customers. Though still contested, residential exchange benefits of more than \$5 billion have reached residential and small-farm consumers through 2012.

## Rising rates push DSIs to the brink of collapse

When the Northwest Power Act passed, BPA had contracts to supply about 3,000 megawatts to industry — mostly aluminum smelters. Direct-service industrial sales tended to produce one-fourth to one-third of BPA's annual revenues. The industries' 24-hour load helped make effective use of electricity produced by river flows during the low-demand overnight hours. Though seldom used, portions of the direct-service industrial

load could be curtailed in times of severe power shortages — often a better option than relying on backup generators.

The tab for the residential exchange program hit the aluminum companies just as world demand for aluminum declined by 12 percent in the early 1980s and BPA's rates climbed. Industrial rates rose nine-fold from 1979 to 1984.

By 1983 the smelters were becoming "swing plants" — higher-cost producers of aluminum subject to shutdown in poor market conditions. The DSIs started asking for rate relief in 1983. BPA first gave them incentive rates to keep their potlines going, but that didn't offer much certainty. A Martin Marietta smelter in The Dalles, Ore., closed completely. The smelter had been the city's largest employer. Some wondered whether many of the smelters could survive much longer.

In 1985, Administrator Johnson realized that losing more DSI loads would leave power unused, eroding the agency's bottom line. He sought a more comprehensive solution. In a demonstration of its new, open approach to regional power issues, BPA went from the high-school gym in Columbia Falls, Mont., to the halls of Congress in Washington, D.C., asking whether BPA should save the aluminum industry, and, if so, how?



Three answers emerged.

- BPA tied its DSI electricity rate to the price of aluminum for 10 years. This “variable rate” proved particularly effective. From 1986 to 1996, it produced an estimated \$100 million more in revenues than BPA might otherwise have collected from the aluminum smelters.
- BPA helped the DSIs become more efficient through a conservation-modernization program in Northwest plants, the region’s first major industrial energy efficiency program. The “ConMod” program saved 54 average megawatts at a competitive cost.
- As the Northwest Power Act directed, BPA linked its industrial power rate to the rate charged by its public agency utilities to their industrial customers.

Unlike the Tennessee Valley Authority, BPA’s mandate does not include economic development. But as the steward of economic value in the form of the hydroelectric system, BPA does share some responsibility for the economic health of the Northwest. Elected leaders weighed in on behalf of the DSIs, citing their contribution to the economy. “I believe that initiatives such as the variable rate help to strengthen the long term vitality



*The Kootenai River plunges over Kootenai Falls, one of the largest free-flowing waterfalls in the United States, downstream of Libby Dam in Montana.*

of the regional power system,” Washington Gov. Booth Gardner wrote to Johnson in 1986. “The problems faced by our smelters are short-term, but their benefits to our communities and the region are of long duration.”

Brett Wilcox, who had led the direct-service industry association, arranged a purchase of the former Martin Marietta plant in The Dalles and reopened it in 1986 as Northwest Aluminum. The aluminum market improved with the economy. “Without the variable rate, this plant could have been bulldozed before the market [revived],” Wilcox said.

BPA economists opined that the variable rate saved three smelters from permanent closure in the 1980s and kept other potlines

operating more often. Several smelters continued operations for nearly another 15 years, longer than many had expected.

## Opening the doors to public involvement

“Usually when you get in financial trouble, you get in political trouble,” said Jack Robertson, former assistant administrator for public affairs and later, acting BPA administrator. Earlier, as a staffer for Sen. Mark Hatfield, he learned the importance of building a constituency; in



*Locals crowded the high school gym in Columbia Falls, Mont., to voice support for continued BPA power service to the local aluminum plant.*

BPA's case, the constituency was very large and diverse.

"We had to straighten out our relations with the governors and with the tribes and with the public and with the environmental groups and the customers," he said. "I told Peter Johnson, 'We're going to have to rebuild our reputation based on doing the right thing the right way, being open-minded and flexible.'"

BPA's reputation was, according to Robertson, one of "technocrats making decisions in a black box that we controlled. BPA was inside a moat. People weren't getting influence in our decision making, even though we are a federal agency."

A prime example was the controversy over construction of a 500-kilovolt transmission line across the state of Montana. No one was happy



*BPA sought public input on the future of its direct service industrial power sales.*

about it — not Gov. Ted Schwinden, not the ranchers whose lands it crossed, not residents of nearby towns, not environmental groups. Anonymous threats were made, and "bolt weevils" were blamed for bolts removed from transmission towers.

Johnson, with the help of Robertson and public involvement coordinator Donna Geiger, fashioned a state-of-the-art public involvement program to bring affected citizens into BPA's decision making. Montana was the start. The approach proved successful and remains standard procedure today. In an article published in the *Harvard Business Review*, "How I Turned a Critical Public Into Useful Consultants," Johnson explained how the program took root and why it makes good business sense."



## Johnson heads home to Idaho

In July 1986, Johnson returned to private life. In 5½ years he had guided BPA through the most perilous period so far in its history. Sen. Mark Hatfield wrote in the Congressional Record, “He took an agency that was in danger of financial collapse and put it back on sound financial footing.”

In a handwritten note, U.S. Sen. Dan Evans wrote to Johnson, “You have seen your share of challenges but have surmounted each with skill and patience — I have thoroughly enjoyed our working partnership. Your persistence and management ability have contributed mightily to stability for the Northwest and a brighter economic future. You will be missed more than most can now understand.”

“Our plight sometimes teetered on the brink of catastrophe.”

Peter T. Johnson



*Sawtooth Range in Idaho.*

Ever the businessman, Johnson urged utility leaders to learn an economic lesson from what the Northwest had just endured. They would succeed, he said, not so much by producing more electricity, but by making better use of what they already had.

“To say that our situation in the Pacific Northwest for the last 10 years was one of upheaval would be an abuse of euphemism,” he told public service commissioners from across the West. “Our plight sometimes teetered on the brink of catastrophe.

“Yet today, Bonneville is looking at flat utility rates for the next 27 months. By 1987,

that will mean fully four years without a wholesale rate adjustment.

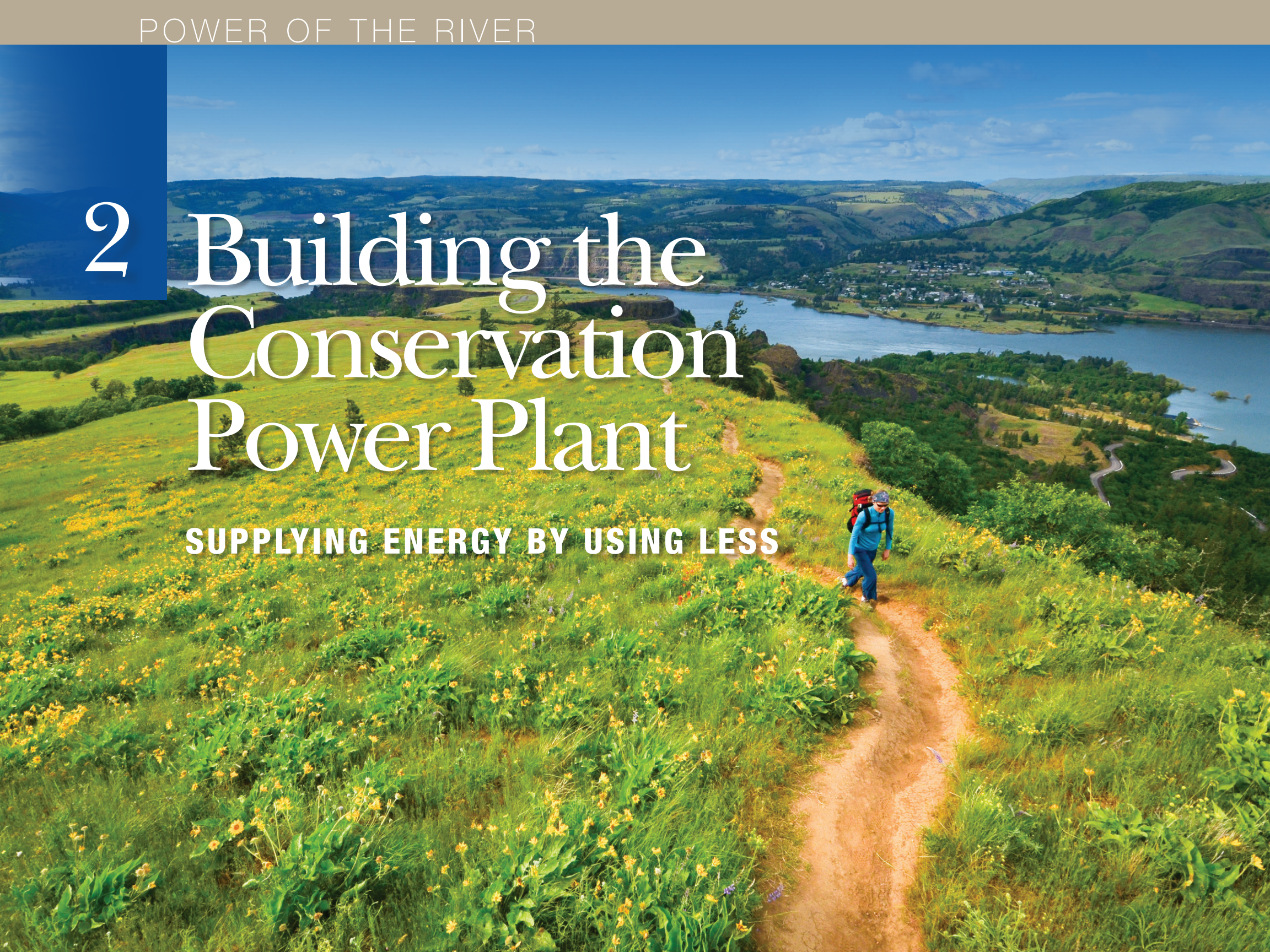
“This is enormously important to the region’s economic development. I am convinced that stable energy resources will be the key in years ahead to attracting and keeping industry. The region that has its energy house in order will be the big winner. And the West has all the right stuff to make it happen. *If* we have learned anything from the conflagration of the past six or seven years.

“And that’s a big *if*.”



# 2 Building the Conservation Power Plant

**SUPPLYING ENERGY BY USING LESS**





“Do you really feel comfortable basing a \$200-million program on this type of analysis?” BPA conservation planning manager Carolyn Whitney stared at the indignant attorney in his three-piece suit and tried not to panic. It was 1982, and the agency’s brand new conservation organization was presenting its budgets in a BPA rate case for the first time.

Look, the attorney was saying, the programs you’re proposing, for residential shower flow restrictors, home weatherization and water heater wraps — all of them show different numbers of housing starts! Each hinged on different assumptions.

“Apparently, each program manager had talked to a different load forecaster in BPA,” Whitney said wryly.

“BPA was in no shape to put together a rate case under the new requirements of the Regional Act,” said economist Steve Lush. “Things did not go smoothly.”

## A new role for conservation

The early days of energy conservation at BPA were days of making it up as you went along.

There was no template for using conservation to meet a utility’s load, a new concept introduced by the Northwest Power Act. There was little concrete data to show how much energy could be saved by building and retrofitting homes and businesses to be as energy efficient as possible.

Some might have conceded that conservation was certainly prudent — that is, if it didn’t cost too much. But nowhere else in the country were utilities treating conservation as an energy resource. It was largely invisible, spread out in attic insulation and switched-off

light bulbs. Truth be told, most utility managers in those days thought it was bunk.

“The thinking was that a resource is something you can kick,” recalls former program manager John Elizalde, “like a nuclear plant or a dam.”

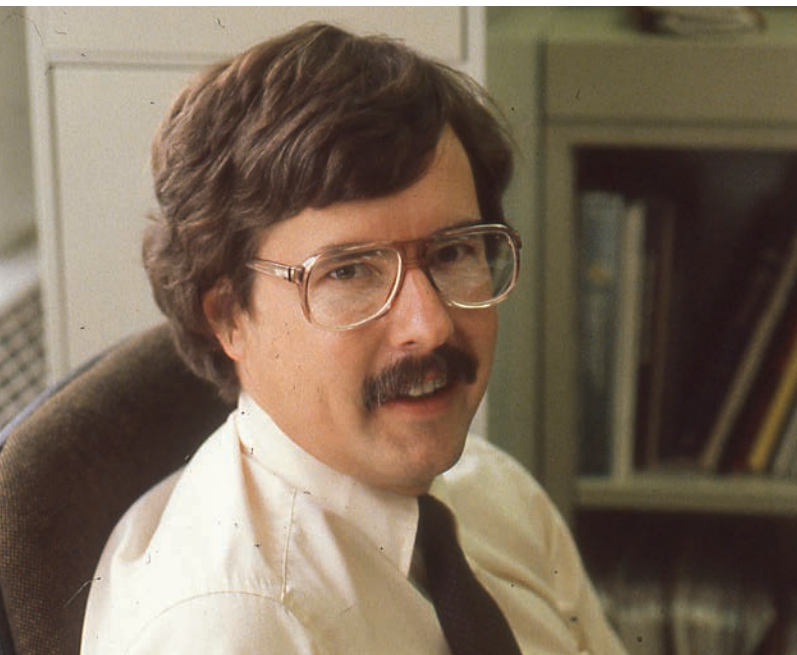
How to make conservation real — that was the challenge that the new and idealistic staff at BPA in the early 1980s had to surmount. Luckily, many of them were experimenters, with vision and creativity, and BPA leaders were wise enough to give them free rein. Eventually, they created a system that was state of the art



*Gasoline shortages, oil embargoes and a record low-water year in 1973 had everyone thinking about using energy wisely. (© Owen Franken/Corbis)*

and accepted as a model nationwide. But not without a lot of trial and error.

The ideas started taking root in the 1970s, when recurring power shortages raised interest in conservation as a potential power source. “It was a liberal idea gaining credibility in progressive state and local governments,” recalled Walt Pollock, who led state energy conservation efforts at Oregon’s new energy

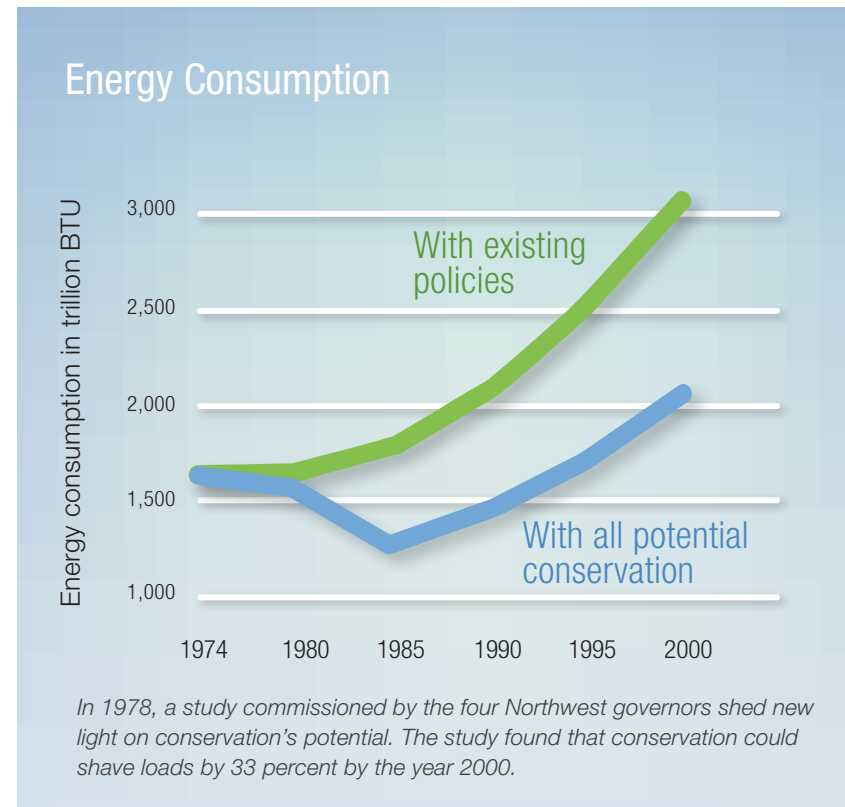


Walt Pollock led a small group of seven that introduced the first BPA conservation programs to the region in 1979.

department. “We thought we could make a better world.”

It may have seemed like a philosophy, but in fact studies increasingly showed that conservation could work. In 1976, BPA’s environmental studies for the Hydro-Thermal Power Program suggested that conservation could reduce load growth over 20 years by 5 percent to 33 percent. In 1978, the Northwest Energy Policy Project, commissioned by the four Northwest governors after the 1973 Arab oil embargo and a record low-water year, called conservation “the cheapest, quickest and easiest source of future energy for the region.” Conservation could shave 33 percent off Northwest loads by 2000, the report found.

Administrator Sterling Munro lured Pollock from the state of Oregon to lead BPA’s first energy conservation organization. Starting with a staff of seven, Pollock launched pilot projects in 1979 on home and water heater insulation, small windmills and irrigation pump testing with publicly owned utilities.





## Hitting the ground running

The name of the Pacific Northwest Electric Power Planning and Conservation Act says it all. Conservation is a fundamental purpose BPA must fulfill. Conservation was one of the keys to Sen. Mark Hatfield's support for the Northwest Power Act. Working with his legislative director, Steve Hickok, Hatfield wrote conservation language into the Act. The Act required BPA to seek first to meet energy needs through cost-effective conservation before acquiring other resources.

Two weeks after the Act passed, BPA increased its expenditures for energy conservation. It hired 181 new staffers, many of them for the new conservation effort. "They were innovative, creative, energetic, smart, liberal people," Pollock recalls.

Bursting out of the starting gates in March 1981, the agency announced plans for a \$400-million, five-year program to acquire the equivalent of 300 average megawatts of conservation. It launched regional conservation programs in home weatherization, efficient street lights, water-heater wrapping, shower-flow restrictors, commercial lighting and public buildings.



*The BPA conservation staff used their own homes to test and demonstrate new conservation ideas. Shown here, BPA conservation engineer Mark McKinstry with his solar home that he designed and built.*

With no handbook to refer to, BPA cast the net wide for new ideas. Staff went on road trips to talk with utility and industry groups to develop a slate of innovative proposals to save energy. When BPA issued a solicitation for

new program proposals, it drew a lot of wild submissions, including one crayon drawing illustrating solar collectors in space.

The fast-growing conservation staff moved from headquarters to rented space just across

“The early conservation organization had an independent streak — which it probably sustains to this day.”

Walt Pollock

the I-84 freeway. Out of sight of headquarters and physically disconnected, BPA's conservation staff developed its own identity and culture. Some might have said its identity just kept getting weirder.

“The early conservation organization had an independent streak — which it probably sustains to this day,” Pollock recalls.

They also had trouble getting the right supplies, it seems. Pollock kept putting in requests for cubicle dividers, but they never appeared. So one weekend, after getting the go-ahead from Pollock, 15 or 20 conservation staff members descended on the space with 2-by-4s and hammers. Bed sheets of every color and design served as wallpaper.

“No two cubes were the same,” laughs



*Internationally acclaimed physicist and conservation expert Amory Lovins was one of the experts Administrator Peter T. Johnson brought in to help get the young BPA conservation staff off to a great start. (© 2007 Nanette Martin/Rocky Mountain Institute)*

Pollock. Soon, after a surprise visit from Munro, conventional room dividers finally arrived.

Peter T. Johnson came to BPA in 1981 and quickly became a strong advocate of BPA's conservation efforts. Johnson brought in Amory Lovins, the internationally known author, physicist and conservation guru, for a two-day workshop with the young staff on



*BPA engineer Ralph Donat, shown here helping a farmer test irrigation equipment, was one of many BPA and utility engineers who spent hours in the field showing consumers how to save energy.*

the economics and logistics of how to pursue conservation.

Johnson, a Republican businessman from Boise, believed that consumers would pursue conservation if it were in their best interests. “I remember hearing about a farmer pumping water by electric motor who deliberately left his pump running all night because that cost him





*Home weatherization was a flagship of the first suite of BPA conservation programs. Contractors retrofitted insulation in the attics, walls and crawlspaces of electrically heated homes to reduce their energy usage.*

less than the gas he used to drive his pickup down to turn the pump off,” he said. “His decision wasted electricity and gas, yet the farmer had made the best economic choice for himself.”

The challenge, Johnson believed, was to disconnect the word “conservation” from its connotation as a social ethic. Conservation needed to be a sensible economic choice. Offering financial incentives, Johnson said, “helped persuade doubters that the idea of reducing loads through more efficient practices was good business.”

## BPA customers take on the challenge

In January 1982, Walt Pollock moved to power sales, and Johnson brought in Steve Hickok as BPA’s first assistant administrator for conservation. Rumor had it he was the grandson of Wild Bill. He certainly entered the scene in a style worthy of his namesake, immediately issuing his Conservation Manifesto:



*BPA engineers peered into crawlspaces to inspect insulation jobs for the weatherization program.*

“Our supply base was recently just the federal hydroelectric dams,” Hickok wrote. “Now it is the entire universe of power supply options ... with conservation, by law, coming first and foremost. Our customer base therefore is going to become our most important supply base.



*Steve Hickok, director of BPA's conservation office from 1982 to 1986, helped spearhead conservation evaluation.*

Three million residences, 400,000 commercial establishments and 10,000 industrial plants are going to supply the conservation. ... We must make things happen.”

As Hickok envisioned, BPA's customer utilities were leading the charge. It was a new relationship for BPA. Its customers, until then on the receiving end of BPA power, would start producing power in the form of conservation. BPA's customers were also its contractors. It would take a while to make the new construct work.

First was the challenge that conservation was designed to reduce utility loads — and therefore electricity sales. To utility managers

who grew up promoting use of electricity — with Reddy Kilowatt and Gold Medallion Homes advancing that goal — this just didn't make sense.

Then there was the question of how to best fund the conservation. BPA opted to treat conservation the same as all its other generation resources — spreading costs evenly across all power customers' rates. “Peanut buttering,” as it is sometimes called, reflected the fact that all share equally in the costs and benefits of conservation.

Finally, as hundreds of new energy companies and insulation contractors sprang up in response to BPA's huge investments, quality control reared its ugly head. BPA introduced the Receipt and Acceptance Program, and BPA engineers took to crawling under houses and measuring insulation depth in attics to ensure that BPA got what it paid for.

BPA area office weatherization manager Ray Classen remembers, “I was doing a site visit for a weatherization job during the first hectic round of “Deceit and Rejection” (as it was sometimes called by disgruntled utility employees) where I was somewhat taken aback to find a vacant lot where the work was said to have been done!”

BPA's auditors suggested that utilities repay the agency for work that didn't



*For more than 60 years, electric utilities used Reddy Kilowatt to promote new ways to use more electricity. In the 1970s and 1980s, many utilities changed their emphasis, instead helping consumers use energy efficiently.*





*BPA and National Park Service staff installed a 5-kilowatt solar photovoltaic array atop a boat shed on Hyde Street Pier in San Francisco Maritime National Historical Park in 2006. BPA engineers installed identical systems at other Northwest national park sites and a Navy base in Washington's Puget Sound.*



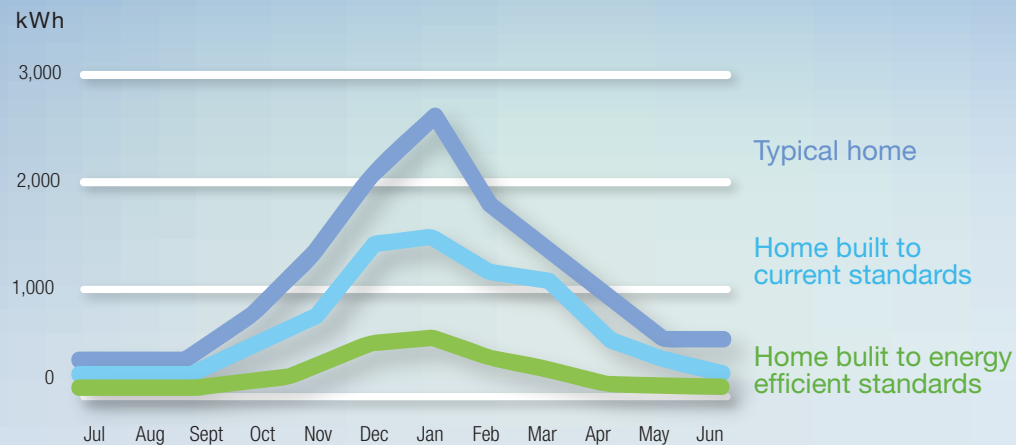
“Three million residences, 400,000 commercial establishments and 10,000 industrial plants are going to supply the conservation. ... We must make things happen.”

Steve Hickok

meet contract specifications. Utilities were inconvenienced — and angry. They were serious about inspecting weatherization jobs, and the huge majority of work was done to specifications. BPA's staff, for its part, felt out on a limb, with too many jobs to be inspected and a huge financial liability.

The market, in time, took care of the less reputable contractors. BPA enlisted state energy extension services to help provide technical training and tighten specifications.

## Average Monthly Electric Heating Use



*The Northwest Power Planning Council produced its First Power Plan in 1983, estimating that new home electricity use could be reduced by half in 20 years with the actions in its plan.*

Utilities learned what to look for and how to manage this new arena.

## Council plan paves the way

Meanwhile, the Northwest Power Planning Council (later renamed the Northwest Power and Conservation Council), also established by the Northwest Power Act, created its First

Power Plan for the region — out of whole cloth. Council conservation manager Tom Eckman, armed with a Texas Instruments Business Analyst calculator and some graph paper, was sifting through and crunching whatever data he could find to come up with the region's first “supply curves” for conservation.

Supply curves are basically line graphs that estimate the electricity savings (in average megawatts) that individual conservation measures can achieve at different prices





*BPA's weatherization specifications called for attic insulation depths of 12 inches or more.*

over time. It's the conservation equivalent of forecasting the size and timing of "resources that you can kick" coming on line to serve load.

Eckman remembers working on those supply curves with another young staffer at BPA, Steve Wright. They struggled with estimates of the potential for energy efficient appliances. BPA had contracts with experts who had helped both the U.S. Department of Energy and the state of California as they were developing

proposals for appliance efficiency standards. But research was spotty and most of the projections were estimates based on guesses.

"We both agreed that 500 [average megawatts] seemed reasonable given the little information we had available, so we plugged it in," said Eckman. The estimate held true years later.

But the two young economists were doing more than forecasting conservation. They were also helping the administrator make crucial decisions about the region's energy future.

The first supply curves came out just as Administrator Peter T. Johnson was deciding whether to terminate the Washington Public Power Supply System nuclear plants known as WNP-1 and WNP-3, funded with bonds backed by BPA. Johnson insisted on thorough, comprehensive analysis as the foundation for decisions, so he called for load forecasts, supply curves and financial details. He had BPA develop its own conservation supply curves and compare them with the Council's.

"We were really looking at conservation as an alternative to the nuclear power plants," Wright recalls. "We knew we were working on something that was really important and that responsibility weighed on me."

It was the first but certainly not the last time that conservation played into decisions about the region's energy future.



*The Northwest Power and Conservation Council's first Power Plan identified energy efficient appliance standards as an important source of conservation savings.*

The Council produced its first Northwest Power Plan in 1983. It contained a jaw-dropping 271 action items for the region. More than 100 of them were action items for BPA



*Hood River on the Columbia River with Mt. Hood in the background.*

and most addressed residential, commercial, industrial and agricultural conservation.

The Council spelled out a building code to ensure that new homes and office buildings would be constructed to the highest level of energy efficiency that was cost effective for the consumer. The Act called for the Council to

develop these “model conservation standards,” known in Northwest energy parlance as “the MCS.” The Act even authorized BPA to add a 10 to 50 percent surcharge to its rate for any jurisdiction that didn’t adopt the standards or their equivalent.

But houses were slow to sell in the 1980s

“We were really looking at conservation as an alternative to the nuclear power plants.”

Steve Wright

recession, and not all homebuilders were thrilled with the new codes and marketing programs. A homebuilders association called the Seattle Master Builders sued the Council over its authority to adopt the MCS. The suit went to the U.S. Ninth Circuit Court of Appeals, which ruled in favor of the Council.

## Power surplus allows for groundwork

In 1983, soaring power rates following the WPPSS shutdown and an economic recession in the Northwest stalled the demand for power. New load forecasts showed a power surplus



far out into the future. Conservation wasn't needed immediately to meet load growth, and BPA was doing whatever it could to keep its power rates low. So between 1983 and 1984, the region's conservation achievements dropped by two-thirds.

Oddly, the dry years of the 1980s recession are where BPA's conservation programs really began.

"We looked at our power surplus as a blessing," Hickok said. "We finally had time to perform and evaluate the technical studies, demonstration projects and pilot programs

**"We looked at our power surplus as a blessing. We finally had time to perform and evaluate the technical studies, demonstration projects and pilot programs ..."**

Steve Hickok

that would enable us to move more confidently into each sector of power consumption when we needed to bring those savings on line." There was finally time to build the capability and knowledge for the next push to get conservation programs out the door.

In the course of the next few years, BPA introduced programs to demonstrate that conservation achieved through the efficient usage of energy really worked. The Council had identified many of the actions in its First Power Plan. The Energy Edge Program showed that new commercial buildings could be up to 30 percent more efficient. Responding to the Seattle Master Builders and others that were still skeptical that the model conservation standards were cost-effective, Administrator Johnson agreed to offer the Residential Construction Demonstration Project.

"There was nothing like it then and there's nothing like it today," recalls Eckman. BPA paid to build 600 homes to the model conservation standards and 600 matching homes to current code. The results showed clear savings from the new standards and proved that energy-saving homes could be built cost-effectively. Compared to a control group, those homes used 40 percent less electricity for space heating.



*Aluminum potlines, used to smelt ore into aluminum, were a key area for efficiency improvements in ConMod.*

## ConMod saves kilowatts, helps industry

High electricity prices and lower aluminum prices challenged eight aluminum smelters that were among BPA's direct-service industrial customers. Following a 1985 study, BPA offered aluminum companies an incentive to improve the efficiency of their energy-intensive smelting processes.

The companies considered their plant designs proprietary. So the Conservation Modernization program, or ConMod, didn't specify the improvements. Instead, BPA paid aluminum manufacturers the difference between their cost to produce aluminum before and after the verified efficiency improvements.

Most of the improvements focused on potlines — long lines of 20 to 100 pots or cells connected on a common high-voltage circuit — that smelt ore into aluminum. Some companies introduced computer controls to more efficiently manage electricity use. Others improved their pot designs. The manufacturers gave up contract rights to the power they saved, freeing it up for others.

Originally designed to save 54 average megawatts, ConMod ultimately achieved an estimated 95 aMW in savings, helping BPA's aluminum company customers stabilize their costs.



*The STS Professional Building in Ellensburg, Wash., was one of eight small office buildings built through BPA's Energy Edge Program to test higher levels of energy efficiency for commercial buildings. Energy Edge ultimately showed that new commercial buildings could be built up to 30 percent more efficient than the Council's standards.*

"It gave us street cred," Eckman said. "For those that thought we were just crazy."

In 1984, Tacoma, Wash., became the first city to adopt the model conservation standards as part of its residential building code. Shortly after, BPA rolled out a regional "early adopter" program offering builder incentives and training for other cities and counties that adopted MCS.

In 1985, the Council's Second Power Plan recommended that BPA levy a surcharge on utilities that were not offering programs for MCS-level new homes. In a series of tense and contentious meetings with utilities throughout the region, BPA's conservation planners laid out the proposed terms for a new surcharge policy: Sign up for a model

conservation standards program or pay extra.

Utilities rushed to sign contracts for Super Good Cents, a program offering advertising, financial incentives and training for homebuilders to build to the new MCS. A devoted cadre of builders joined enthusiastically, teaching and learning from each other. "They were willing to try all kinds of new, crazy things," remembers Jeff Harris, a BPA residential buildings expert now at the Northwest Energy Efficiency Alliance.

A new idea, "lost opportunities," started gaining traction. The Council had shown that it is much more expensive to go back and retrofit a building with efficiency measures. Building it right in the first place averted that lost opportunity and saved money. New homes and businesses became the first priority, as Hickok slowed the weatherization program for existing homes by 60 percent in 1984 in the face of budget cutbacks.

Building the region's conservation capability also included changing hearts and minds. BPA plunged into the world of advertising in a big way, running ads during the Super Bowl to promote Super Good Cents homes. Builders learned to look for hats and coffee cups emblazoned with the Super Good Cents logo when their utility reps came out to inspect





*The softball team from BPA's Portland conservation office congratulates the BRACO team following a weekend match-up at the annual Energy Bozo softball tournament in Port Townsend, Wash., in 1990.*

homes. Sherlock Holmes searched for efficient appliances in BPA's Blue Clue ads.

Other pilot programs tested whether BPA could work effectively with such diverse businesses as appliance manufacturers, grocery stores and third-party financing providers. The region continued to build a delivery infrastructure of weatherization contractors, trade organizations, suppliers and training.

The ideas flew fast and furiously. The conservation community developed and grew, and those who were living it developed a rare bond. Annual "Energy Bozo" weekend softball

tournaments on Orcas Island drew staff from BPA, state energy offices, utilities and public utility commission staff. They volunteered their own homes for testing new energy equipment. Their crazy "what's my line" send-ups at office holiday parties became the stuff of legend. They joined together on ski weekends, camping trips and a common cause.

"It was a wonderful group of people," said John Pynch, a longtime BPA conservation manager fondly referred to by staff as "the Big Kahuna." "They thought they were doing God's work, I tell you. They really believed in it."



*The conservation staff climbed mountains together. Pictured here, at the summit of Mount Hood in 1990, back row (left to right): Mike Newsham, Mark McKinstry, Mark Ross; front row (left to right): Grant Vincent, Phil Thor, Darla Darville, Pat Zimmer.*

## Validating the conservation resource

Programs like Energy Edge and the Residential Construction Demonstration Project helped BPA get a handle on how much energy the standards could save in an individual building. But to answer the question of how far energy efficiency could go across whole communities — known as "market penetration" — BPA



*Super Good Cents homes, built to high levels of energy efficiency, were popular with new home buyers. The program helped build support for energy efficient building codes.*

needed the Hood River Conservation Project.

It's rumored to have started as a bet between an executive at Puget Power and Chuck Collins, one of the first Council members from Washington. Collins stood behind the Council's plan, which projected that 85 percent of eligible homes would opt to install the most efficient levels of insulation, storm windows and doors over 20 years. The utility executive said, "Prove it."

So in 1983, BPA, in cooperation with Pacific Power and Hood River Electric Co-op,

began a two-year project to weatherize an entire county.

They offered free weatherization to all homeowners in Hood River County, Ore. — attic, crawl space and wall insulation; caulking and weather stripping; energy efficient windows and doors — even tests to find out whether ventilation and air quality changed in the newly sealed-up homes. Utility staff knocked on doors and ads ran on billboards, newspapers and television.



*Sherlock Holmes sleuthed out energy efficient appliances in ads for BPA's Blue Clue Program. BPA worked with manufacturers to label the most efficient refrigerators and washers so consumers could spot them easily.*

It was tough to avoid the message and the offer if you lived in Hood River in the early 1980s. "Ultimately, Hood River was testament to the effectiveness of peer pressure," recalls Ralph Cavanagh, energy program co-director at the Natural Resources Defense Council and one of the brains behind the Hood River Conservation Project.





*BPA and utility execs celebrate the Hood River Conservation Project's achievement: 85 percent of eligible homes weatherized in a period of three years. Back row, from left: Steve Hickok, BPA; Ted Perry, Hood River Electric Cooperative; Terry Oliver, BPA; Gil Peach, Pacific Power and Light; Syd Berwager, BPA; Jim Pienovi, PP&L; Ken Keating, BPA. Front row, from left: Peter T. Johnson, BPA; Ralph Cavanagh, Natural Resources Defense Council; Robert Moench, PP&L.*

BPA proved it could be done, weatherizing 3,000 homes — 85 percent of those eligible. Evaluations found that 92 percent of the total possible savings in existing Hood River homes and apartments had been achieved less than three years from project launch.

Results from metering thousands of homes and commercial buildings were plugged into increasingly sophisticated



*The Hood River Conservation Project with a colorful logo was an ambitious experiment to see whether all the residents of a small city could be persuaded to weatherize their homes.*

models. Annual program evaluations reported savings achieved and their cost.

The region was steadily building a more and more reliable picture of what conservation could do — how long it would take to develop, how much it would cost, how much energy savings it would generate and how long it would last. Just like building a power plant.

“Program evaluation is the meter of energy conservation,” Hickok explained. “It makes the invisible power resource visible.

“The stuff we published made our people the keynote speakers at national conferences on how to do conservation,” Hickok said. It’s one of the ways he lured those experts to work for BPA, and eventually, they blazed a whole new trail. Hickok himself described the



# POWER OF THE RIVER







*Conservation takes a village. This poster was created circa 1985 to show the multitude of technologies and partners that BPA and its customer utilities employed to achieve the savings envisioned in the Northwest Power Act.*

concept of conservation as a power resource at a 1990 international forum in Moscow. In following years, the U.S. Agency for International Development sought BPA staff to advise emerging Russian leaders on launching national energy conservation programs.

## The ‘go-go’ conservation era

As BPA continued to build capability and move up the conservation experience curve, the economy in the Pacific Northwest suddenly took off. New homes and businesses started popping up everywhere. Energy demand was growing and forecasts were starting to show loads exceeding BPA’s

resources beginning in the early 1990s.

Conservation was jolted into action once again. Residential weatherization and commercial and residential building code programs that had been idling or in low gear accelerated. New ones for manufactured housing, industrial processes and appliance efficiency took off and started yielding savings.

Claire Hobson was one of several new staff members BPA hired in the late 1980s to help conservation ramp up once again. Her first day on the job, her new boss, Dennis Oster, informed Hobson and her colleagues at a staff meeting that they weren’t spending money fast enough. “I knew this was going to be a fun job!” she said.

By 1989, BPA had achieved 300 megawatts of energy conservation, and its cumulative

investments exceeded \$1 billion. Evaluations were demonstrating that the average cost of that conservation was just 2 cents per kilowatt-hour, lower than BPA’s wholesale power rate at the time. BPA had 32 conservation programs up and running, including those to weatherize homes, improve irrigation efficiency, retrofit institutional buildings, design energy efficient commercial buildings and improve maintenance and industrial processes.

It was during this “go-go” era that BPA launched the Super Good Cents Manufactured Home Assistance Program, known as MHAP. One of the early examples of market transformation, MHAP demonstrated that BPA and utilities could acquire efficiency up the market chain by working directly with manufacturers. Instead of working



*Redman Homes was proud to deliver the 15,000<sup>th</sup> Super Good Cents manufactured home. Ultimately, 50,000 manufactured homes were built and sited in the Northwest through the program.*

piecemeal with homeowners and businesses, BPA contracted directly with 18 regional manufacturers to build all of their electrically heated manufactured homes to Super Good Cents levels of efficiency. All of the region's investor-owned utilities agreed to reimburse BPA for those homes sited in their service territories.

In 1991, BPA's programs to promote the model conservation standards achieved a huge milestone when Washington adopted the model conservation standards into its state building code. Oregon followed suit in 1992. BPA offered financial incentives, training and technical assistance through the state energy offices.



*A manufactured home gets wrapped with insulation in the factory, before it's delivered to the lot or the home buyer. BPA worked with utilities and manufacturers to get 100 percent of all manufactured homes sited in the Northwest built to Super Good Cents efficiency standards.*

BPA introduced innovations in the commercial sector, too. Portland Energy Conservation Inc., a small nonprofit that had been quietly helping Portland businesses, gained prominence in 1991 when BPA hired the organization to help manage its Energy Edge Program. Portland Energy Conservation's work was showing that it didn't matter how efficient the building was if the equipment didn't work right. That came down to basics such as fans running the right direction, dampers opening and closing at the proper times, and programmable thermostats that followed their programs.

Building commissioning, the process of testing systems and training operators so that the energy systems work the way they were designed to, is widely acknowledged as being invented in the Pacific Northwest. It is

now nationally recognized as the first order of business before the tenants move into a new commercial building.

BPA's expertise soon drew attention around the world. In 1992, the nonprofit International Institute for Energy Conservation sent BPA's Terry Oliver to Bangkok, where he spent eight

**“The stuff we published made our people the keynote speakers at national conferences on how to do conservation.”**

Steve Hickok





years on a 10-person staff pioneering appliance and labeling standards. The group helped shift Thailand's homebuilding materials from cement blocks to gypsum wallboard with room for insulation between the studs. The same nonprofit sent BPA weatherization manager John Lebens to help introduce similar sea changes in Chile.

By 1993, BPA conservation programs were running at full steam. That year, BPA achieved record conservation savings of 52 average megawatts.

But the power market was becoming more and more cutthroat. The Super Good

Cents Manufactured Home Program was one of the casualties, a victim of its own success. At \$2,000 apiece, the cost of the 50,000 manufactured homes built to model conservation standards and delivered to the Northwest gave utilities pause.

John Graham, the conservation manager at PacifiCorp, called Tom Eckman more than once with his concerns. "This is an expensive program," Graham complained.



*Weather data, soil mapping, and moisture sensors apply today's technology to greatly improve irrigation efficiency. On many Northwest farms today, you can see both wind energy and irrigation efficiency at work.*

"No it's not, it's just big," Eckman said. The savings, he added, were certainly cost-effective.

In 1995, though, the Manufactured Home Program was terminated. By then, the electric utility world was in upheaval and the future of conservation, the Council, even BPA itself, was unclear.



POWER OF THE RIVER





## Conservation in the deregulation age

“All utilities in the region had a rough patch in the 1990s,” recalled Jean Shaffer of Seattle City Light, “and conservation became much more confusing.”

In 1992, with BPA’s conservation programs running full tilt, the National Energy Policy Act introduced electricity deregulation, changing the playing field. New market players — independent power producers, brokers and marketers — showed up, flexing their muscles. These new players, for the first time in BPA’s history, offered power at prices lower than BPA’s price.

BPA was not unique. Fearing their loads would shrink as competitors won over their customers, utilities didn’t want to be saddled with costs for resources they didn’t need. BPA, battling to keep its rates low and competitive, slashed budgets for resource acquisitions. The nascent conservation power plant, just taking shape in the region’s collective imagination,

found itself tarred with the same brush as every other potential investment.

Then, in 1996, the four Northwest governors initiated the Comprehensive Review of the Northwest Energy System to explore BPA’s role in a deregulated energy market. The Review recommended a new approach to funding conservation. Utilities could do it on their own.

Utilities assured the governors that they would continue to develop conservation even without BPA funding. Maureen Carr, a staff member with the Public Power Council, delivered a letter with 92 signatures to back up that claim.

In the end, the Review recommended just \$13 million a year in BPA conservation funding. BPA’s conservation expenditures dropped from \$135 million a year to less than \$16 million from 1995 to 2000. By 1997, the tally of annual energy savings from utility conservation programs in the region dropped by half.

“The utilities said they would do conservation and there was no need for Bonneville to get involved,” Pyrch said. “But in fact between 1995 and 2000, very little conservation was accomplished by utilities.”



*BPA and the Northwest Energy Efficiency Alliance are working to influence passage of federal standards requiring heat pump water heaters for all electric storage tanks. These heat pump water heaters are being bench tested in the Electric Power Research Institute’s Knoxville Living Laboratory.*

## Power plans: then and now

Since its inception in 1981, the Council has produced six regional power plans. The tools have changed, but the findings on conservation have remained consistent. The Council’s Fifth Northwest Power Plan, issued in May 2005, introduced a “portfolio model” that analyzed the costs and risks of acquiring a range of resources, from natural gas to wind to energy efficiency. The months-long analysis involved 750 hypothetical energy futures, computer models that took hours to scan and analyze mountains of data, and new buzzwords such as “efficient frontier.” The key finding was that the least cost and lowest risk strategy for the region to meet its future load growth was steady funding for energy efficiency at the highest rate practical.





Roof unit, commercial building ductless heat pump.

## Reinventing conservation

It was a dark day in the Northwest's conservation history. But once again, BPA used this down time to good advantage. "We were serious about conservation and we stayed serious," Hickok said.

"You don't just cut costs," Jack Robertson

explained. "You try to figure out ways to do things in a more businesslike way. If you don't, you are just an old bureaucracy that's going to get choked."

So BPA plunged into yet another conservation reinvention. Incredibly, savings from existing programs kept average megawatts ticking on the conservation meter. The new state building codes made an important contribution. BPA also continued to offer utilities scaled-down



Ductless heat pumps (such as the outdoor compressor unit shown here) proved to offer significant energy savings for single-family homes when NEAA field tested them in 2006 to 2008. BPA was a major contributor to their success. In 2011, tests were under way to evaluate ductless heat pumps for use in manufactured homes, multifamily homes and small commercial buildings.

versions of some of its popular "legacy" programs from the 1980s such as weatherization and Super Good Cents. Savings from those programs mounted.

One of the new ideas was an energy service business. From 1994 to 1998, the number of BPA conservation staff and contractors dropped from about 350 to fewer than 80. Many who remained were engineers and analysts, their skills honed on the monster research and



demonstration programs of the 1980s. BPA proposed to contract out their services as energy auditors and energy system designers.

That didn't last long. Private industry and BPA's own utility customers cried foul, saying the federal government didn't belong in the marketplace.

BPA quickly pulled back, limiting its energy efficiency outreach to unserved markets. It helped federal agencies from the National Park Service to the U.S. Navy with energy audits. In 2000, under a reimbursable-cost agreement, BPA sent conservation and power marketing

staff to Sri Lanka to help the Ceylon Electricity Board develop its electric utility under a two-year program with the U.S. Department of Energy.

One of the more enduring ideas to take root during the otherwise dark ages of conservation was market transformation. After recommending that conservation budgets be slashed, the Comprehensive Review pinned some of its hopes for conservation on this idea.

Market transformation works on the supply side — with manufacturers and dealers — rather than on consumer demand. Training for plant managers and line workers, retooling assembly lines and offering incentives to dealers and manufacturers could “transform” the market to recognize the value of energy efficiency as a product attribute.

BPA had already demonstrated that, given the right support, manufactured home suppliers would improve the efficiency of their products. The Environmental Protection Agency had used BPA's Blue Clue refrigerator program as a model for national appliance labeling offered through the Department of Energy and the Federal Trade Commission's Energy Star Program. New horizons beckoned, to motivate manufacturers to make more efficient lights, appliances and motors.

“You don't just cut costs, you try to figure out ways to do things in a more businesslike way. If you don't, you are just an old bureaucracy that's going to get choked.”

Jack Robertson



LEDs (light-emitting diodes), installed in the BPA headquarters lobby in 2010, use about 25 percent less energy than compact fluorescent bulbs and illuminate the artwork more effectively. BPA is pilot testing new uses for LEDs and expects their practical application to grow over the next decade.





Jack Robertson

In 1996, BPA and other Northwest utilities agreed to fund \$65 million over three years for a new nonprofit organization to improve the efficiency of electric use and reduce costs through market transformation. By March 1997, the Northwest Energy Efficiency Alliance had launched programs on efficient washing machines, residential lighting, ultra-efficient motors and building operator training.

## Green power takes off

Jack Robertson was acting administrator during some of the most tumultuous times for BPA and conservation. Known for his vision and big ideas, Robertson, working with Ralph Cavanagh of the Natural Resources Defense Council, dreamed up the Bonneville Environmental Foundation.

“The Bonneville Environmental Foundation was a way to grow money, grow wealth,



*This 20-kilowatt photovoltaic installation was contracted by BPA engineers on a service building at Mt. Rainier National Park; it operates off the transmission grid, dramatically reducing the use of a diesel generator.*

and then share that wealth both with the environment and with lower-cost rates to customers,” Robertson said. The BEF was established in 1998 by three public interest groups: Renewable Northwest Project, the Natural Resources Defense Council and the Northwest Energy Coalition. Sen. Mark Hatfield was president of the board.

It was an elegant construct. The public interest groups signed an agreement saying they endorsed specific generating plants (often wind) as environmentally preferred sources of energy, or “green power.” In exchange for this endorsement, BPA paid



*The federal government’s Energy Star program works by encouraging manufacturers and dealers to improve the energy efficiency of their products. BPA pioneered this approach, known as market transformation, with conservation programs such as Blue Clue and the Super Good Cents Manufactured Home Program.*





*This 10-kilowatt photovoltaic array at Cabrillo National Monument in San Diego, was designed and contracted by BPA engineers under a reimburseable cost agreement with the National Park Service. Beginning in the mid-1990s, BPA contracted out to other public agencies to design and install energy efficiency and renewable energy system projects.*

BEF a portion of the market premium it received from selling that power. BEF used those premiums to develop more green power and for fish and wildlife projects. It was, as Robertson said, “a self-replenishing engine of wealth.”

The BEF launched its Green Tag program in September 2000. BPA became a major supplier of Green Tags to the foundation. By April 2000, BPA had sold 36.7 megawatts of



*In 2008, the City of Ashland, Ore., installed 363 photovoltaic panels on a city utility vehicle parking structure. Consumers who purchase shares of the 64 kilowatt “Community Solar” project receive credits on their utility bills for electricity that the project generates.*

environmentally preferred power to nine Northwest utilities, generating about \$2.5 million in power premiums. Between 2000 and 2002, BEF Green Tag sales went from about 600 to almost 20,000.

In 2000, Dick Wanderscheid, conservation pioneer and City of Ashland utility manager, got the city together with the BEF, Oregon

Shakespeare Festival and Southern Oregon University for one of the BEF’s first renewable energy projects. The festival’s administrative office, the university’s library and two city buildings were retrofitted with photovoltaic panels that could produce 32.4 kilowatts. It was the first solar addition to BPA’s environmentally preferred power portfolio.



## Pushing the Electric Revolution

In 1999, BPA helped advance an electric revolution by laying groundwork for demand side management and an eventual “smart grid.” Its primary champion, John Holmstrom, dubbed BPA’s initiative the “Energy Web.”

The idea behind the Energy Web was to give consumers information and controls to manage their own energy use. Examples include air conditioners that supply a constantly updated signal about market prices and supply; controls that allow a homeowner to decide when to wash clothes based on the hourly price of energy; and relays that let a utility turn off power to an end user when the grid is in danger of being overloaded.

BPA sponsored Electric Revolution conferences in 1999 and 2000, drawing several hundred attendees and exhibitors to promote everything from fuel cells to photovoltaics. In August 2000, BPA launched two power demand exchange pilots to test Energy Web concepts. Wired magazine featured the Energy Web in 2001.



*A pretreatment structure for wood chips at NORPAC, the continent’s biggest newsprint producer, is part of the largest energy efficiency project in the Northwest and one of the largest in the country. In 2012, BPA and Cowlitz County Public Utility District partnered with North Pacific Paper Corp., owner of the Longview, Wash., paper mill, to reduce the electricity and chemicals needed to refine wood chips, saving enough energy to serve 8,000 Northwest homes. (Brent Arnold/Cowlitz County PUD)*

## Conservation’s finest hour

Ralph Cavanagh of the Natural Resources Defense Council, said the seeds of the energy crisis of 2000 and 2001 were sown during the electricity deregulation of the mid-1990s. One of those bad seeds, he added, was a slowdown in conservation.

“If energy efficiency had been acquired through the late 1990s at the rate recommended in the Council’s Power Plan,” the Council pointed out 10 years later, “80 percent of its costs would have been recovered in one 12-month period — June 2000 to May 2001 — because of the high market prices during the energy crisis.”

In other words, during those long weeks in 2001 when the market price for power





*With turbines running in the background, Oregon Gov. John Kitzhaber, right, and Washington Gov. Gary Locke hold a press conference at Bonneville Dam to ask for help in confronting the power crisis. They urged consumers and businesses to cut their electricity use by at least 10 percent. (Associated Press/Don Ryan)*

topped \$200 per megawatt-hour, the price of energy efficiency — about 2 cents per kilowatt-hour (or \$20 per megawatt-hour) — remained unchanged. It would have proved a tremendous bargain.

The fact was not lost on BPA, Northwest governors or utility customers. In the winter of 2000, as wholesale power prices soared to unprecedented levels and the water supply forecast was dropping like a stone,

Oregon Gov. John Kitzhaber and Washington Gov. Gary Locke stood with acting Administrator Steve Wright at Bonneville Dam to implore the public to reduce power use by 10 percent. BPA ran full-page ads in major media carrying the governors' message.

"In 2000, the whole West Coast woke up," Steve Hickok said. "Suddenly, there were conservation conferences again with the same graphs we'd seen 20 years before."

BPA was well-positioned. The Energy Web had laid the groundwork for BPA to use demand exchange to reduce its costs. BPA paid large industrial and commercial consumers of its customers to cut electricity use during periods of high demand and high energy prices.

The supply pipeline was primed and ready to go when BPA's Ken Keating and Don Davey initiated the Energy Star Lighting Coupon Campaign. The Northwest Energy Efficiency Alliance had spent three years establishing effective relationships with compact fluorescent lighting manufacturers and retail vendors. So they were able to respond quickly when utilities offered \$6 discount coupons for CFLs in the retail bills sent to their consumers. With 70 utilities and 700 retail vendors participating, retail consumers in the Pacific Northwest purchased 8.3 million lights in 2001 alone.



That July, Wright and his elder son, Tyler, joined Gov. Locke and Seattle City Light staff handing out CFLs and shower flow restrictors to 45,000 fans at a Seattle Mariners game. (The Mariners won.)

## Great ideas emerge on the fly

Vending machines. Traffic lights. Pumps, fans, nozzles, sprinklers. If it used electricity and could use less, BPA wanted to pay for the savings during the energy crisis. With new power sales contracts and new wholesale power rates taking effect in October 2001, BPA pushed conservation back to the front burner with the Conservation and Renewables Discount (C&RD), a ½ mill per kilowatt-hour discount on BPA's firm power rates. This came as a line item credit in power bills that customers could spend on qualifying conservation measures and activities. A second program, called Conservation as part of Augmentation (or ConAug) because it augmented BPA resources, provided customized contracts between BPA and utilities for conservation programs and projects.

BPA threw the doors wide open to new technologies that utilities were able to find



*In 2000, during the height of the Northwest energy crisis, acting Administrator Steve Wright and Senator Patty Murray handed out compact fluorescent light bulbs at an event in Spokane, Wash., to encourage consumers to help the region save electricity. (The Spokesman-Review)*

and fund. Many were still running the legacy conservation programs and simply ramped them up. Others wanted to expand to new lighting and computer technologies.

“Without batting an eye, the region’s utilities cranked up conservation programs — and

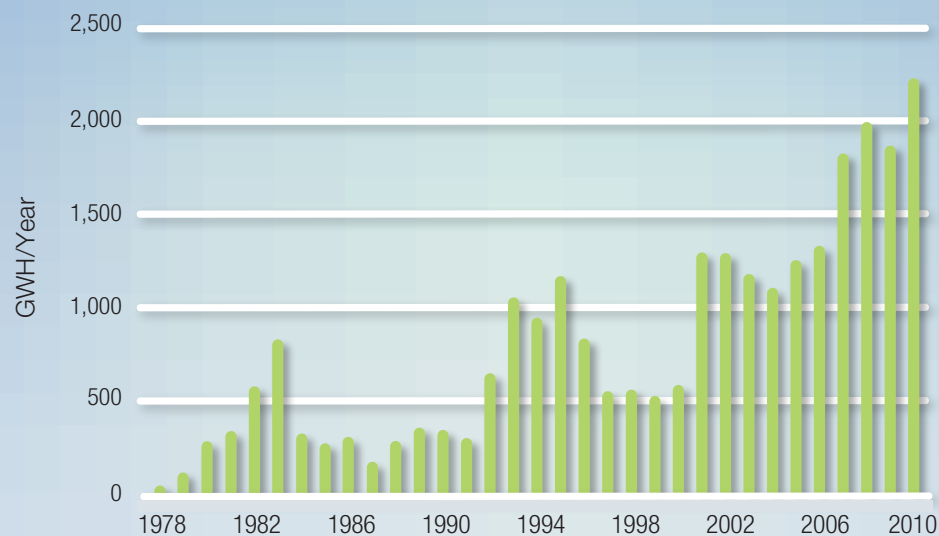
regretted having shut them down just a few years earlier,” said longtime BPA conservation manager John Elizalde. Energy efficiency savings from utility programs jumped from 50 average megawatts to 110 average megawatts between 2001 and 2002.



“We wanted to get the utilities re-engaged in conservation in a big way, and it sure worked,” said John Pyrch. “It was one of the highlights

of my career in conservation at BPA.” The region returned to a path that would achieve upwards of 250 aMW of conservation in the coming years.

### Conservation Acquisitions



*Provided by Northwest Power and Conservation Council*

*In 2002-2003, the Pacific Northwest finally got off the conservation roller coaster and made a long-term commitment to conservation as a resource. This graph, from the Council, is a birds-eye view of the historical phases — the ups and downs — of the early periods of the BPA conservation program.*

## Getting off the conservation roller coaster

In the wake of the power crisis, BPA and the Northwest Public Power Association organized a September 2001 conference called “Conservation or Crisis: A Northwest Choice.” Wright told the crowd that the region needed to get off the conservation roller coaster. “We must all stop treating conservation as a reaction to crisis,” he said. “It must be the cornerstone of our region’s energy future.”

“We must all stop treating conservation as a reaction to crisis. It must be the cornerstone of our region’s energy future.”

Steve Wright



The West Coast energy crisis had shown everyone what conservation could do. After lurching to life in the 1980s, taking off in the early 1990s, then screeching to a halt, “Mr. Toad’s Wild Ride” had finally found a reliable gear. Conservation had earned its place in the region’s resource strategy.

Northwest Energy Efficiency Alliance market transformation initiatives have since saved over 700 average megawatts. Portland Energy Conservation Inc., the fledgling organization that introduced commercial building commissioning with BPA’s Energy Edge Program, has more than 300 employees. Energy efficiency is the third-largest energy resource in the region — behind hydroelectric power and coal. Experts estimate that energy efficiency is an \$800 million to \$1 billion a year industry in the Northwest.

A final strategy, long aspired to by conservation experts, was locked into place with BPA’s fiscal year 2011 power rates. BPA charges one rate for a utility’s historical load and a higher rate for additional increments. These tiered rates encourage utilities to build conservation in their service areas to forestall rate increases.

“This is an economic decision, not a cultural bias,” explained Tom Eckman of the Northwest Power and Conservation Council.



*BPA headquarters in Portland, Ore.*

“The new crop of utility managers gets this. We don’t hear ‘It doesn’t work’ anymore.”

John Elizalde offers a bit more information about this generation of utility managers. Recalling a meeting with utility general managers around the time of the West Coast energy crisis, he said, “I was shocked to look around and see a huge percentage of people who had been utility conservation managers

in the early 1980s who were now running those utilities.”

“In short, we had made a real difference. Mission accomplished.”





*An unlikely combination ~*

# WOODY Guthrie & BPA

It's an odd professional combination by today's standards: a Dust Bowl-born radical songwriter and a Northwest-bred federal power agency.

But when Woody Guthrie met BPA in 1941, creative sparks flew.

The musical electricity that resulted is still heard, thanks to a BPA employee named Bill Murlin and his quest in the 1980s to rekindle the embers of a lost legend.

The story began in May 1941, when Guthrie was hired on a one-month contract to speed-write music for a BPA film on the new Columbia River hydro system.

"They couldn't get him on the [permanent] payroll," says Gene Tollefson, BPA retiree and author of "BPA & the Struggle for Power at Cost." "So they hired him for 30 days. And he wrote a song a day."



*Woody Guthrie's 30 days at BPA is considered one of the single most productive bursts in his fruitful career.*



The month's work paid only \$266.66, a monumental bargain for a 28-year-old songwriter at the peak of his powers. It was the year after Guthrie had written a song he renamed and released in 1944 as "This Land Is Your Land," America's unofficial anthem.

With a BPA driver at the wheel of a black Hudson, the tumbleweed troubadour swept up and down the Columbia Gorge, a dust storm of song ideas billowing behind

him. The mind-boggling sight and story of the two new dams — whose gray, elephantine sides crawled with workers in an era of desperate unemployment — set Guthrie's songwriter brain afire.

For 30 days, he sang, he smoked, he toured, he typed. His legendary creative turbines spun at full capacity as he witnessed first hand the ways hydroelectricity would elevate a hard-

scrabble life for so many in the Northwest.

The pictures and words from that trip were "faster to come and dance in my ears than I could ever get them wrote down," he said.

Indeed, BPA information officer Steve Kahn said Guthrie almost vibrated as the ideas flowed through him — he'd clasp a metal disc and beat out rhythms on the leg of his desk at the old northeast Oregon



*Workers like these at Grand Coulee Dam inspired Guthrie to write "Jackhammer Blues" during his month as an information specialist at BPA.*



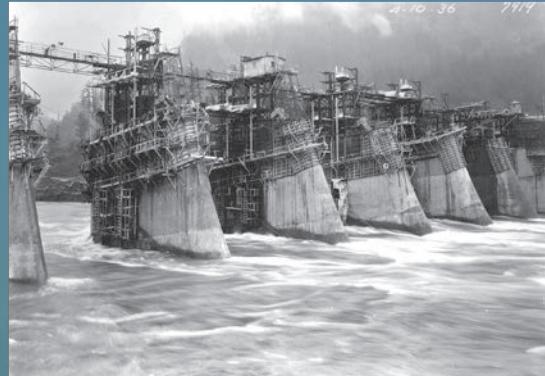
*Guthrie brought his wife, Mary, and three children with him to Portland, where they rented a home at 6111 S.E. 92<sup>nd</sup> Ave. in the Lents neighborhood in May 1941.*



# POWER OF THE RIVER

Street headquarters as he wrote. (It's said he got relocated from the second floor to the basement early on for disturbing others.)

When Guthrie was done, he'd fulfilled his contract with 26 song lyrics, a dozen recordings and new arrangements of old American melodies put to colorful original lyrics — "Roll On, Columbia," "Pastures of Plenty," "Grand Coulee Dam." He recorded 11 of the songs in BPA's basement;



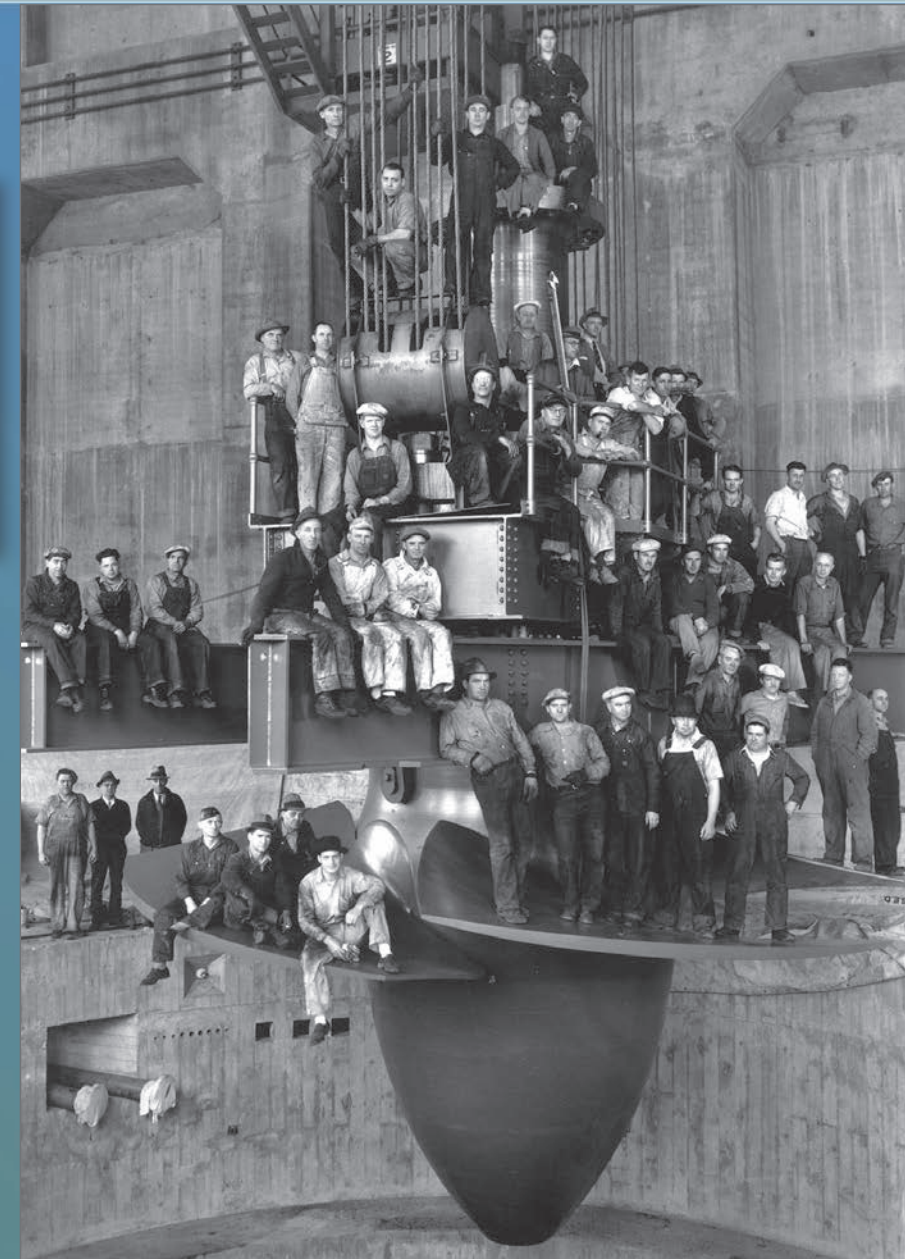
*"My children won't run away to town, Since Bonneville brung the 'lectric lights around," Guthrie wrote in "Out Past the End of the Line."*

three songs he recorded in a New York studio eventually appeared in the agency documentary "The Columbia."

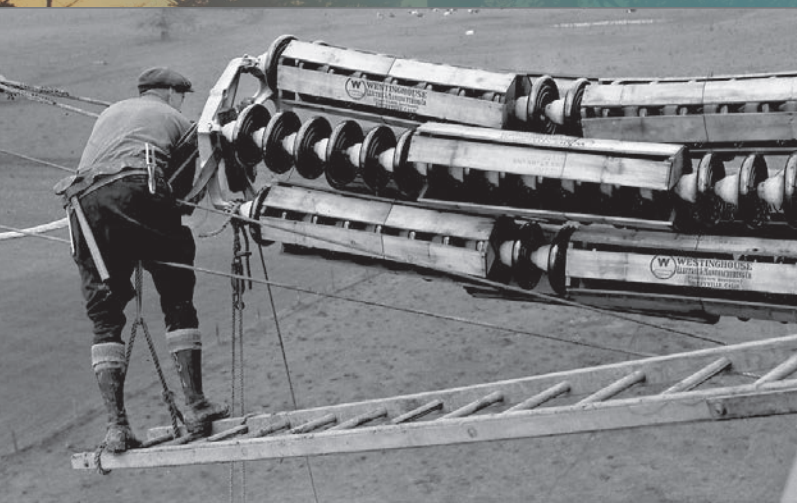
"The Pacific Northwest is one of my favorite spots in this world," he declared.

Then he was gone as quickly as he'd come, off to New York, his car repossessed, marriage in shreds, wife and kids going back to Texas without him, his focus turning to using his guitar as a "machine to kill fascists" in a world war.

The story of Guthrie's wildly productive month along the Columbia was forgotten. After the war and the political tensions of the McCarthy era, his stint at BPA shrank in the rearview mirror to a few grainy words at the end of an old government film in a file cabinet.



*In an era of desperate unemployment, Guthrie was inspired by the swarms of workers on the dams. "When I seen that great big Bonneville Dam; Well, I wish't I'd a been workin' makin' somethin' for Uncle Sam," he wrote in "Ramblin' Blues (Portland Town)."*



*Witnessing the benefits of BPA's rural electrification work around the Northwest, Guthrie opined, "The whole damn country ought to be run by electricity."*





Bill Murlin, in the Woody Guthrie Circle at BPA headquarters on his 2005 retirement day, says, "If we hired Woody Guthrie today, we'd have him singing about saving salmon and conserving energy, instead of using him to sell power."

Four decades later, that's where Bill Murlin came across it. His workplace epiphany would raise the agency's profile around the world and draw two of Guthrie's children to BPA to honor their father's work.

If you were going to order the perfect Woody Guthrie detective, the lanky, laconic Spokane native would be straight from central casting. Murlin combined the chops of a professional folksinger with the skill set of a broadcaster — an ear for sound coupled



Murlin, a professional folk singer, performed with Arlo Guthrie, on the left, during Guthrie's visit to BPA headquarters in April 1985. About 400 employees joined them in "Roll On, Columbia, Roll On," Washington state's official folk song.

with a nose for news. He'd been performing Woody Guthrie songs since college in the 1960s, the perfect preparation for his starring role in uncovering a wealth of missing material.

By the time Murlin came to BPA in 1979, he'd already spent half a lifetime with the tools of a traveling storyteller on his shoulder — from radio recorders to film cameras to his oversized folk guitar ("the dreadnought," he says, "one of the biggest damn guitars out there").

So if Guthrie's iconic presence slid past everyone at BPA for decades, it wouldn't elude Bill Murlin.



Murlin traveled to Washington, D.C., to donate the rare copies of Guthrie's BPA recordings to the National Archives in October 1987.

Murlin's first job at BPA was running the "radio boiler room," a one-man operation to produce, narrate and deliver BPA news by telephone (with the help of 20 volunteers) to 300 radio stations in four Northwest states. He worked with Ann Skalicky, a Public Affairs staffer who kept early BPA films, many depicting construction projects, in her tall metal file cabinet. Murlin liked to open it and "look at the movies every once in a while."

One day he was screening the 1948 film "The Columbia" as background for his own BPA film work. Professional curiosity made





*Nora Guthrie, director of the Woody Guthrie Foundation in New York, greets Elmer Buehler, the BPA driver who toured her father around the region for a month in 1941. Nora Guthrie visited BPA and Buehler's northeast Portland home in September 2004.*

him watch it to the very end, where he encountered one name he never expected to see on a government movie.

He halted the reel for a second look and thought, "Cool! I didn't know that Woody Guthrie had worked for the government — or BPA."

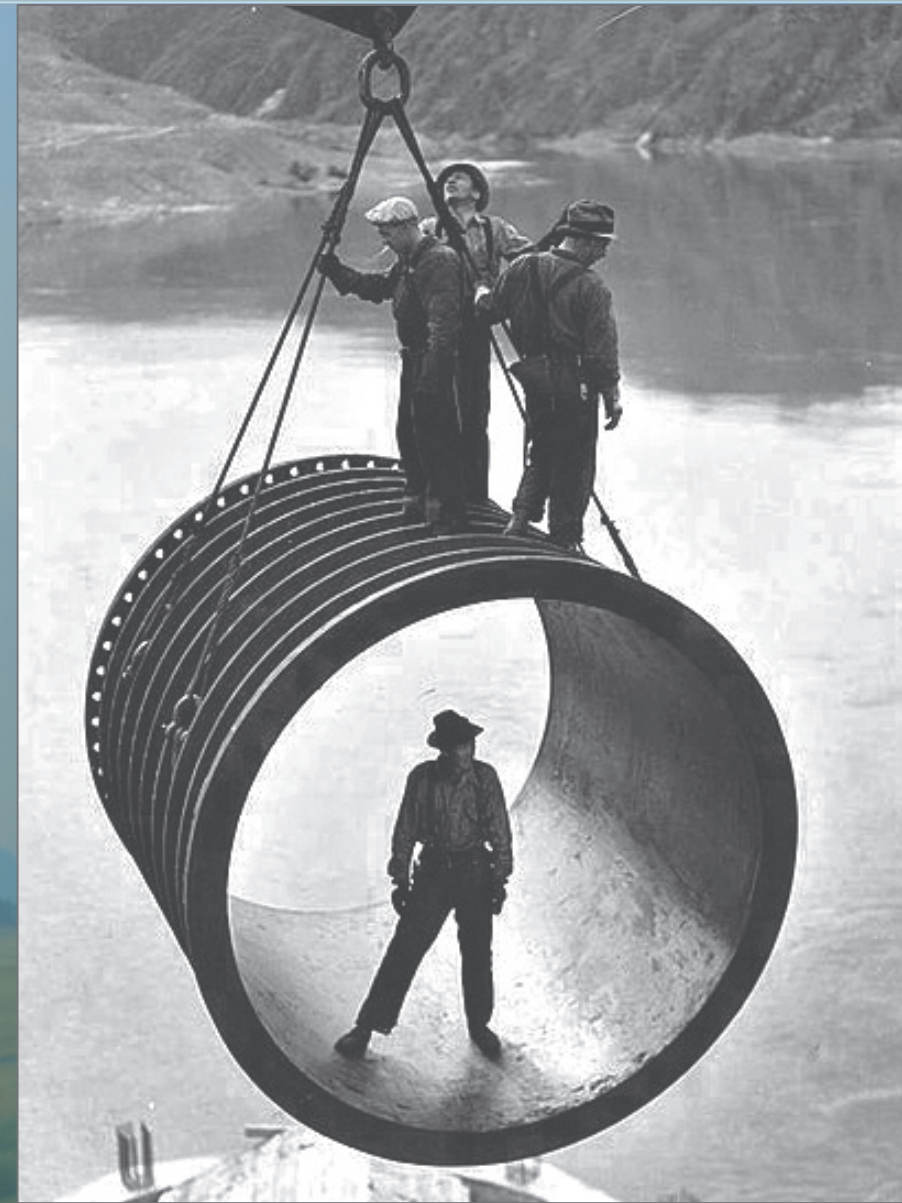
He rummaged through another cabinet and found a file labeled "The Columbia." Inside were 40-year-old documents and employment records — "the first solid clues to Guthrie's BPA employment," Murlin says.

The next breakthrough came when Murlin located a music scholar in Michigan, who provided a copy of a 1945 letter from BPA to Guthrie's family that contained the lyrics to 22 of the lost songs. In 1983, Murlin wrote an article on his find for BPA's Circuit newspaper, and the news suddenly leapt far beyond the agency.

"On a Monday morning, the story turned up on the cover of The Oregonian above the fold," Murlin says. From there, it swept across the country, and to Europe via the BBC.

The quest for any trace of Guthrie singing his BPA songs became a labor of love, which Murlin kept alive via snail mail and landline. Although it proved painfully slow going, with many false leads and dead ends, he picked up the assistance of folk legend and Guthrie friend Pete Seeger along the way.

Eventually, persistence paid off — Murlin hit paydirt, turning up recordings of Guthrie's



*Workers ride a section of pipe being moved by crane at Grand Coulee Dam. "Woody saw the majestic Grand Coulee Dam as the creation of the common man to harness the river for the common good," wrote folk historian Alan Lomax in the songbook of Guthrie's BPA work that Murlin produced in 1987.*



voice from his BPA sessions at opposite ends of the West Coast. One came from a San Diego newspaper editor who had worked at BPA a few years after Guthrie (and nearly lost his Guthrie collection in the 1948 Vanport flood). The other key discoveries came from a fan on Washington's Olympic Peninsula and an Associated Press reporter in Portland. Each of the three had the rarest of the rare, a vinyl or acetate disk bearing a different assortment of the missing cuts — among them, the only recording of Guthrie singing “Roll On, Columbia.”

“I said, ‘Manna from heaven, a gold mine,’” Murlin says. “I never anticipated that I would find unpublished recordings of Woody Guthrie singing his own Columbia River songs.”

In spite of media attention, those three records — none commercially made, but each a mix tape of its time — were the only copies that ever surfaced of Guthrie performing selections from his BPA songbook.

Murlin achieved his goal, and the recovered music was widely shared for BPA's 50<sup>th</sup> anniversary. A commemorative album of Guthrie performing 17 of the

songs was released, later accompanied by a songbook containing a lovingly written forward by folk historian Alan Lomax, Guthrie's dear friend and admirer who had recommended him for the job at BPA.

The unearthing of a pop-culture icon in BPA history gave people inside and out new cause for pride.

“That's one of my favorite stories of my life at Bonneville,” says former acting Administrator Jack Robertson, who in 1987 accompanied Murlin to present the six fragile copies of Guthrie's BPA recordings to the National Archives in Washington, D.C.

“I don't think the government has ever gotten a better investment for its money,” BPA's Kahn told *The New York Times*.

Today, Murlin is a Bonneville retiree. After half a century, he still performs with his college friend, Carl Allen, in the folk group *The Wanderers*, and they still sing Woody Guthrie.

When Murlin has occasion to call BPA during its 75<sup>th</sup> anniversary year and happens to get put on hold, he might hear a familiar twang, followed by some lyrics close to his heart:



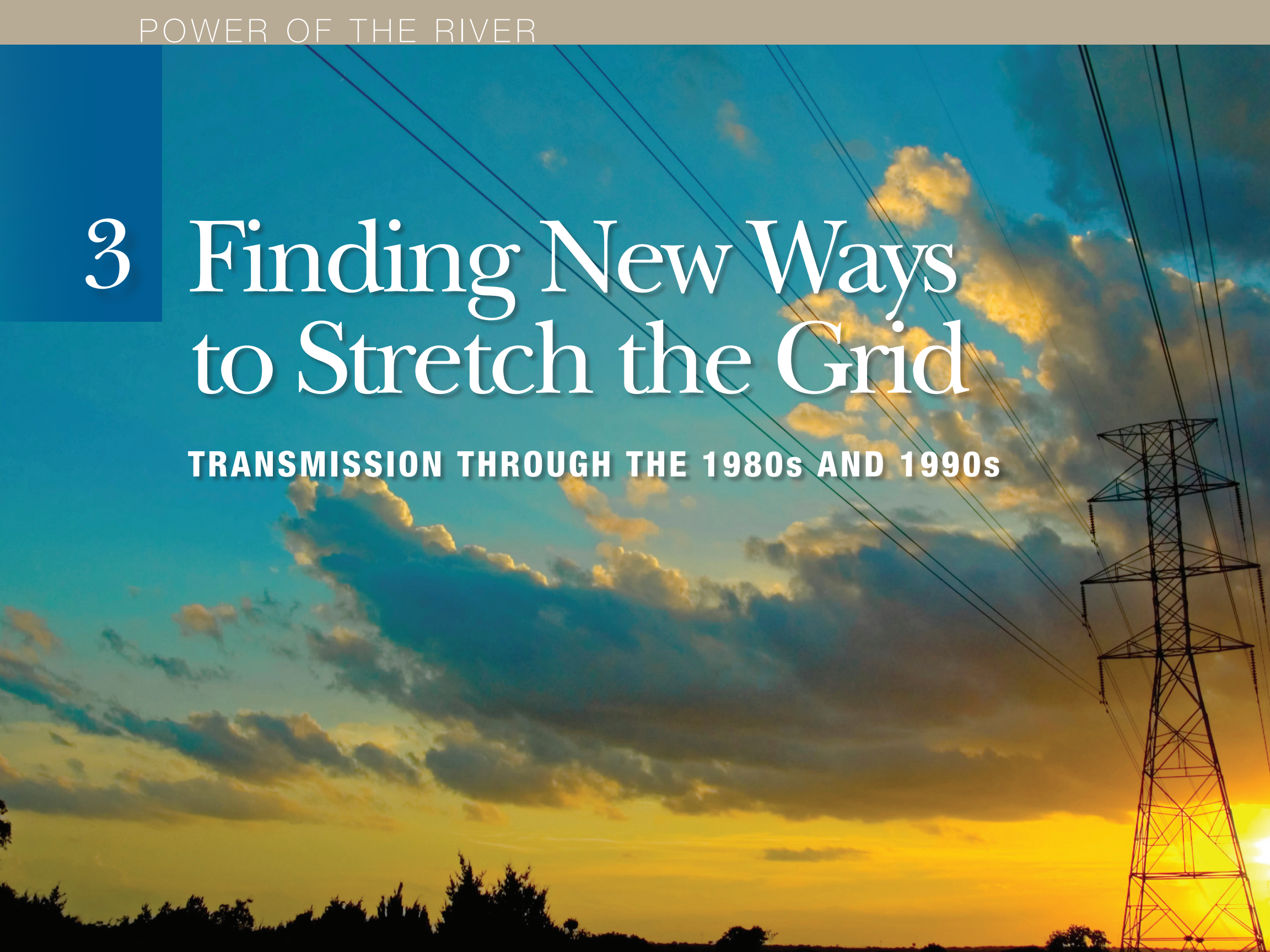
*Guthrie's well-traveled guitar bore a sticker that famously proclaimed “This Guitar Kills Fascists.”*

“... In the misty crystal glitter of that wild and windward spray ...” (“Grand Coulee Dam”) And Murlin will say to himself, “Cool!”



# 3 Finding New Ways to Stretch the Grid

**TRANSMISSION THROUGH THE 1980s AND 1990s**





A noisy, angry mob packed the Montana meeting room. In the front sat landowners, ready to speak their minds about transmission lines. To one side sat leaders of a local citizens group. In the back, power company reps quietly conferred, waiting to see how BPA would manage the crowd.

George Eskridge walked in with a leisurely stride, sporting his familiar handlebar mustache. He shook a few hands, greeting people in each group, then moved to the front of the room. In seconds, the crowd was silent.

Eskridge headed BPA's Missoula office, established in 1981 to address the concerns



*George Eskridge took heat from residents about the Colstrip transmission line. But his calm demeanor and willingness to listen helped pave the way for a resolution.*

of Montana residents. He worked from a daylight basement on the outskirts of town — a space some considered more of a bunker than an office. Eskridge had become the focal point of a very unpopular project — the proposed Colstrip transmission line.

BPA wanted to build a 350-mile electrical highway to export power from a huge coal plant in eastern Montana to five utilities in Washington, Oregon and parts of Montana. Many Montana residents detested the idea of a line that would slice across their land without much benefit to them.

Gone were the days when BPA drew accolades for introducing electricity to rural areas. Construction crews were once greeted with cheers and refreshments when they brought light to remote farms and communities. But by the early 1980s, a new transmission line was more likely to provoke protests and lawsuits. It was seen as an intrusion, not a sign of progress.



*Montana residents protested the idea of stretching a transmission line across the pristine landscape.*

Construction of the Colstrip line was tough on BPA employees too. It uprooted hundreds from their homes and families for more than a decade in the days before cell phones and email, sending them to the extreme eastern edge of BPA's territory. Others, like the project's engineering representative, Lou Driessen, spent weekdays on the job site and returned home on the weekends. That was his weekly commute for eight years.

Despite the hardship, they constructed one of the agency's longest lines through tough terrain in harsh conditions. When it was done, the agency had what some called a "gold-plated" system, with more than enough capacity to





*The Colstrip coal-fired power plant was already under construction when BPA agreed to build the new line. Utilities had invested millions of dollars, and the agency faced intense pressure to build the line quickly. (PPL Corp.)*

serve its needs. Colstrip was the last main grid 500-kilovolt line BPA would build for 15 years.

Engineers instead turned their focus to getting more from the system they'd already assembled. They saved money by inventing ways to squeeze more out of existing equipment, pioneering many new technologies along the way.

In doing so, they readied the Northwest for the age of the Internet and made it possible to lay the foundation for a smart grid, a term yet to be coined.

But years of doing more with less would eventually catch up to BPA, and the agency would question whether it had cut costs to a fault.

## Off to a tough start

The Montana Power Co. led five utilities that were building two new coal-fired generating stations in eastern Montana, called Colstrip No. 3 and No. 4. The Colstrip plants were part of the same regional Hydro-Thermal Power Program that included the ill-fated Washington Public Power Supply System nuclear plants, but BPA was not involved in their financing. The utilities had intended to build a transmission line to ship their power



*BPA held dozens of public meetings on the Colstrip project and invited input from anyone interested.*

from Colstrip west. But public opposition was strong. When the Confederated Salish and Kootenai Tribes refused to let the utilities cross their lands on the south side of Flathead Lake, the project came to a standstill.





*Landowners examine maps of the proposed routes to see if the new line will cross their property.*

The utilities turned to BPA. The federal agency was, after all, known for constructing a premier transmission network that lit up all corners of the Northwest. The system would eventually stretch over 15,000 miles. The utilities knew BPA had a vacant right-of-way over the Rocky Mountains — a perfect location for the new line.

BPA signed on for the project in 1977. Congress subsequently directed the agency to construct the line from Townsend, Mont., to Spokane, Wash. Right away, Montana residents protested. “What’s it going to take to stop this power line coming through here?” a resident asked BPA staff at one of more than a dozen public meetings.

But an earlier environmental study on the Colstrip plants had already confirmed the need

for the line. BPA’s concern was not whether to build it, but where. People could help choose one route or another, but not no route at all. For many ranchers, the threat of losing land to condemnation to make way for the new line was real.

“The generation was already being built,” said Gail Kuntz, who worked for the Montana Department of Natural Resources at the time. “BPA was under tremendous pressure to build the line — you would be hard pressed to overstate how much pressure there was.”

The utilities had spent heavily on the Colstrip plants and were counting on the power to serve their customers. Transmission project engineer Mike Johns recalled the pressure to meet construction deadlines. “It was something like \$1 million a day — that’s how much the utilities would lose if we missed our schedule.”

“So BPA walked in saying, ‘We have a line to build,’” Kuntz said.

BPA’s arrival was highly publicized. An Oregonian headline read, “BPA called arrogant, belligerent.” The Missoulian reported on “Bad blood with BPA.” Locals threatened BPA employees. On one occasion, a rancher aimed a rifle at surveyors. Protestors disrupted every public hearing the agency held and punctured tires on government vehicles in the parking lot.

At one heated public meeting, project environmental lead Tim Murray was grateful that a police officer stood nearby. When Murray told the officer how glad he was to see him, the man replied, “I’m one of them.”

“It was clear we needed to do a better job of keeping people informed and working with them,” Murray said.

Beginning with the Colstrip line, BPA put a new public involvement philosophy into action. It reflected Administrator Peter T. Johnson’s direction that the agency had to go further to demonstrate public accountability. The agency invited input from anyone who had an interest. It held dozens of meetings to identify problems, listen to concerns and suggestions, and respond to questions.

**BPA’s concern was not whether to build the Colstrip line, but where. People could help choose one route or another, but not no route at all.**



“I get out and meet the public, tell them what we’re doing, and as much as I can not only about the transmission line, but about Bonneville itself. Any time we get a chance, we try to make contact with the public.”

George Eskridge

That’s when BPA opened the Missoula office and brought in George Eskridge. Driessen also worked out of the office. “We learned as we went,” Driessen recalled. “BPA didn’t have a dedicated public involvement office back then, so it was new to all of us.”

They produced newsletters and worked with county commissioners and the congressional delegation.



*BPA spent years refining the route for its Colstrip line across western Montana to reduce impacts on local residents.*

“I see my job primarily as information,” Eskridge said in a 1982 interview. “I get out and meet the public, tell them what we’re doing, and as much as I can not only about the transmission line, but about Bonneville itself. Any time we get a chance, we try to make contact with the public.”

Kuntz, who later became BPA’s constituent account executive to Montana, recalled that Eskridge, who later became an Idaho state legislator, took a lot of heat. “But somehow he was able to — not erase — but mitigate and address concerns.”

## Which way hurts least?

BPA had some tough choices.

The agency had an existing right-of-way over the Rocky Mountains. But, just like the line the utilities had planned, it crossed the Flathead Indian Reservation. The Confederated Salish and Kootenai Tribes disputed BPA’s right to construct the line on their land. The right-of-way also cut through Missoula, and the residents rallied against BPA.



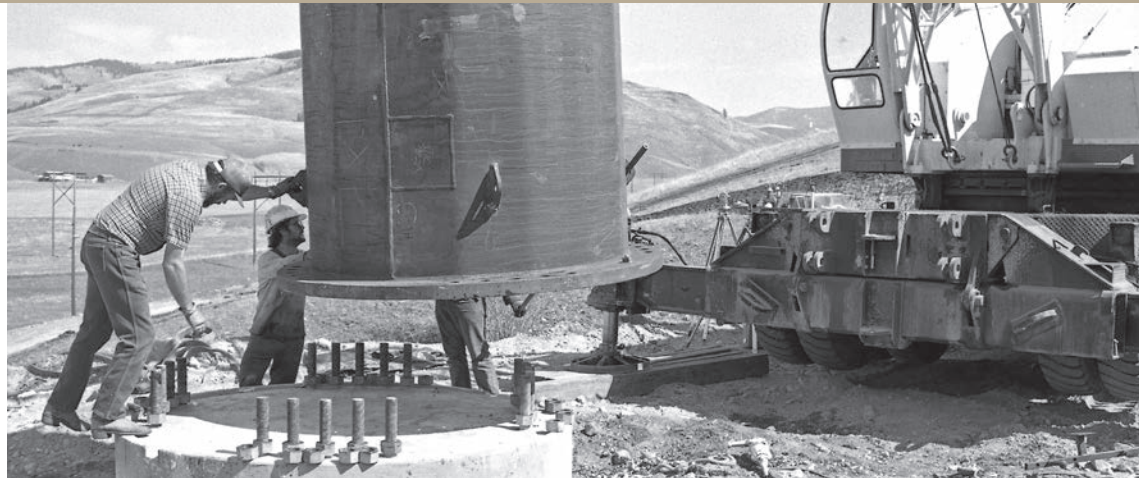
Another potential route went right behind a town, while another went through a valley where some residents still lacked electricity. Routes crossed river valleys, prized fishing grounds, national forests, farmlands, rangeland and mountain ranges — all of which residents wanted to protect.

BPA knew there was no such thing as a perfect route, but it had to find the one that would hurt the least.

“We tried something we hadn’t done before, and as luck would have it, it worked,” said Tim Murray, the environmental lead. “We had a team, Montana had a team. I thought, why don’t we put our teams together to find the right route?”

BPA coordinated with staff from the U.S. Forest Service, the Bureau of Land Management and the state. “We paired our landscape architect with their landscape architect, our engineer with their engineer,” Murray said. The pairs performed their studies, then came together for a week-long meeting and settled on a route both BPA and Montana could support.

“From an engineering perspective, we wouldn’t have chosen to build it the way we did. We went through high elevations, rough terrain and deep snow,” said Johns. BPA routed the line away from scenic agricultural lowlands and behind forested ridges. Some



*BPA included the public throughout the Colstrip project, including selection of the tower designs. The residents near one section of line selected single-pole towers, which BPA then designed and built specifically for this project.*

## Bringing the outsiders in

Instead of making decisions first and then informing the public, Jack Robertson proposed that BPA invite the public into the process. He thought that could help defuse the kind of controversy BPA encountered on the Colstrip line.

BPA attorneys, however, worried public involvement would force the premature release of documents and jeopardize attorney-client privilege. Some also worried that BPA would forfeit its flexibility to the point that outsiders would gain leverage to make unreasonable demands, exposing BPA to lawsuits.

But Robertson, a former staffer for Sen. Mark Hatfield and later acting BPA administrator, convinced Administrator Peter T. Johnson that he must weigh those risks against the serious risks of leaving the public out. And, he said, if we’re going to do this, “We have to make a rock-solid, ethical commitment to be open and honest, whether or not it is to our presumed, near-term advantage. I’ve got to have your

credit card,” he insisted to Johnson. In other words, Johnson had to trust his expertise.

BPA radically changed its approach over about five years.

“We took all the environmental leaders in the region, for example, and formed a group out of them,” Robertson recalled. “To many people in Bonneville, these guys were dangerous. But I said, ‘Not only are we going to talk with them, we’re going to get ‘em in a room. You’re going to be there, I’m going to be there. They can set the agenda. We’re going to do it every month. It’s going to start out as a screaming match, but we’re going to turn it into a dialogue.’”

It worked.

“Our operations did not come to a screeching halt,” Johnson later concluded. “On the contrary, we gained authority and legitimacy, avoided costly lawsuits and political challenges, and arrived at creative solutions to seemingly intractable problems. Overall, our policy-making improved.”





*Residents selected the single-pole tower design for its reduced visual impact.*

locations were difficult to reach. “But we did what we could to reduce the impacts,” Murray added.

And the agency designed and built the first double-circuit, single-shaft, 500-kilovolt transmission towers in the United States.

The towers were more expensive, but they were selected by residents themselves for their reduced visual impact. “I showed them pictures of possible tower designs and let them choose,” Driessen recalled. The poles — 16 of them — rise 175 feet above the grassy



*A crane lifts a section of a 175-foot single-shaft transmission tower.*

slopes of Miller Creek, about 10 miles south of Missoula. At its base, each tower measures 7 feet in diameter, and each weighs more than 55,000 pounds.

These structures taxed the capacity of the plant that manufactured them. “When





*Helicopters flew equipment into the rough Montana terrain, speeding construction.*

they came through the shop, all the other work stopped,” said Leon Kempner, the BPA engineer who designed the towers. “One of the welds — the one that joins the shaft to the base plate — took 12 hours of continuous welding to complete.”

To make up for time spent on planning and environmental studies, BPA crews built the Colstrip line at record speed, despite the remote location, steep terrain and



## ‘Substation in a box’ keeps power flowing

In the middle of the Colstrip line, Taft Substation is wedged deep in the Rocky Mountains. In a typical winter, it’s buried under 10 feet of snow. To keep it operating, BPA built its first and largest indoor substation.

Engineers used new gas insulating technology to pack what would normally cover 15 acres into one 60-by-200-foot concrete building. BPA contained all of the conductor and substation equipment in steel tubes filled with pressurized sulfur hexafluoride gas, which has about 20 times the insulating property of air.

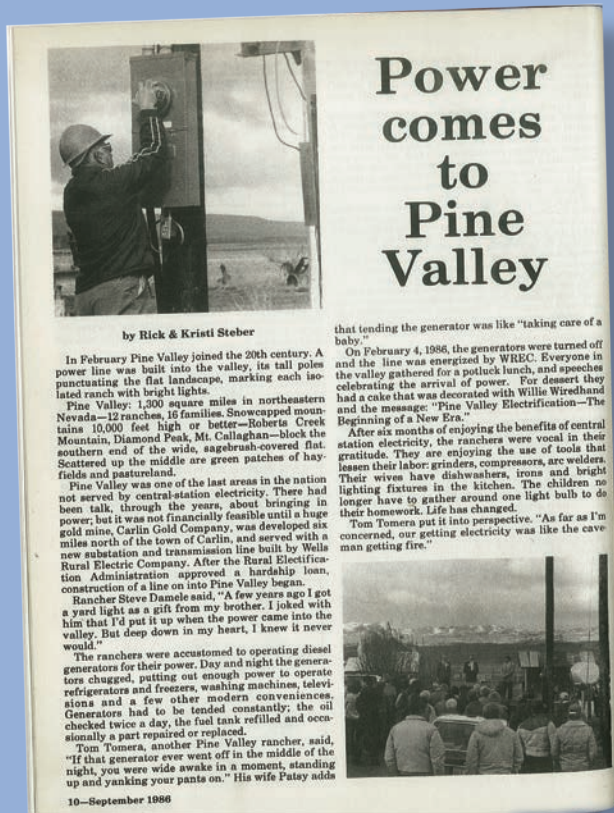
Inside, it looks like a densely packed tangle of gargantuan plumbing. “It’s not as difficult as it looks,” said Keith Coy, foreman of the project’s electrician crew. When they were putting it together in 1985, Coy explained, “The pieces



*Squeezing a 15-acre substation into a 60-by-200-foot building keeps Taft Substation operating despite snow that can be 10 feet deep in a typical winter.*

are numbered, just like the logs in one of those do-it-yourself cabin kits. It’s only a matter of fitting them together.” Except some of the pieces weighed 15 tons and had to be “threaded into holes the size of your thumb,” he added.





## Like “fire to a caveman”

While main grid high-voltage work was complete, BPA still had plenty of lower-voltage construction to perform — including rural electrification. In February 1986, BPA energized a new line to Pine Valley, Nev., one of the last places in the nation to receive power.

“Electricity means ... freedom from drudgery,” said rancher Hale Bailey. “I’ve heard a lot of people complain that power lines spoil the scenery, but they sure look good to me.”

Another rancher, President Ronald Reagan, called with his congratulations.

Pine Valley rancher Tom Tomera put the line’s significance into perspective. “This power to us was like fire to a caveman,” he said.

severe winter weather. One 97-mile stretch from Garrison to Townsend went up in 15 months instead of the typical 30. BPA flew in equipment by helicopter and hired two construction crews to work in multiple locations at once.

BPA completed the line in three sections. The first two were complete by 1985. They stretched from Townsend, Mont., to the new Garrison Substation near Deer Lodge, Mont., and then to the new Taft Substation near the Montana-Idaho border.

“Once we got to Taft, a lot of the pressure was off,” Johns said. While they still needed a 96-mile section from Taft Substation to Bell Substation in Spokane, they had reached a major milestone. Taft Substation connected to BPA’s existing Hot Springs and Dworshak substations. That meant power from the two new Montana coal plants could make it into BPA’s system.

BPA completed the final segment of the Colstrip line in 1987, the end of the era of expanding transmission. For decades, each BPA annual report had proudly recited the miles of new line and number of new substations added to the grid that year. After 1987, the practice ended. There would be little to list for the next 15 years.



*During a Montana cold snap in 1989, equipment at Garrison Substation choked in the sub-zero temperatures.*

## The grid hits its limits

Through the 1980s, BPA had more than adequate transmission capacity to serve the region. Some argued that BPA overbuilt the system. But a cold snap in 1989 proved that, in some places, the grid was actually wearing thin.

A BPA transmission crew working near Drummond, Mont., had been tracking snow into the cabs of their trucks, where it melted during relatively mild weather in the first few days of February. The temperature then





dropped nearly 80 degrees overnight to about 40 degrees below zero. “We could not open any of the doors on the trucks as they were all frozen shut,” recalls Michael McCracken, who worked on the crew and later became manager of BPA’s Kalispell District. “After a couple of hours with extension cords and hair dryers, we were able to open the driver-side doors on some.”

Although BPA used winter grade fuel with anti-freeze additives in its diesel equipment, the fuel turned to gel. Coming just two years after the Colstrip line was complete, the extreme cold took out equipment at Garrison

Substation near Deer Lodge, Mont. Transfer capacity from the Colstrip plant to the Puget Sound area dropped precipitously.

BPA supplied 70 percent of the Puget Sound area’s peak power supply on five lines that crossed the Cascade Mountains. If one of those lines had gone out, millions could have lost power. “We were biting our nails and watching the system,” recalled Brian Silverstein, then an electrical engineer in Transmission Planning.

BPA crews plowed up to Garrison at an elevation of 5,020 feet, fighting minus-37-degree temperatures and 40 mph winds. They

restored full use of the line to Puget Sound, but it was a wake-up call. Loads in the Puget Sound area were growing more than 3 percent a year, faster than anywhere else in the Northwest. Studies showed that the system was vulnerable.

“We knew we needed to reinforce the grid into the Puget Sound area,” said Silverstein.

The engineers’ first plan was to build a new 500-kilovolt line from the Columbia Basin across the Cascades.

“As we sat down with stakeholders — the utilities, environmental groups, advocates of energy efficiency — we realized that we





*Transmission lines across the Cascades supplied about 70 percent of the Puget Sound area's power during the 1989 storm.*

needed to look at all possible solutions before we took the big step of building a transmission line," Silverstein said.

Besides the environmental challenges, another consideration was money.

BPA's financial situation was grim. The

economy was in trouble. Power sales were down. The aluminum industry was in distress and was using about half the energy it had once purchased. And costs were rising. In 1982, BPA customers had faced an 80 percent rate increase that reflected the spiraling cost

of nuclear plant construction at an already difficult time. Pressures to control costs continued through much of the 1980s as BPA tried hard to stabilize rates. The agency extended transmission maintenance intervals where possible. Transmission projects were delayed or canceled because of declining load forecasts. Replacements of aging equipment were deferred.

## Anything to avoid a new line

But after the 1989 cold snap, some action was needed. While the economy was stabilizing, BPA did not immediately pursue costly new construction. Instead the agency asked its engineers to find alternatives to building a new line across the Cascades. And they did, basically by cutting the lines near the middle and installing a new substation called Schultz between them.

"We took four of the large transmission lines that cross the Cascade mountains and tied them together on the east side to basically make those lines appear electrically shorter," Silverstein said. The four 500-kV lines loop into the substation, creating eight operationally





*Transmission lines connected to BPA's Schultz Substation near Ellensburg, Wash., helped BPA avoid stretching a new line across the Cascades.*

independent line sections. This reduces the impact of a transmission line failure because only half of the line is lost rather than the entire line. Schultz came on line in 1994.

"We also put on very large amounts of series compensation. These are large devices — nearly the size of a football field — that actually make the system sturdier and make us less vulnerable to problems," explained Silverstein. The devices make the transmission lines function as though they are shorter, helping to support voltage at the receiving end. Voltage is the electrical pressure on a power line. It's similar to the pressure in a water

hose — too little pressure, and there is not enough water; too much, and the hose could burst. The addition of the series compensation devices increased the east-west transmission capacity by about 300 megawatts.

"And we did something that was a significant change for Bonneville," Silverstein said. "We focused our energy efficiency measures into one geographic area because we would save the energy, but we'd also reduce the peak demand on the transmission grid and push out the need for the cross-Cascade line." Through 2012, BPA still had not built a new line across the Cascades.



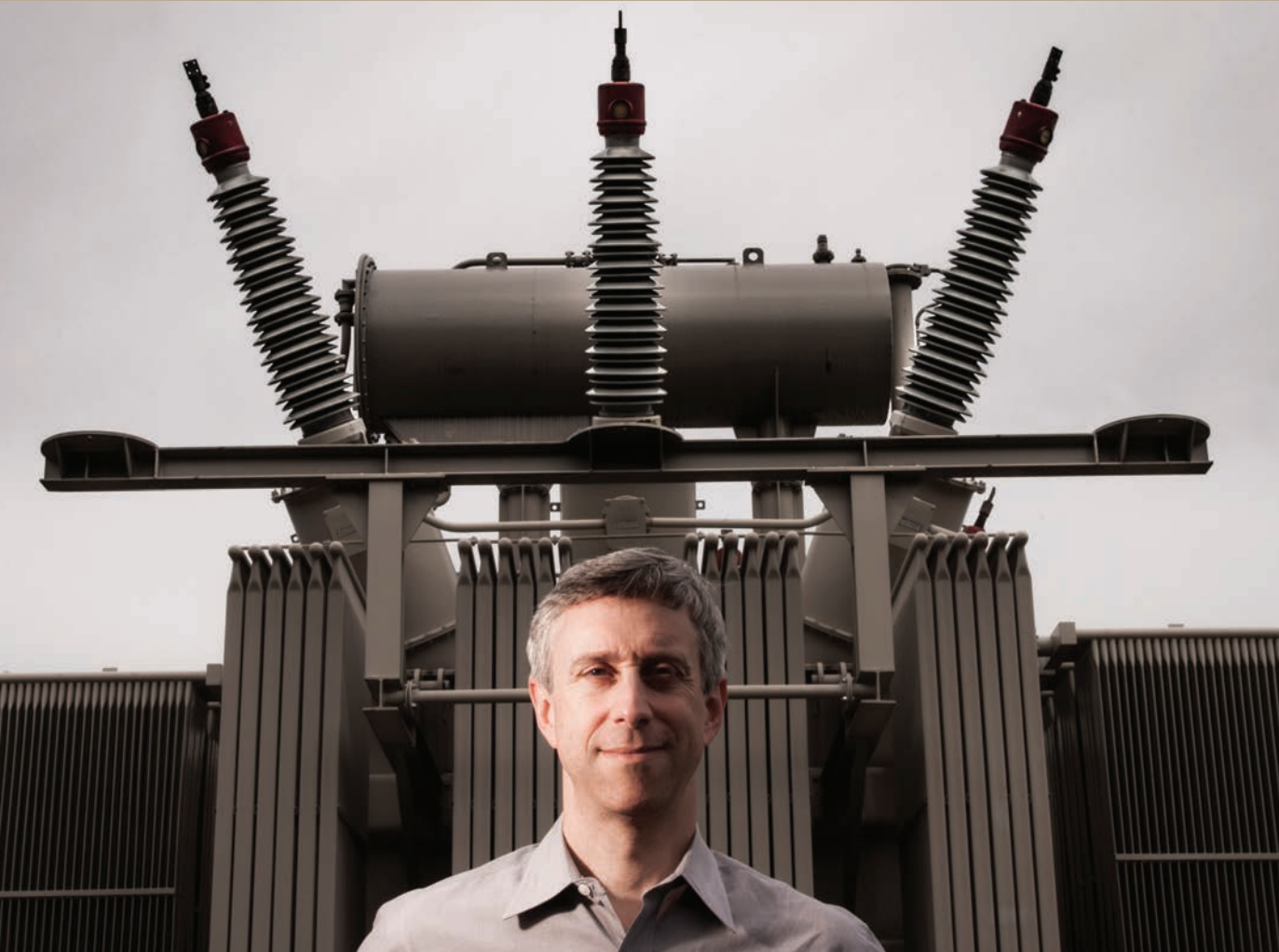
*Series compensation devices, such as these at BPA's Schultz Substation, store voltage momentarily. Huge banks of them along lengthy transmission lines help keep the power system stable.*

## Engineers answer the call for ingenuity

A culture of innovation helped BPA manage through rough financial spots.

"Where I used to work [at Bell Labs], everyone had Ph.D.s and they were specialized," recalled Bill Mittelstadt, a former top BPA engineer and internationally recognized technical expert. "I had to fit into





“The towers and the wires are a great legacy that will serve the region for decades and decades to come. But it’s also the ideas that we’ve developed here that have benefited not just the Northwest, but also people throughout the world.”

Brian Silverstein

their plan, do what they wanted me to do. It was an area where you could be a little player in a big operation.

“But at BPA, there was so much opportunity to do things that hadn’t been done before ... where we were just beginning to find out some of the things we could do. That appealed to me so much more, and it turned out to be the right choice,” he said.

It turned out well for BPA, too.

Mittelstadt was named Federal Engineer of the Year in 2003. He contributed to many advances in the operation of BPA’s high-voltage transmission system, including a mid-1990s breakthrough known as Wide Area Measurement Systems that was named one of the top technological innovations of the 20<sup>th</sup> century.

Many others at BPA have also won professional accolades. Nine BPA engineers have won the Herman Halperin Electric Transmission and Distribution Award, one of the highest honors in transmission engineering, for advances ranging from improved direct-current technologies to better understanding of the electromagnetic fields around transmission lines.

Word of that innovative reputation got around, and that’s how Brian Silverstein came to BPA in 1979. Silverstein heard that if you want to live in the Northwest, and if you want





*Bill Mittelstadt, named Federal Engineer of the Year in 2003, gained international recognition for his work at BPA. He and other BPA engineers saw opportunity to “do things that hadn’t been done before.”*

to work on power systems, there was only one place to work: BPA. “And so I took that advice, and I never regretted it,” Silverstein said. He later became senior vice president for Transmission Services.

“The towers and the wires are a great legacy that will serve the region for decades and decades to come,” he said. “But it’s also the ideas that we’ve developed here that have benefited not just the Northwest, but also people throughout the world.”

One of those ideas revolutionized the use of direct-current technology.



*Improvements doubled the capacity of the direct-current intertie, in the foreground, without adding to the wires already in the air.*

## Doubling the DC line

In the 1980s, BPA came up with a plan to open a new path for power sales, which would help revenues, while improving transmission reliability throughout the West. At the same time, it would reduce the burning of oil and natural gas to supply electricity to Southern California by the equivalent of up to 1.6 million barrels of oil a year. All that, and it wouldn’t require new lines or even changes to lines already in the air.

BPA planned to use new technology to increase the voltage and capacity of its only direct-current transmission line — an 846-mile link between The Dalles, Ore., and Los Angeles, Calif. When it was energized in 1970, it was the first high voltage DC line in the nation and the largest and longest of its kind in the world. Long transmission lines benefit from DC technology because they require two conductors instead of three, the simpler towers cost less and less power is lost in transit.

The line starts and ends at two massive converter stations: Celilo, owned by BPA, and





*The 1970s construction of BPA's Celilo Converter Station included mercury-filled power converters, above. In 1985, BPA installed new semiconductor-based switches, right, boosting the direct-current line's capacity from 1,600 megawatts to 2,000 MW.*

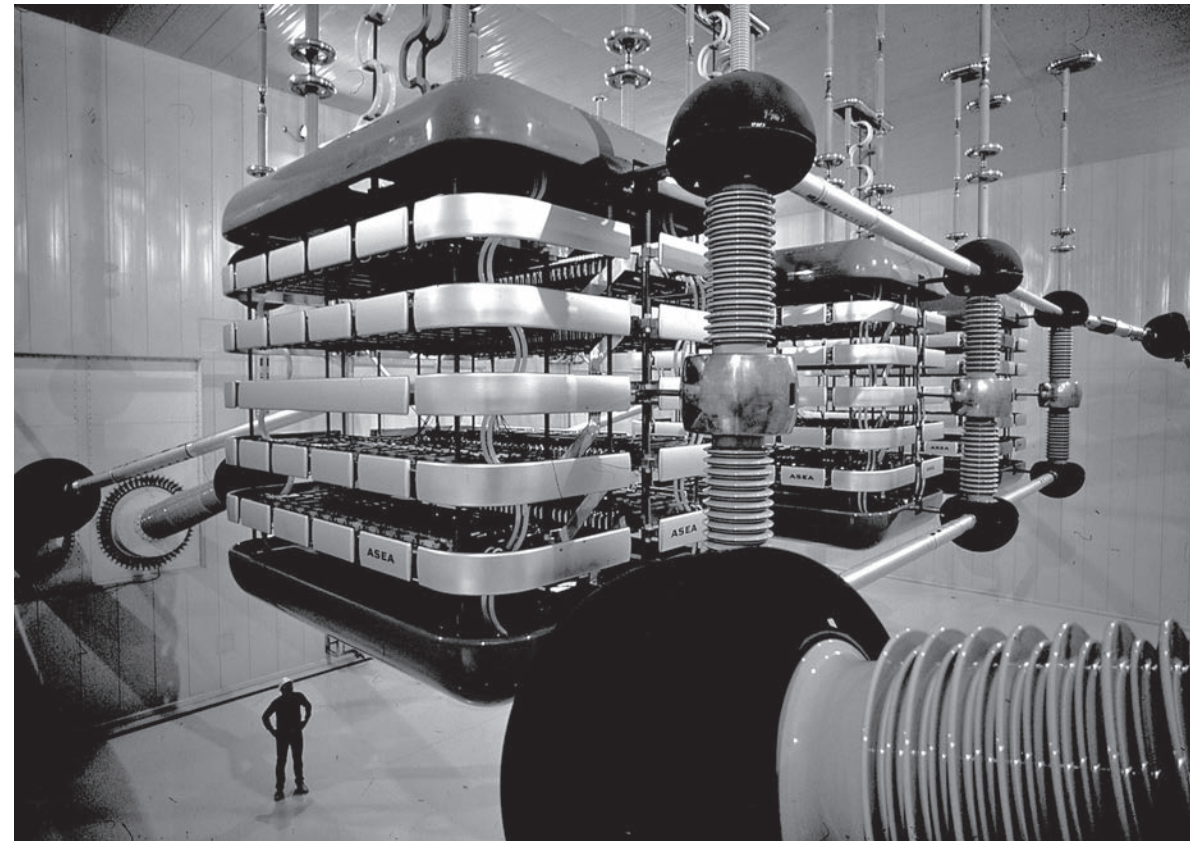
Sylmar, owned by the Los Angeles Department of Water and Power. Each converts power from alternating current to direct current, or vice versa, depending on which way the power is flowing.

Engineers designed the DC line very conservatively. It was believed to be able to carry 1,440 MW. But as operating experience grew, BPA and the L.A. Department of Water and Power learned that the wires could safely carry much more. With new technology, they discovered they could double its capacity.

The project involved hanging six 46-ton, 50-foot converter valves from the ceiling at

each station. At the heart of the valves are thousands of solid-state thyristors, disc-like objects not much bigger than a hand that convert AC to DC and vice versa.

Thyristors are semiconductor-based switches — essentially, big silicon chips. They are far superior to the old mercury-filled



power converters. They are much smaller, last longer, require less maintenance and are more reliable. And they don't have the environmental concerns of handling mercury. Making the switch was like going from a boxy vacuum tube television to a flat screen.

This initial upgrade boosted the capacity of



the DC line to 2,000 MW. More equipment added in 1989 bumped the capacity to 3,100 MW — enough power for three cities the size of Seattle. When California utilities turn off their fossil-fuel-burning power plants and use Northwest hydroelectric power traveling down the DC intertie, California's air gets a bit cleaner. In the 20 years after construction of the intertie, BPA shipped enough electricity to California to displace power generated by about 270 million barrels of oil, or 37,000 barrels a day, reducing carbon dioxide emissions and other pollution.

## Stringing lines with fiber

BPA soon moved on to another kind of cable — fiber optics. What started as a plan to improve the agency's own communications system would transform life around the Northwest, helping to bring the region into the digital age.

BPA's telecommunications equipment controls, protects and monitors the grid. Through the 1980s, microwave radios were its backbone.

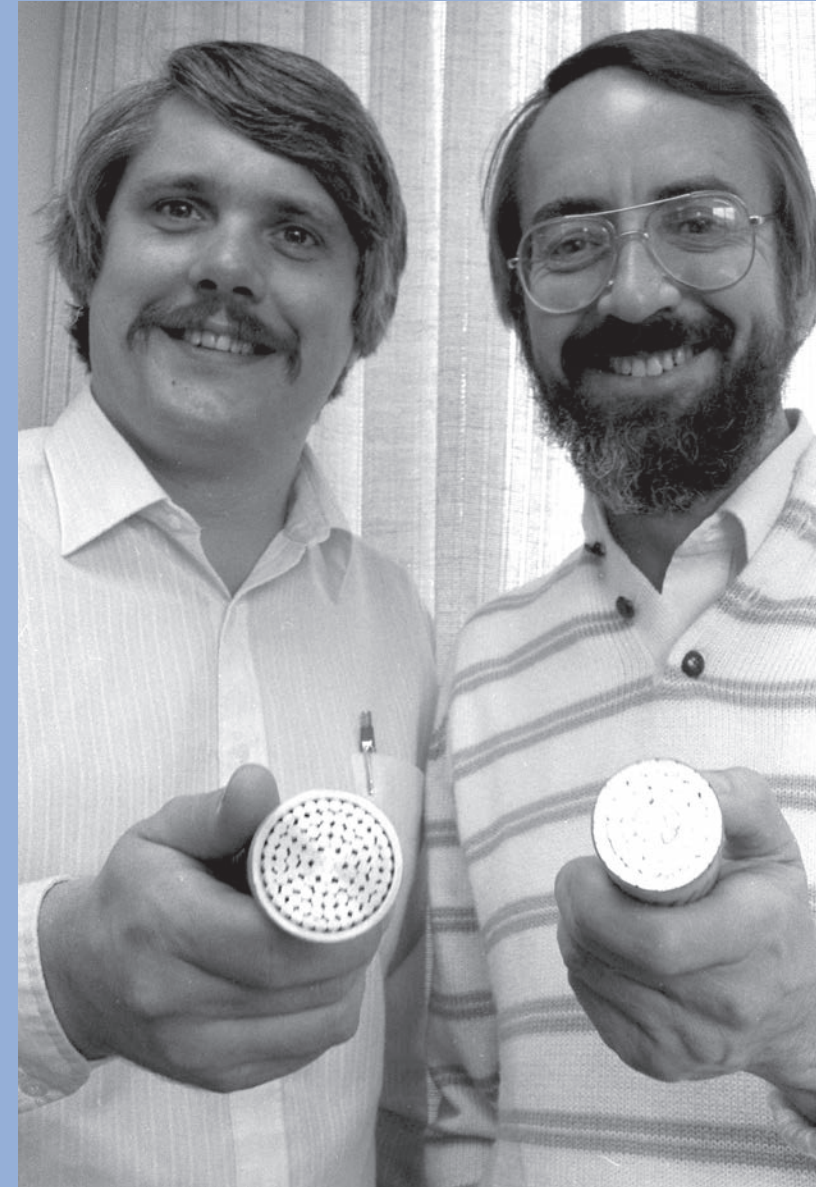
"Your communication system tells one end of the line what's happening at the other end of the line," explained Vickie VanZandt, former senior vice president of Transmission Services.

## Engineers revolutionize the industry, one wire at a time

High-voltage conductors — the lines that carry energy from tower to tower — come in different sizes and designs, but typically, circular strands of aluminum wrap around a steel core. In 1985, BPA engineer Jerry Reding had an idea to improve the design. He wanted to turn the circles into trapezoids.

Reding and his colleague Ed Bennett spent six years developing and testing the idea. Then it quickly became an industry standard. With four flat sides, the redesigned strands fit more closely together. More metal remains in contact, nearly eliminating air voids within the cable. With trapezoid-shaped wires, about 20 percent more aluminum fits into the same cross-section. That translates into about 20 percent more capacity.

Virtually all manufacturers began offering trapezoid conductors. Having designed them, BPA engineers got to name them. Anyone purchasing conductor now can choose from wires named after Northwest rivers and mountains. Common conductors in the BPA system are Hood, Jefferson, Toutle and Deschutes.



*Ed Bennett (left) and Jerry Reding replaced the circular strands in transmission line conductor with trapezoidal strands that eliminated air space within the cable. The ground-breaking idea increased the conductor's capacity by about 20 percent.*





*Using precision flying techniques, a BPA helicopter pilot helps crews string fiber optic cable.*



*BPA crews have installed thousands of miles of fiber optic cable on existing transmission towers.*

“You have to be able to talk to the other end so that you can catch a disturbance, get it isolated and get it back in service very fast.”

Signals from microwave technology were susceptible to electrical interference; physical obstructions such as mountains, trees and buildings; and natural events such as heavy rainstorms. And signals travel only along straight lines, so BPA needed repeater stations to turn corners. Fiber optic cables, which carry messages as pulses of light, were immune to all these problems.

“Fiber optics provides much more bandwidth than microwave, so you can have

lots more talking between ends of transmission lines,” VanZandt added. “The higher speed your communications and controls, the more you can get out of your transmission system.”

As microwave bandwidth became scarcer and scarcer, BPA faced a decision.

“The issue was, were we going to put money into redoing an analog system or leap into what was then this brave new world of fiber optics and digital communications?” recalled Jack Robertson, former acting administrator. “And the decision was, we’re going to need to go into fiber optics.”

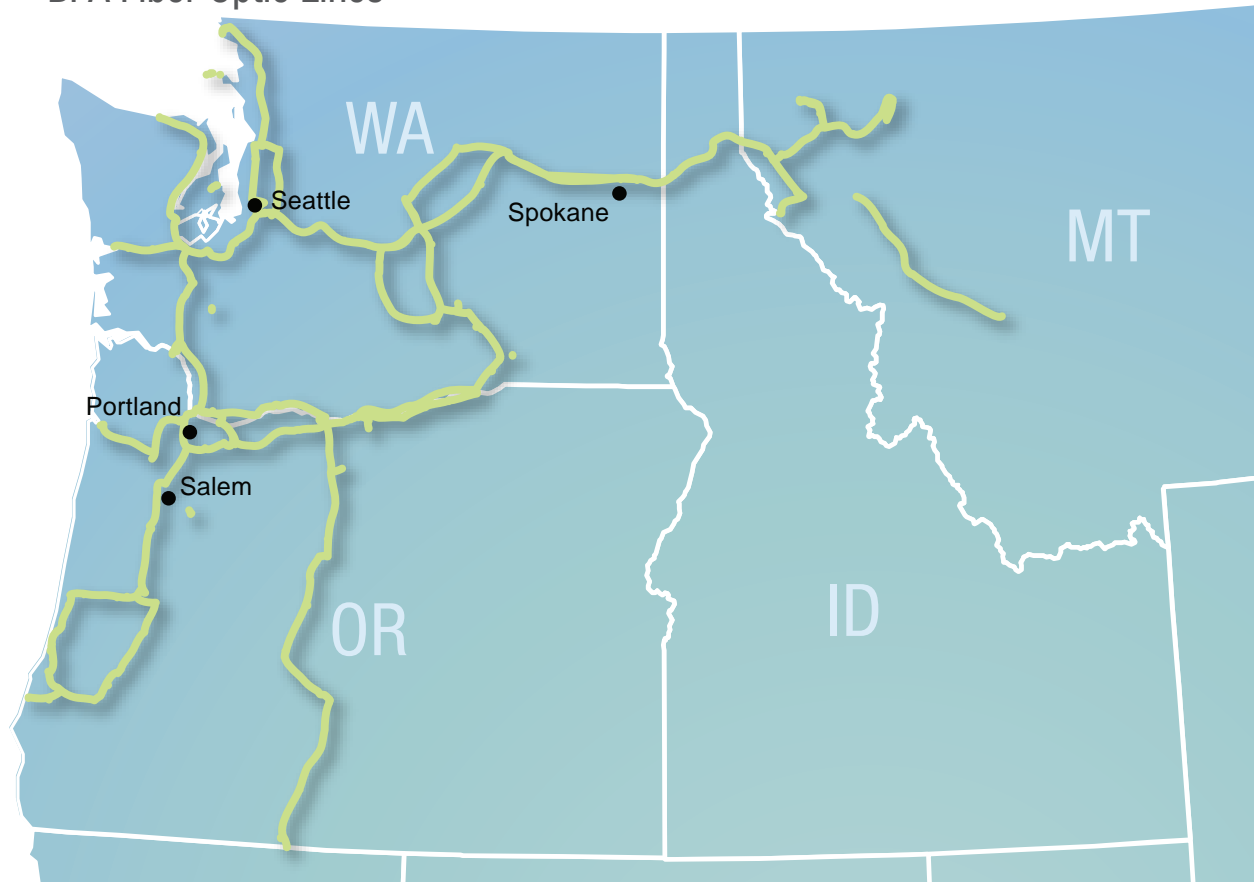
With fiber optics, an operator at Dittmer

Control Center in Vancouver, Wash., could remotely direct circuits at a substation in Pasco, Wash., trace the reason for an outage in the Columbia River Gorge, or reprogram computer controls at a substation in Oregon.

“Our fiber network is what enables us to control this far-reaching power system that extends over four states,” said Silverstein. “To get the information that we need — to get what we call visibility so we understand what’s going on — and to be able to then send signals out for circuit breakers and other equipment to take action, absolutely depends on modern digital equipment.”



## BPA Fiber Optic Lines



*BPA's expansive fiber communications system helped bring the Northwest into the digital age.*

In 1994, BPA set out to add about 800 miles of fiber optic cables to existing transmission lines, a multi-million-dollar project

involving thousands of transmission structures. Because it's far cheaper to install additional cable in the first place than to add more later,

BPA routinely installed enough to provide for future needs and then leased the extra space until the agency needed it for operations.

"The side benefit was really cool," Robertson said. "Public power utilities, particularly in rural Oregon and rural Washington, were getting cut out of the digital age because communication companies couldn't afford to run the fiber cable to small towns. It was exactly the same template that troubled the early history of electricity in the Northwest. Electricity went to the cities first because that's where the consumers were. And they couldn't rationalize going out to get electricity to the farms.

"So we thought, we're building this fiber for Bonneville's needs," Robertson added. "We're going to pay for it anyway. Why don't we, as we build the fiber on the main power system — which by definition takes power to these remote rural areas — why don't we simply provide these towns fiber access through their local utility at a small fee? We'll drop it at the substation. You pick it up. You wire it. Public power got excited about that."

But not everyone was excited. After deregulation, Montana Power Company restructured itself into a telecommunications company called Touch America Holdings Inc.





It resisted the idea of BPA offering fiber optics as a public service and fought to keep the agency from doing so. Under an interpretation of the Communication Act of 1934, federal agencies cannot operate, or “light,” fiber except for their mission purposes. And in early 2000, Rep. Bob Franks, a New Jersey Republican, and Martin Meehan, a Massachusetts Democrat, complained to

Secretary of Energy Bill Richardson that “BPA seems to be venturing into the commercial telecommunications business.”

But Oregon Rep. Peter DeFazio, a Democrat, said the complaint was “full of inaccuracies and hyperbole.” BPA was not “lighting” fiber like a private telecommunications provider would, he explained. It was leasing dark fiber to others.

The Office of Management and Budget disagreed and stalled BPA’s fiber optic program for nearly a year until BPA, with other power marketing agencies, presented a multi-year fiber optic plan to Congress. BPA ultimately received policy approval from the White House to move forward with its program.

“It will probably never be known why, if you are in the middle of a small public power community, you have fiber optics in your house,” Robertson noted. “But this wouldn’t have happened unless Bonneville had made these decisions.”

By 2012, BPA had installed about 3,000 miles of fiber optic cable. The agency earns about \$9 million a year leasing space on the cable not yet needed to control the transmission grid.

## Defying the laws of physics

Grid operators cannot control power flow directly; they cannot tell electricity how to move. The laws of physics state that energy takes the path of least resistance.

But what if you could defy that law? That’s what BPA ventured to do in the





*(James L. Amos/Corbis)*





*In the heart of the Columbia River Basin's wheat-growing region, BPA's Slatt Substation became home to the world's first 500-kV flexible alternating-current transmission system devices, or FACTS, which control the flow of power on transmission lines.*

early 1990s. Working with the Electric Power Research Institute, BPA installed the world's first 500-kV flexible alternating-current transmission system devices, or FACTS, in its Slatt Substation. The substation controls a 500-kilovolt transmission line with a 2,500-megawatt capacity.

"EPRI coined that name for anything that could make the AC network act like a DC network, where you could control the flows on the lines the way you want to," said Bill Mittelstadt, BPA's principal transmission planning engineer in 1992. "AC systems are not very controllable; the only way you could

control it is by raising and lowering generation at different places. FACTS devices force power where you want it to go, like putting valves in the lines."

The equipment BPA and EPRI developed was a thyristor-controlled series capacitor. BPA had used thyristors to double the capacity of the DC intertie. But the technology had never been applied to series capacitors, equipment that adds to the capability and stability of the AC transmission system.

Essentially, the equipment directs electricity more precisely along transmission lines and stabilizes power swings caused by



*BPA's Keeler Substation (below), near Portland, is home to the fast-acting devices (above) which help stabilize power swings on the system caused by short circuits or other disturbances.*





short circuits and other disturbances. The thyristor controller safely allows higher loading of transmission lines, reducing or delaying the need for new facilities.

“This technology could help us carry more power over our lines,” said Mittelstadt in an interview at the time. “It takes a very long time and a huge investment to build new transmission. This could provide a less costly option.”

It did.

BPA later installed another type of FACTS device in substations near Seattle and Portland. It provided fast-acting stability that allowed BPA to avoid building a new cross-Cascades transmission line.

BPA engineers are still researching new ways to use FACTS devices to increase the capacity of the grid.

## Engineers look to the sky

To understand what’s happening in its own transmission system, BPA needs to know what’s happening in the systems around it. For BPA that means the entire Western Interconnection, which stretches from Alberta, Canada, to Baja, Mexico.

Engineers had long had only limited information. BPA’s supervisory control and data acquisition system, or SCADA, takes two seconds to collect a full sweep of measurements from the system. That’s just not fast enough. “Some of the things on the power system happen very quickly. Sometimes you need to know what’s happening within a tiny fraction of a second,” explained Brian Silverstein.

And there was another problem. Measurements came from opposite ends of the system at different times, so they didn’t match up.

“If I want to understand what’s happening in the Western Interconnection ... that’s a really broad geographic scope. I want to take a snapshot very often, but I need to take the snapshot exactly at the same time in San Diego that I am taking the picture in



Alberta and at Grand Coulee,” Silverstein said.

The solution to the engineers’ problem was in the stars. In the 1990s Virginia Polytechnic Institute and State University developed phasor measurement units, which measure conditions in the grid up to 60 times a second. Global Positioning System satellites provided the units with location and time information accurate to one-thousandth of a second.

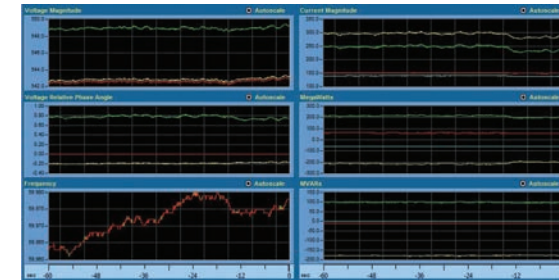
BPA began installing the units throughout its grid. They provided BPA with information faster, which helped. But the data from different units arrived at different times because of delays in the microwave signals that carry it. That made it difficult to get a useful “snapshot” of conditions across the grid at once. Ken Martin of BPA developed a phasor data concentrator to help align the measurements from different parts of the grid based on the time they were collected. BPA also developed a program called StreamReader to display data. Together, the PMUs, phasor data concentrator and display program make up what BPA named the Wide Area Measurement System, or WAMS.

The aligned measurements help engineers spot unusual conditions across large sections of the grid. Bill Mittelstadt explained, “You can take measurements from different ends of the system and compare them, take the difference, and see how oscillations between two ends



*More than 100 phasor measurement units, or PMUs, monitor BPA’s transmission system.*

are developing.” Mittelstadt compared power grid oscillation to the bouncing you feel in a car without shock absorbers.



*BPA created StreamReader, a program to archive and display in real time the synchronized data from phasor measurement units.*

“When the power system hits bumps — when lines short circuit and trip out — those bumps can cause the whole northern part of the system to oscillate in motion against the southern half of the system,” he said. “It takes three to five seconds for one oscillation to go through the system. But if the system is stressed, it can continuously happen and get larger in magnitude and trip lines.”

Engineers want to spot such oscillations before they cause trouble, and WAMS gives them the early warning they need. In 2001, the Department of Energy called WAMS one of the department’s best scientific and technological achievements of the 20<sup>th</sup> century. Although Mittelstadt – William A. Mittelstadt – helped advance the project, he insists the acronym matches his initials only by coincidence.





*BPA electrical engineer Dmitry Kosterev (left), Bill Mittelstadt's protégé, and Vickie VanZandt (center), former vice president of Transmission Services, speak with Administrator Steve Wright. VanZandt, with the Western Electricity Coordinating Council, and Kosterev are working to transform wide-area monitoring into a system that can help operators resolve stresses in the grid before they cause problems.*

The Western Electricity Coordinating Council later launched a project to take WAMS from a developmental monitoring system to one that many system operators and reliability centers can use to identify problems and determine proper control actions.

The radio-based GPS signals central to WAMS represent only one example of BPA's

use of the radio spectrum. BPA uses more than 9,000 licensed radio frequencies to monitor and control its substations and metering stations at the speed of light. The agency's Washington, D.C., office has consequently kept close tabs on telecommunications issues that could disrupt or otherwise affect BPA's use of the radio spectrum.

## Breaking the bottleneck at the border

While new technology helped improve grid operations, sometimes nothing less than new transmission lines will do.

The Pacific Northwest-Pacific Southwest Intertie proved so successful at sharing power between the two regions that by the early 1980s it was loaded to nearly its full capacity. Raising the capacity of the direct-current line had eased congestion, but planners said that a new alternating-current line between the Northwest and California was necessary for reliability and made good economic sense.

Adding a third AC line to reinforce the two existing AC lines would increase BPA's ability to sell power to the south. With the Northwest awash in surplus power, revenue from increased export sales could offset rising costs of nuclear projects, energy conservation programs, and fish and wildlife initiatives. At the same time, the electricity could displace the more costly oil and gas generation that California otherwise relied on, saving billions and reducing dependence on imported fuel.









The first two AC intertie lines were constructed in the 1960s as an electric highway between the Northwest and Southwest.

But the same kind of divide between public and private, investor-owned utilities long at play in the Northwest also complicated the picture in California. Private utilities, mainly Pacific Gas and Electric and Southern California Edison, controlled most of the capacity on the southern end of the existing AC intertie lines, limiting access by public California utilities. The public utilities bought much of their power from the dominant private utilities, but expanded intertie access would finally open the door for them to receive preferential access to federal power like public utilities in the Northwest, according to a 1983 report by the General Accounting Office (since renamed the Government Accountability Office). “The private utilities are concerned that as public utilities gain more intertie capacity



Administrator Randy Hardy, center, Pacific Power & Light President Paul Lorenzini and Portland General Electric Vice President Dick Dyer threw a symbolic golden switch to energize the Third AC Intertie on Nov. 8, 1993.

and greater access to the Northwest because of federal preference, public utilities will gain a favorable market advantage to available Bonneville power,” the GAO wrote.

Other concerns included uncertainty in California over how much federal hydroelectricity BPA would have to sell given the legal provisions that gave Northwest utilities top priority for the power. And then there were questions about how fast Northwest demand might grow and how much conservation might or might not free up power to go south. But the GAO concluded that, regardless, both regions would clearly benefit from extra intertie capacity and should negotiate an agreement, with BPA playing “a key role in addressing the impediments.”

## Pacific Northwest–Pacific Southwest Intertie



The Third AC Intertie, which includes components constructed by both Northwest and California utilities, appears in orange. It was energized in 1993, not long after utilities doubled the capacity of the DC line, which extends from The Dalles, Ore., to Los Angeles. Together, these transmission lines make up the largest single electricity link in the United States.





## Putting an end to ‘electric chicken’

The Third AC Intertie could not have happened without political steps in Washington, D.C., to break an electricity bottleneck between California in the Northwest.

The Government Accountability Office had described the issue in reports, but Sen. Mark Hatfield of Oregon spelled it out on the Senate floor in 1984: A handful of California utilities exercised near-complete control over the California end of the interties from the Northwest. That kept other California utilities from competing for Northwest hydropower even as they burned more expensive oil and gas for electricity.

The controlling utilities waited until Northwest reservoirs filled, forcing BPA to either spill water or sell power at what Hatfield called “bargain-basement prices.” The result was “highly inefficient operation of the Pacific Northwest system and wastage of a much valuable resource,” not to mention lopsided prices. He noted that California paid about half on average of what BPA’s Northwest customers did for

the federal power in 1983. Sen. Dan Evans of Washington noted that federal dams had annually spilled enough water to generate the equivalent of two 1,000-megawatt power plants.

Hatfield demanded “cessation of the game which has come to be known as electric chicken, where the Northwest is forced to hold energy until it can be held no longer, and then sell and spill.” His statement became known as the “electric chicken speech.”

Congressman Vic Fazio, a California Democrat, worked with Hatfield and Evans to give the Department of Energy authority in an appropriations bill to build the Third AC Intertie. The California and Northwest lawmakers ultimately agreed that expanding the intertie would better distribute the benefits of low-cost hydroelectric power and balance the economic interests of the two regions.

“By all working together and not giving up, we got it built,” says Roger Seifert, the longest-serving employee of BPA’s Washington, D.C., office.

Finally BPA and its California counterparts came up with a plan to build the third AC line, adding about 2,000 megawatts of AC capacity and bringing the total AC capacity to 4,800 MW. They concluded they could do it at minor expense, compared to the benefits, and with minimal new rights-of-way. BPA would finance work on Northwest facilities it owned with Portland General Electric and Pacific Power & Light, while about 30 public and private California utilities would build a 340-mile line to the San Francisco area. It would become what some called the most complex transmission project in BPA’s history, at various times involving more than 60 utilities.

“We hadn’t been involved in a public/private partnership like this before,” said project manager Mike Johns. “This project occupied a lot of us for many years and required culturally different utility team members to work together for the greater good.” Johns traveled monthly between his home in Portland and Sacramento, Calif., for nearly a decade to coordinate activities with BPA’s California partners.

Negotiations between BPA and the major Northwest and California utilities continued even as construction wound down. BPA resolved technical and contractual differences

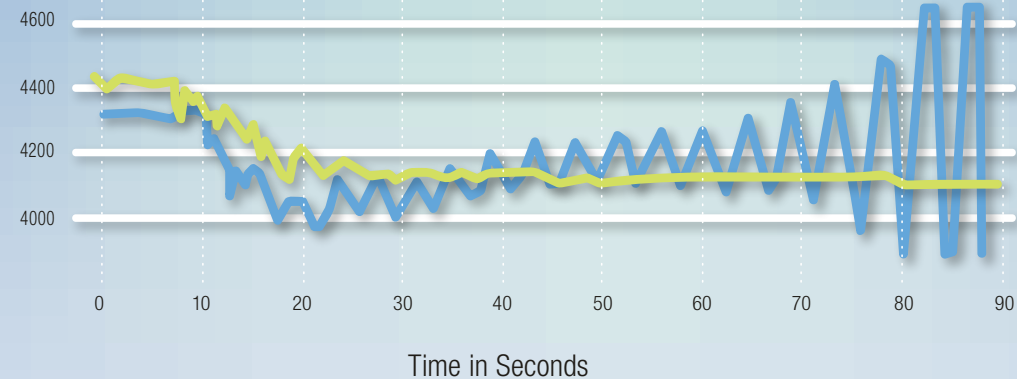




Two days after the blackout, from left, BPA Administrator Randy Hardy, Deputy Secretary of Energy Charles Curtis (a former chairman of the Federal Energy Regulatory Commission) and Western Systems Coordinating Council Executive Director Dennis Eyre answer questions in Portland. (Associated Press/David Falconer)

between federal and private utilities while also smoothing the way on environmental issues, design compatibility and testing. Administrator Randy Hardy, with Pacific Power & Light President Paul Lorenzini and Portland General Electric Vice President Dick Dyer, threw a symbolic golden switch to energize the project on Nov. 8, 1993. The 500-kV, third AC line extends from BPA's Alvey Substation south of Eugene, Ore., to Pacific Gas and Electric's Tesla Substation east of San Francisco.

## Growing Oscillations Turn Disastrous



BPA power system simulations, shown in green, offered little hint of the looming power outage on Aug. 10, 1996. But on the grid, constant oscillations caused by generation and load imbalances grew in magnitude, as shown in blue. They turned disastrous for the power system.

Ironically, the line — intended to open new California markets to Northwest power — initially carried electricity mainly in the opposite direction — from California to the Northwest. By the time the third AC line was done, the Northwest power surplus was gone and the region was in drought.

No sooner was the Third AC Intertie line complete than trouble hit the DC line. In 1993, a fire broke out at the Sylmar Converter Station, the California end of the direct-current line. While repairs were under way, a 6.7 magnitude earthquake hit. The converters were completely destroyed. The damage reduced the capacity of the DC intertie until repairs were complete the following year.

Then another disaster struck. This time, on BPA's end of the intertie. And this time, involving the AC and DC lines.

## Disaster strikes the intertie

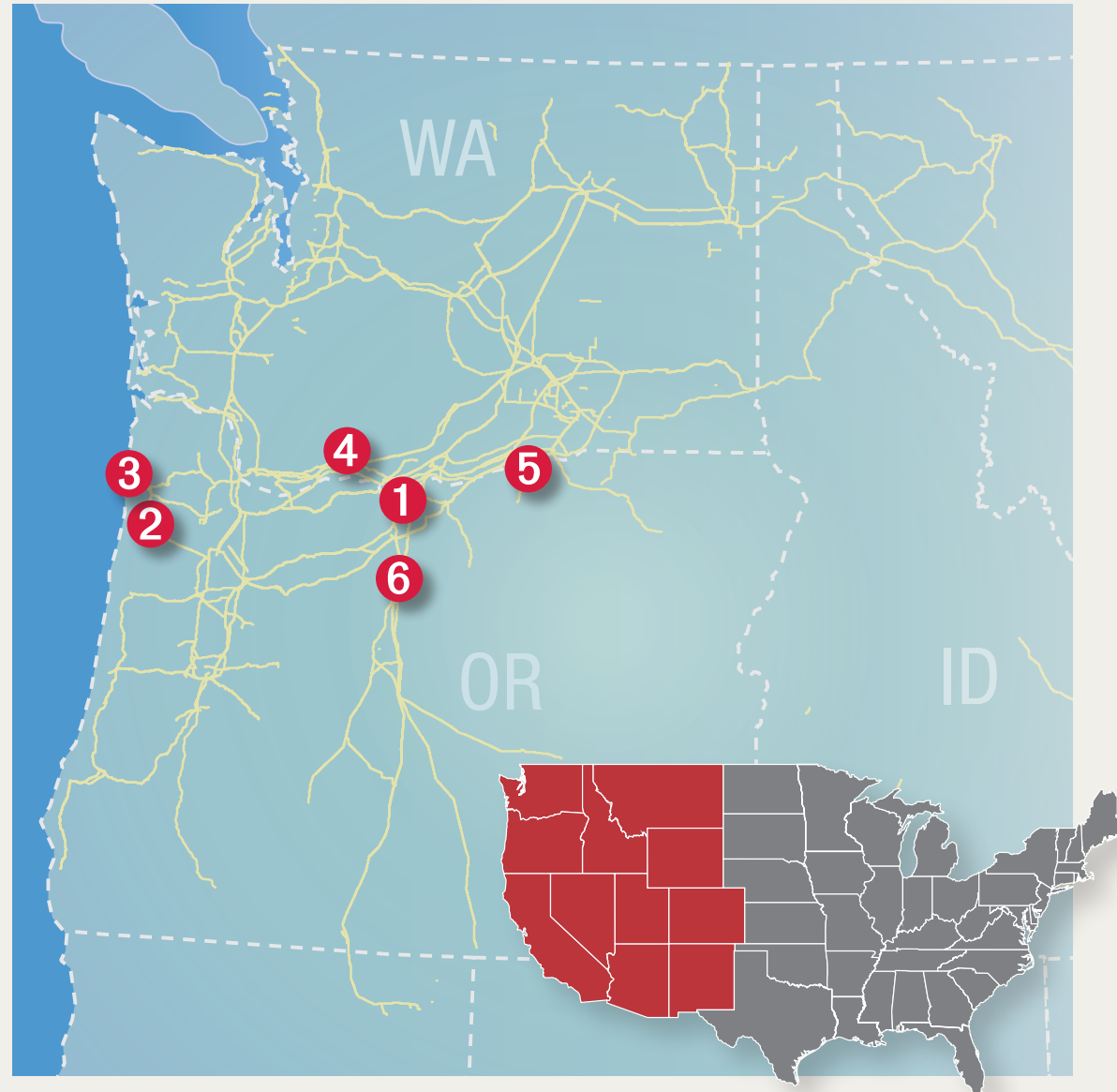
It was Saturday, Aug. 10, 1996. Northwest temperatures soared into the triple digits. The intertie was loaded. BPA was sending California enough electricity to power 7 million homes.

**2:06 p.m.** — In the Dittmer Control Center in Vancouver, Wash., a low-voltage alarm alerted BPA dispatchers. A line was



## How trees near BPA lines triggered the 1996 blackout

- 1 2:06 p.m.** A tree shorts out a 500-kilovolt line.  
A low-voltage alarm sounds in BPA's Dittmer Control Center.
- 2 2:52 p.m.** Another tree knocks another 500-kV line out of service.
- 3 3:42 p.m.** A third tree shorts out a third 500-kV line, pushing the remaining lines to their limits.
- 4 3:47 p.m.** A 230-kV line faults to a tree, starting a small fire.  
A generator at PacifiCorp's Swift Dam trips off. The grid loses critical voltage support.
- 5 3:47 p.m.** Generating units at McNary Dam begin switching off, eliminating remaining voltage support for interties to California.
- 6 3:48 p.m.** Cascading outages knock out interties. Within two seconds, the entire western grid collapses.



The 1996 blackout affected most western states.



out of service. They weren't overly concerned and corrected the problem by switching on capacitors to increase voltage.

**2:52 p.m.** — Another transmission line went out. Dispatchers tested the line and it shorted out again. They followed protocol and called field crews to check it out. The remaining lines had to shoulder more power, but dispatchers were confident they could get the system under control.

They didn't know it, but the system was operating dangerously close to its limits. BPA's operating studies turned out to be inadequate for those conditions, so dispatchers couldn't tell that the loss of one more line could trigger a cascade of outages. For example, only five of 22 generators were operating at The Dalles Dam so water could instead flow through spillways to help juvenile salmon migrate downstream. That reduced the voltage support the dam provided the transmission system. But that had not been factored into the studies, a later report found. After years of stretching the grid to its limits, the people overseeing it didn't know just how little room was left.

**3:42 p.m.** — Another line went out of service. It was the final blow and the start of a disastrous and uncontrollable chain reaction. With several line segments down, the fewer remaining lines were forced to carry the additional



*Passengers waiting to board flights at San Francisco International Airport try to make themselves comfortable during the power failure, which delayed incoming and outgoing flights. (Associated Press/Darryl Bush)*

load. Under the added power flow, they sagged even closer to trees and the ground.

**3:47 p.m.** — One more line faulted. The system was too stressed to absorb generation from PacifiCorp's Swift Dam, so the generator there tripped off line. Critical voltage support was lost. That put more pressure on McNary Dam to provide the support. But all 13 generating units at McNary switched off in response to the chaos rippling through the grid. That collapse of support amounted to ripping the Western grid in two, dividing the northern half from the states of California, Arizona and New Mexico, as well as parts of Utah and Colorado.



*A private citizen directs traffic in Los Angeles after the power outage caused traffic lights to fail. (Associated Press/Frank Wiese)*

## Lights out, West Coast

Vickie VanZandt was at home in Vancouver, Wash., planting azaleas in her garden. She was BPA's chief engineer, responsible for the long-term needs of BPA's transmission grid. The next month, she was to take over Transmission Operations and Planning, which would make her the head of BPA's transmission control centers. On this blistering Saturday afternoon, the current vice president of operations was on vacation. In an emergency, the dispatchers were to call VanZandt.

Her phone rang at **3:48 p.m.**





*McNary Dam, near the head of the intertie, provides critical voltage support for the lines to California. But cascading line outages in 1996 strained the transmission system and caused the dam to trip off line. It was the final blow in a catastrophic series of events.*

She heard a normally unflappable dispatcher practically shouting into the phone. “The interties have gone down!”

With McNary Dam shut down, there wasn’t enough voltage support to keep the power flowing on the main artery to California.

“We were sending 7,400 megawatts on the interties. And he’s telling me they’re down,” VanZandt recalled.

More than 7 million people in nine states instantly lost power. Ironically, the lights in

BPA’s part of the grid didn’t blink.

“We were the sending end — we protect ourselves against loss of export,” VanZandt explained. “But the Californians did not protect themselves against loss of import. With the Third AC Intertie in, they thought this could never happen, no single event could take out all three lines. Well, not a single physical event, but an electrical one sure did.”

Utilities in the southern part of the interconnection considered it so unlikely that



*Vickie VanZandt*

they eliminated an automatic remedial action scheme that would have reduced the impact of the interties going out.

The blackout reached parts of Canada and Baja, Mexico, affecting about 7.5 million people. In Los Angeles, firefighters responded to dozens of reports of people trapped in elevators. Without traffic lights, streets were gridlocked. The Republican National Convention in San Diego went dark. Tourists evacuated Space Mountain at Disneyland.

BPA worked to replace energy from California’s Diablo Canyon nuclear plant, which the blackout knocked off line for several days even as many California cities sweltered



in the summer heat. In a step that angered environmentalists, BPA received emergency permission to temporarily send more water through turbines at The Dalles Dam to generate 800 megawatts more power to support California instead of spilling it for salmon.

While crews restored most power within several hours, others tried to figure out just what had gone wrong.

## An embarrassing discovery

The Western Systems Coordinating Council (forerunner of the Western Electricity Coordinating Council) called an emergency meeting in Portland with the U.S. Department of Energy, BPA, and Oregon and California utilities to investigate the power outage. A first step was to restrict the intertie to two-thirds of its rated capacity.

“At first, we didn’t know what had happened,” VanZandt said. “Somebody had found what looked like blasting caps on the California portion of the intertie, so we were thinking it must have initiated there.”

But that evening, BPA discovered the real cause: Improper maintenance on its own system had initiated the cascading outage.

The culprit was one of the Willamette Valley’s iconic filbert trees, which had grown too close to a transmission line.

In hot, still weather, transmission wires expand and sag. Utilities are responsible for keeping trees and other vegetation at a safe distance. “Even a little bit of wind really helps [prevent problems]. If you have zero wind and it’s hot out, your lines are going to drop more than you can imagine,” VanZandt said.

Jack Robertson, former acting administrator, said the 1996 outage should never have happened. “In retrospect, it was an outage born mostly of failure to keep up with operation and maintenance on the system,” he said. “Budget cutbacks were putting pressure on everybody, including transmission, to save money.”

BPA had a vegetation management program to keep its rights-of-way clear. But cost cuts starting early in the 1980s had left a backlog of routine service and preventive maintenance. “That’s an example that goes back to the responsibility that rests with management,” Robertson said. “We had to cut costs. But the last thing you want to mess with is the stability of the power grid, because that’s people’s lives.”

Robertson said everyone learned from the events of that hot day in 1996. And in its wake, BPA began to work with a group of







*BPA replaced the wood poles on its Albany-Burnt Woods and Santiam-Toledo transmission lines in the summer of 2009. Vegetation stands well back from the lines.*

independent advisers. “The Department of Energy got involved,” Robertson said. “And it should, because when you’ve let it black out, and it’s on your watch, people need to see if you are competent to hold the franchise. It was a painful lesson.”

As she took over the lead position in Transmission Operations and Planning, VanZandt took much of the heat for BPA. “It was tough around here, it was tough,” VanZandt said. She recalled going to a meeting of state utility commission regulators in the Southwest. When she walked in the room, she was booed.

“They were making jokes about chainsaws and things like that,” she said, a jab at BPA’s response to the problem.

## Fallout from the blackout

At one time, BPA took care to save as many trees on rights-of-way as possible. When it built the Colstrip line, for example, crews varied the width of the clearing to create a more natural, scalloped appearance.

Within weeks of the 1996 blackout, BPA took out 6,000 trees. The agency and its field crews recommitted themselves to very disciplined vegetation management.

“I know scorched earth isn’t pretty to most people,” VanZandt said, “but that’s what I call a beautiful power line right-of-way, because it’s completely clear of obstacles.”

The outage also made it clear that operators needed a much better and more rapid view of what was happening in the system and when.

“We were unable to identify that there was a problem pending,” said Silverstein. “Afterwards, as people analyzed data from preceding days, they saw voltage moving where it shouldn’t. If they’d had tools to identify the patterns, we could have backed off transfers to California.”

If WAMS had been in place, the problem would have been clear. But at the time of the outage, BPA was just beginning to install the new monitoring system. The data was being collected, but not until after the outage could BPA stream real-time data into the control center in a way that dispatchers could use.

While it didn’t help prevent the blackout, the data WAMS provided was useful after the fact. “It helped a lot to be able to analyze what was happening during that time,” Mittelstadt said. “We could see how it began and how it progressed until it finally cascaded. You could see that all developing.”

Determining what had happened was an important step in restoring the intertie rating. It helped identify where reinforcements, such as additional voltage support, were needed.

Also important: preventing it from happening again. Getting the real-time data from WAMS into the control room became a



priority so BPA could spot problems in time to catch them. VanZandt also installed a Remedial Action Scheme, or RAS, desk in the control room. RAS is a high-speed electronic control tool that can be activated when the grid is operating near its limits to react to problems much faster than a human operator ever could. She also installed more devices that could automatically respond to changes in power flow and voltage within milliseconds.

“As Randy Hardy was about to head out the door as our administrator,” VanZandt recalled, “he asked me, ‘If there was one thing I could do for you, what would it be?’ I asked him for some synchronous condensers at The Dalles and John Day dams.”

VanZandt explained that when those dams reduce generation to spill water for fish, it also reduces the automatic support provided by the dam’s generators to keep voltage on the grid within a safe, stable range — right at the head of the intertie.

The additional equipment allows the dams to act as electrical shock absorbers when voltage on the intertie drops. The electronic components and RAS — the brains to operate them — exchange information at the speed of light, thanks to the millions of dollars BPA invested in fiber optics. BPA worked with the U.S. Army Corps of Engineers to fund the synchronous



*The U.S. Army Corps of Engineers completed a rehabilitation of Bonneville Dam’s first powerhouse in 2010, installing turbine runners that are safer for fish and rehabilitating power generation equipment that had been in service for nearly 70 years.*

condensers through a new method known as direct-funding authority, which would become increasingly important through the years.

“It was a couple of years before things settled down, until we got our intertie rating back where it belonged,” VanZandt said. The full intertie rating was restored in 1998.

But the stability would turn out to be brief. The system that critics once accused BPA of overbuilding was at a breaking point, and technology alone couldn’t remedy it indefinitely. “We had some margin built into our transmission

system, and we exploited that,” VanZandt said.

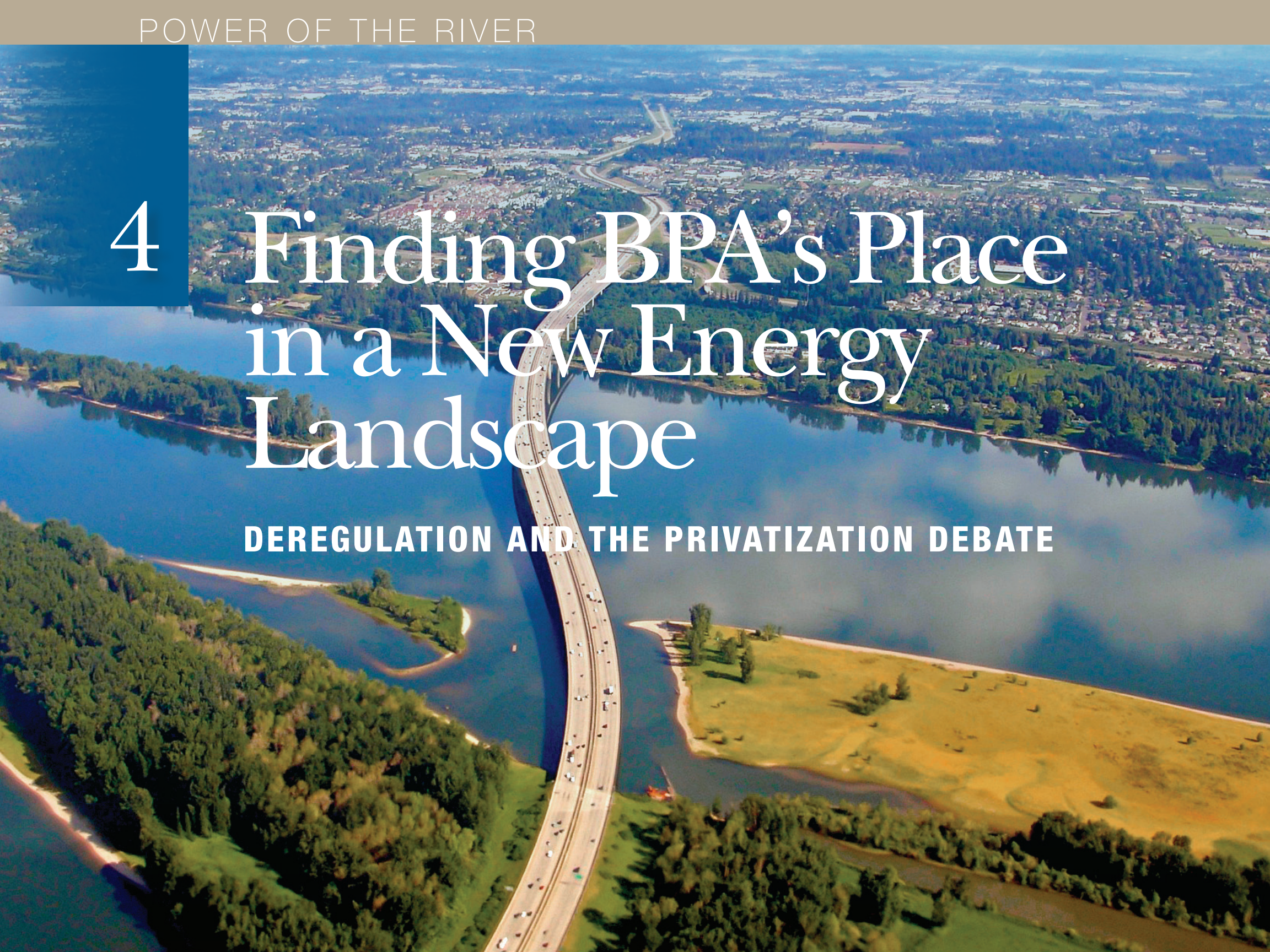
Soon that margin was gone — and not only on BPA’s transmission grid. The very foundation of the industry was about to be shaken.

Despite all of BPA’s efforts to learn the lessons of the blackout, to better foresee trouble and act quickly, it would not be enough to avert the coming crisis. Because no amount of engineering expertise could control the turbulent forces about to hit the nation’s utility industry.



# 4 Finding BPA's Place in a New Energy Landscape

**DEREGULATION AND THE PRIVATIZATION DEBATE**





Peter T. Johnson returned to Boise in July 1986, leaving BPA on its financial feet but still shaky from the Washington Public Power Supply System nuclear debacle. It fell to Jim Jura, who had been Johnson's chief operating officer, to reduce the enormous new debt burden on the agency and re-establish sound working relationships with some very angry customers, while upholding the value of the Columbia River hydroelectric system.

After separating from the Army at Fort Lewis, Jura graduated from the University of Washington and earned an MBA at Seattle University. He worked at Boeing before entering federal service with the Office of Management and Budget in Washington, D.C. As his children were reaching school age, he wanted to return to the Northwest with his family.

"And oh, you'll get a kick out of this," he mused. "I was well aware of BPA, of course, and a budget examiner job came up. I applied for that position and I didn't get it. So I thought, well heck, that's it. I'll look elsewhere."

Then, by chance, he met Earl Gjelde, special assistant to Sterling Munro, and George Bell, manager of BPA's Washington, D.C., office. They offered him a job working for Bell with the understanding that Jura

would move to Portland when a position opened. That soon happened, and it wasn't long before Jura became a key player in Peter T. Johnson's administration.

"And I can tell you at that time, the furthest thing from my mind was that one day I would be the head of the place," Jura said. "It was nothing I aspired to, but it was a wonderful opportunity and I was really blessed to have it."

Johnson had pushed for Jura to move into the administrator's office. "I was concerned about who would succeed me, whether BPA would continue to operate on sound business principles," Johnson said. "Jim understood the agency and all that we had accomplished to provide best value."

Though Johnson had fenced in the runaway nuclear program, Jura inherited the fallout in 1986. With \$6 billion owed, some with interest rates as high as 15 percent, WPPSS had been shut out of the bond market. But



*BPA Administrator Jim Jura, left, rebuilt relationships with customers angry over the enormous debt carried by the agency after the nuclear financing crisis.*

Johnson's efforts to stabilize BPA's fiscal affairs were renewing confidence on Wall Street. Soon BPA and WPPSS were able to refinance a package of about \$2.5 billion in bonds at about 8 percent interest. The savings in debt service were expected to reach \$1 billion over the life of the bonds, and refinancing would continue over the years as market rates improved.

Johnson had muscled WPPSS into cutting back its construction program, which soured BPA's relationship with the board and management. Still, the two organizations had to work together to issue bonds. Wall Street investment banks stood to earn lucrative





*Sen. Mark O. Hatfield was a stalwart supporter of BPA and its role in the Northwest.*

commissions for underwriting huge WPPSS bond sales, so competition was keen. Jura recalled an instance when BPA and WPPSS management had disagreed over the selection of an underwriter.

As Jura remembered it, he was summoned out of a WPPSS board meeting to take a call from the secretary of energy's office. At the time, the administrator reported directly to the secretary. Jura recalled the conversation this way:



*Jim Jura, BPA's 13<sup>th</sup> administrator (including acting administrators).*

"This staff assistant said, 'Jim, I understand you've got this issue with the Supply System about who the lead underwriter is going to be.' So I said, 'We've already decided that.' And he said, 'I just want you to know the secretary thinks it should be someone else.'"

Jura offered to show the secretary the cost-benefit analysis BPA did in the selection process. "My obligation is to the region's ratepayers," Jura objected, "and I can't agree to that. And this fellow said, 'No Jim, you don't understand. The secretary WANTS ...' I said, 'No, you don't understand. The statute tells me what I have to do.' That would be my answer."

Jura said the aide's last words were, "Well, you're on your own."

But those wouldn't be the last words. "So I called Senator Hatfield," Jura recalled. "I said, 'Senator, if this gets me fired, that's fine, but you just need to know this is going on.' I never heard about it again."

Jura said one of his most treasured relationships as administrator was with Sen. Mark Hatfield of Oregon, who time and again came to BPA's assistance at crucial moments.

Among other challenges Jura faced was re-establishing good will with BPA's customers,

**"And this fellow said, 'No Jim, you don't understand. The secretary WANTS ...' I said, 'No, you don't understand. The statute tells me what I have to do.' That would be my answer."**

Jim Jura





*Decommissioning of mothballed nuclear power plant WNP-1, which was never completed, began in 1995.*

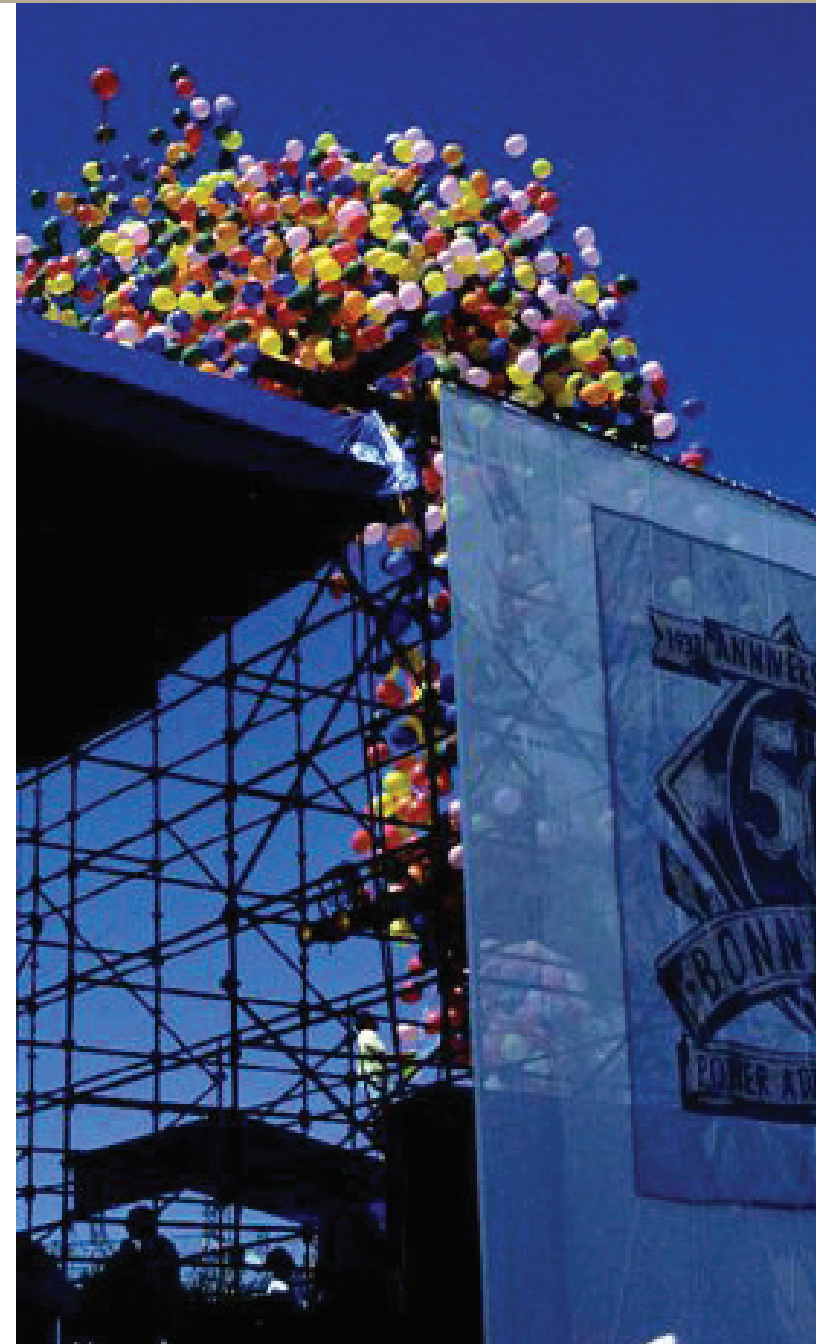
who had been hammered by steep rate increases because of WPPSS costs. Amid the struggle out of recession, retail consumers held elected members of utility boards responsible for the WPPSS debacle. Boards and managers looked for someone to blame, and the administrator was a convenient target.

Jura understood and took the heat. Power purchases made up 60 to 65 percent of most public utilities' costs, "so their welfare rises and falls on how well Bonneville performs," he

said. He challenged field offices to establish closer working relationships with local utilities. Internally, he reorganized for efficiency. As demands on BPA grew under the Northwest Power Act, Jura sought better understanding among customers and constituents of the links between BPA's costs and its rates. He launched a public process in 1988 called "Programs in Perspective" to engage diverse regional interests in strategic planning, one of many actions over the years opening BPA's doors to meaningful public participation.

Meanwhile, BPA's utility customers were suspicious of the new Northwest Power Planning Council's incursion into BPA affairs. Former Washington Gov. Dan Evans, the Council chair, had taken "a very aggressive approach" in asserting the Council's will, Jura said. Sterling Munro had advised Jura that the legislative intent was a council that was strictly advisory.

"The fact is, we had to work out some real serious turf issues with that Council," Jura said. "Bob Duncan (former congressman and early member of the Council) was just a prince, and he and I and our guys hammered out some agreements that I think worked."



*In 1987, BPA celebrated its 50<sup>th</sup> year of providing cost-based power to the citizens of the Northwest.*



## The power surplus goes poof

On its 50th anniversary in 1987, the agency was steering a route between the twin dangers of high costs and a volatile energy market. Jura faced the perennial challenge of satisfying his customers that the agency was doing all it could to hold down its costs and rates. Soon after taking the oath of office, Jura faced declining revenues as low oil and gas prices depressed power markets.

Electricity prices have historically followed those of fossil fuels, particularly natural gas and oil used to fuel generators. Idle combustion turbines sit in reserve until needed to meet peak loads or make the most of favorable markets. In 1986, oil prices dropped nearly 50 percent. Natural gas prices followed, making market power prices competitive with BPA's hydroelectric power and reducing BPA's secondary sales revenue.

BPA can't control the market, but it can plan for contingencies. In 1987, it completed its first Resource Program, a blueprint for implementing the Council's power plan. As the Northwest Power Act directed, the program focused on energy conservation as the lowest cost and most flexible power resource. The program did not call for



*Bonneville Dam, the first federal dam constructed on the Columbia River, was completed by the U.S. Army Corps of Engineers in 1937, the same year the Bonneville Power Administration was created. An Oregon Department of Fish and Wildlife hatchery is in the lower right foreground. (Philip James Corwin/Corbis)*

any new large power plants, but the WNP-1 and -3 nuclear plants remained preserved as a hedge against higher load growth scenarios.

Economic risks are usually considered greater with overbuilding than underbuilding. So as long as BPA and the region sat on an apparent surplus, there was no justification

for new large investments. Then, with little warning, BPA's power supply took a big hit.

Since 1963, BPA had marketed power from the N Reactor at Hanford, an 860-megawatt plant that produced both weapons-grade plutonium and electricity. The one-of-a-kind plant had been powered down for maintenance





*Hanford's N Reactor is called a dual-purpose reactor because it not only produced plutonium for America's defense program, but also generated electricity marketed by BPA. At construction in the early 1960s, it was the only reactor of its kind in the nation.*



*An aggressive drawdown of Lake Roosevelt behind Grand Coulee Dam helped meet unusually high power demand during a 1989 cold snap.*

when the 1986 Chernobyl nuclear disaster struck the Soviet Union. Its design bore some resemblance to the Chernobyl reactor so it remained off line pending extensive analysis and safety examinations. But nuclear nervousness remained high and the U.S. Department of Energy officially shut it down for good the next year, ending the run of Hanford's longest operating reactor.

BPA's power surplus dropped precipitously from 1,400 average megawatts to about 500 aMW at a time when the economy was

reviving. Meanwhile, mandates for additional spring flows and for spill over dams to help young salmon migrate downstream left less flexibility to generate electricity.

## Cold snap hits

In February 1989, an "arctic express" of frigid air hit the Pacific Northwest with temperatures 20 degrees below normal. The thermometer plunged to 40 degrees below zero. Winds

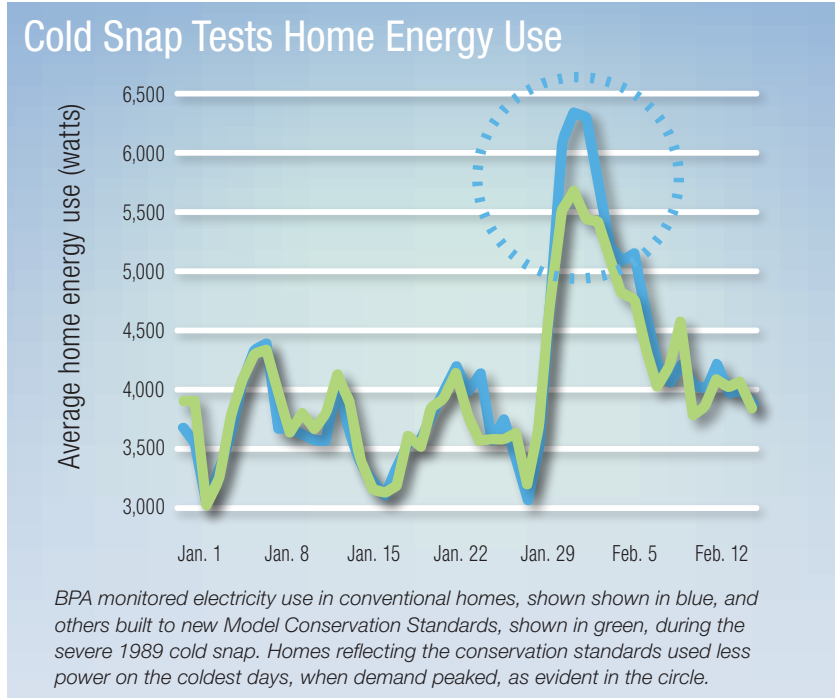
gusted to more than 100 mph in Montana, freezing reservoirs and choking rivers with ice. Power lines went down and wind chills dropped to 75 degrees below. Nearly a foot of snow piled up on parts of the Oregon Coast. Moored boats sank into the Columbia River under the weight of the ice coating their decks.

It was the same severe storm that had demonstrated the BPA transmission system was nearing its limits. Transmission crews struggled through deep snow and bitter cold to keep lines in service.





To avoid blackouts during the cold snap, BPA applied an as-yet-unused provision of the Northwest Power Act. The provision allowed the agency to temporarily redirect 25 percent of the power used by aluminum producers such as the Martin-Marietta smelter near Goldendale, Wash., to meet other demand. (Rod Aho/BPA)



On Feb. 3, power demand set new records on BPA's system and blackouts threatened. As it was, two previous years of drought had left reservoirs low. The federal hydroelectric power system lost generation as regional loads peaked. The remaining nuclear plant at Hanford, WNP-2 (now Columbia Generating Station) suffered an outage and then remained at reduced output as the cold snap continued. BPA, the U.S. Bureau of Reclamation and U.S. Army Corps of Engineers agreed to draw down Lake Roosevelt behind Grand Coulee

Dam by two feet per day to generate additional power. But it wasn't enough. For the first time, BPA would exercise its right outlined by the Northwest Power Act to temporarily interrupt 25 percent of the electricity to the aluminum DSIs in a power emergency.

"I went to Jura and told him I would tell the DSIs at 9 a.m. they had to be off the system by noon," recalled Walt Pollock, BPA's power manager at the time. "The common wisdom was that although we had the right to do it, we never actually would. Jura said, 'Do what you must.'"

Most of the aluminum companies complied, even though ramping down power risked pots going cold and their molten contents hardening in place. BPA offset much of the impact by purchasing replacement energy, and the action allowed BPA to narrowly avert a severe power shortage.

The situation illustrated how close to the margin BPA was. The power surplus had disappeared. The draft 1990 Resource Program, prepared in 1989, called for BPA to acquire 200 average megawatts of



conservation by 1997 and outlined plans to pursue new generating resources. But it would be up to the next administrator to see that through.

In the fall of 1991, Jura got the nod to become general manager of the Associated Electric Cooperative, headquartered in Springfield, Mo. He was satisfied that BPA was on the right course. Rates had remained stable. BPA had refinanced a large block of WPPSS high-interest bonds for a savings of \$85 million a year for 20 years, and was holding the line on new debt. The agency was financially healthy and ready to respond to load growth. Customer relations, though better, still demanded attention.

“In each of those camps, the DSLs and IOUs and the munis, there were hard noses, and they just didn’t like Bonneville, didn’t like not getting their way and they were going to sue you and so forth,” said Jura. The perennial bickering over rates and benefits notwithstanding, his tenure had been relatively quiescent. But another crisis was coming. It would be up to Randy Hardy, a former naval officer and large utility executive, to lead BPA through what would become a sobering and unsettling lesson on the unpredictable behavior of markets.



*Randy Hardy is sworn in as BPA's 15<sup>th</sup> administrator (including acting administrators) in October 1991.*

## Hardy hits uncharted waters

Jura's departure from BPA left the appointment of a new administrator subject to the political vicissitudes of Capitol Hill. Sens. Hatfield of Oregon and Slade Gorton of Washington locked horns over Jura's successor. The lead contenders were Jack Robertson, a former Hatfield staffer then serving as BPA's deputy administrator, or Gorton's choice, Jim Waldo, a Tacoma attorney. Then Energy Secretary

James Watkins, a retired Navy admiral, settled the matter by launching a formal civil service selection process, and Hardy won the appointment.

A graduate of the U.S. Naval Academy, Hardy also held a master's degree in public administration from the University of Washington. As a young naval officer he became a White House Fellow, where he learned the workings of the federal government. He had married his sister's college roommate, and with a return to the sea looming, he wanted a career change. Leaving









*Leaders break ground for the 248-megawatt Tenaska gas-fired generating station near Tacoma. In 1992, BPA agreed to purchase output from the plant to meet an energy deficit, but backed out of the deal three years later amid concerns about a surplus of power and the pressures of deregulation.*



*As part of BPA's Resource Program, the agency acquired the output of the 70-megawatt hydroelectric development at the Cowlitz Falls Dam, owned and operated by the Lewis County Public Utility District.*

the Navy, he signed on with the Federal Energy Administration.

"I wanted to get back to the Northwest and a position opened in the Federal Energy Administration office in Seattle as a policy analyst," he said. "While there, I got to know [BPA Administrator] Sterling Munro and [Deputy Administrator] Earl Gjelde." That led to an appointment by Munro in 1980 to manage BPA's Seattle Area Office, followed by a stint from 1982 to 1984 heading the Pacific Northwest Utilities Conference Committee, and then seven years as superintendent of Seattle

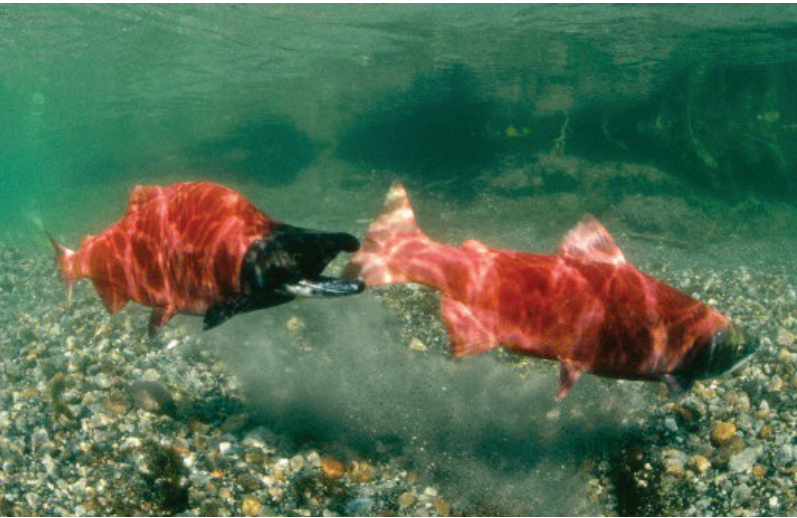
City Light. Hardy was credited with resolving difficult personnel and financial issues at the region's largest municipal utility.

As its power deficit grew, BPA under Hardy expanded its conservation and resource programs, seeking 660 average megawatts of conservation and 120 aMW of generating upgrades at federal dams through 2003. Guided by the Resource Program, BPA also began a competitive process to identify new power resources, including a gas-fired combustion turbine in Tacoma called Tenaska. BPA also purchased power from a

70-megawatt hydroelectric project developed cooperatively with Lewis County PUD at Cowlitz Falls Dam, and looked for geothermal and wind power.

Because it can take up to five years to develop a new power plant, BPA launched a "Resource Contingency Program" to reduce the lead time. The agency contracted for up to 1,050 megawatts of power options, agreeing to fund preconstruction costs and permitting work. In return, BPA received options to purchase the plants' output if and when it was needed.





*In 1991, Snake River sockeye became the first Columbia Basin salmon listed under the Endangered Species Act. (Michael Quinton/Minden Pictures/Corbis)*

Though tied together by the federal transmission system and the value of the Columbia River hydroelectric system, the Northwest's electrical community is very diverse. Investor-owned utilities, public utility districts, municipalities and rural electric co-ops push and pull in different ways. Governors disagree about policy. Throw in huge industrial consumers — a single aluminum plant consumes enough power to light the city of Eugene — and the contending interests resemble a simmering stew that sometimes boils over. Often the heat rises with costs, and spending on salmon recovery would unite customers in a whole new way.



*Low water at Kettle Falls, Wash., at the upstream end of Lake Roosevelt. Three consecutive low-water years in the early 1990s strained BPA's finances.*

In 1991 came a long-debated listing under the Endangered Species Act of Snake River sockeye salmon, known for spawning in Idaho's Redfish Lake. It was the first of many listings that would affect the Columbia River Power System just as the listing of the northern spotted owl two years before had affected the Northwest timber industry. "It was clear that expenses would go up dramatically," Hardy said.

In the next few years, changes in river operations to help migrating salmon and steelhead would limit BPA's flexibility to use water stored in reservoirs from year to year, ultimately reducing the FCRPS generating capability by roughly 1,000 average megawatts. Meanwhile, annual costs of fish programs

would rise from \$150 million at the beginning of the 1990s to \$400 million by 1995.

"Three consecutive low-water years from 1991 to 1994 ate through BPA's financial reserves, taking them down from \$900 million to \$200 million by 1995," Hardy said. That put an agency with nearly \$3 billion in annual expenses at extreme risk of missing a critical payment to the U.S. Treasury.

The prolonged drought, combined with low sales revenue from aluminum producers and increased salmon recovery costs, prompted BPA to increase rates 15 percent from 1993 to 1995. Then, as if BPA didn't have enough to worry about, the 1992 Energy Policy Act changed the energy landscape.



## BPA struggles in a new market

“We knew [the Energy Policy Act] would make fundamental changes and that we would have to start operating more like a business,” Hardy said. But he didn’t fully appreciate how much deregulation of the electricity market would imperil BPA’s market position until the day in 1995 when he got a phone call from Brett Wilcox, owner and CEO of Golden Northwest Aluminum.

“Brett said, ‘I’m really sorry, Randy, but I got this great deal from Avista at a much lower price. I got the equivalent of 20-mill power and your rate is 27 or 28. I just had to take advantage of this for the top quartile of my load,’” Hardy recounted. The aluminum companies’ contracts let them leave BPA’s service on six months’ notice.

The loss of a quarter of the power sales to a large aluminum customer revealed a crack developing in what had been an airtight market for BPA power, and Hardy had no idea how many of his customers might bolt through it. The new law encouraged competition among wholesale power providers by making high voltage transmission grids “open access, non-discriminatory” common

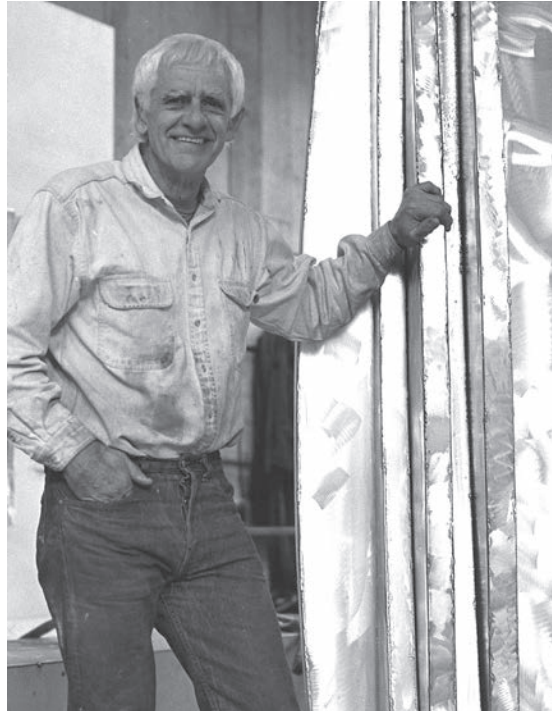
carriers. With their large, concentrated loads, the DSIs were lucrative targets for marketers using this newly acquired access to transmission lines. The aluminum plants were looking to cut costs because the collapse of the Soviet Union led Russia to flood the world market with cheap aluminum to raise much-needed cash.

BPA’s public utility customers also had off-ramps from BPA service in their 1981 contracts, which had never anticipated deregulation. A new breed of power brokers and marketers, such as Enron and various independent power producers, knocked on utilities’ doors with offers as low as \$15 a megawatt-hour. And plant developers brandished competitive rates



*Molten aluminum poured into molds inside a smelter. Production of the metal requires vast amounts of electricity.*





*Sculptor Lee Kelly with "Water Column," his sculpture symbolizing the importance of hydroelectric power to the Northwest aluminum industry.*

for new generating resources. Utilities clamored to jump at prices well below BPA's \$28 per megawatt-hour rate.

With Treasury obligations to satisfy and public service missions from fish protection to energy conservation, BPA considered a legal



*Sen. Mark Hatfield of Oregon unveils the sculpture commissioned by aluminum direct-service industries to commemorate the partnership between BPA and the DSIs. Deregulation severely tested the partnership. Administrator Jim Jura is to Hatfield's right.*

maneuver to hold its customers to their contracts. "But we really didn't want to test these issues in court because it would tie us up for two to three years, and we wouldn't even be able to talk to our customers during the litigation," Hardy said. He had to find other solutions. Public utilities watched BPA's reaction, wondering whether they really needed the federal

agency anymore. "People were asking, 'Is it going to be a ball and chain or is it going to be leading us forward?'" recalled Bill Drummond, then manager of Western Montana Generating and Transmission Cooperative.

Deregulation appeared to be lowering prices as intended, but no one knew how low they would go or how long it would last. Deals like



those that Avista, Enron and others offered to utilities and industries were like cheese to mice. Brokers were wheeling and dealing, buying power wherever they could find low prices, packaging it and offering it to anyone interested. Access to the retail market, a more complicated proposition, was not available, so the focus was limited to wholesale transactions.

Where was all the cheap power coming from? Historically, utilities had enjoyed captive retail markets for power from their own generators or from purchases. With the approval of public utility commissions, they built new plants and raised rates to cover the capital costs — even if they overshot demand and the plants were underutilized. Some utilities had also built inefficient “peakers,” gas turbines that operated only during high demand hours or emergencies.

“So you had all these old plants with high heat rates that had been amortized long ago and natural gas selling for \$1 [per million Btu],” Hardy said. “With fuel costs that low, why not operate them if a small [profit] margin was possible?” And operate them the utilities did, flooding the market and sending wholesale power prices through the floor.

BPA was caught between the proverbial rock and hard place. Not only were its rates



well above market prices, its expenses were also rising. The Northwest Power Act had dramatically expanded BPA’s responsibilities to acquire power and conservation and to fund fish and wildlife programs. BPA’s failure to make its full payment to the Treasury on time each year as it absorbed nuclear plant costs in the 1980s had prompted calls to sell the agency. Hardy did not want that to happen again.

## BPA gets fit to compete

With the market morphing and customers looking to leave, BPA quickly moved to cut costs and stabilize revenues. In 1994, the agency issued a draft business plan designed to help it survive the increasingly competitive market. “Providing public benefits through



commercially successful businesses,” was a new motto that stuck but was a paradox for an agency that had always viewed itself as wholly dedicated to public service. BPA adopted the business plan in 1995, defining a new market-driven mandate.

“To continue to provide the public benefits that the region relies upon, BPA has had to learn new ways to achieve the same results more efficiently with fewer staff and lower costs, through market-based approaches that allow BPA to maintain competitive rates,” the business plan stated. Like its competitors and customers alike, BPA concluded the spot market was the most cost-effective way to supply power beyond what the Columbia River system could provide.

While Hardy believed BPA still offered the best value over time, “We had been running slow in the fast lane. We took a frantic series of actions from April to October 1995, when we were making two to three major policy decisions a week, any one of which, if it went wrong, could have caused us to miss a Treasury payment with the likely consequence that we would lose control of the agency. OMB [Office of Management and Budget] and political forces in Washington would conclude the agency was acting in a fiscally irresponsible manner and would move to privatize BPA,

make us charge market rates to our Northwest power customers or otherwise seek to remove Bonneville from Northwest control.”

The steps BPA took were “enormously controversial,” Hardy said, but necessary to pull itself back from the precipice of insolvency. Key among them was reduction of the annual budget by \$600 million a year. “We did it by essentially gutting programs,”

he said. Sen. Hatfield, clear sighted about BPA’s challenges, helped the agency get authorization for early retirement and separation incentives that helped reduce staff by about 1,000 full-time equivalent employees, from 3,755 in 1994 to 2,738 by 1999.

BPA also put the brakes on its resource acquisition process to avoid purchasing power supplies it might not need. The agency took



*John Day Dam on the lower Columbia River with the Martin-Marietta aluminum smelter in the background. The aluminum plant was idled in 1985 for economic reasons and eventually sold. Despite efforts by the subsequent owner to maintain it, the facility was permanently shut down in 1987.*





Former BPA Administrators Randy Hardy, left, and Jim Jura.

steps to get out of contracts for the Tenaska gas plant under construction in Tacoma and several renewable energy projects. An angry Tenaska ownership sued BPA for \$1 billion. The case went to binding arbitration and BPA lost, paying \$330 million — costly but less expensive than purchasing power from a completed project, Hardy said.

Other cost-reduction steps included: cancelation of a tentative agreement with British Columbia to return power under the Canadian Entitlement, which obligated BPA to

transmit power generated south of the border to Canada as part of the Columbia River Treaty; and dramatically cutting residential exchange benefit payments to investor-owned utilities. The latter occurred as a result of the “rate test” in the Northwest Power Act, a cost formula protecting the rates of preference customers. At the behest of the region’s governors and congressional delegation, a panel of business leaders reviewed BPA’s costs and found some additional savings, which BPA adopted.

“We had been running slow in the fast lane. We took a frantic series of actions from April to October 1995, when we were making two to three major policy decisions a week, any one of which, if it went wrong, could have caused us to miss a Treasury payment with the likely consequence that we would lose control of the agency.”

Randy Hardy

## Sen. Hatfield to the rescue – again

On another front, BPA worked to hang onto every slice of its shrinking revenue pie. The aluminum companies had provided as much as a third of BPA's revenue in better days, and losing that revenue to marketers such as the one that lured Wilcox would undermine the agency's future. Hardy and his staff saw the situation as a make or break moment: The DSIs argued they had no choice but to shift to market-priced electricity to remain profitable if they didn't get an acceptable package from BPA.

The question was whether BPA could drop its rates low enough, fast enough, to compete while still covering its costs. Hardy and BPA leaders thought they could, but only with the help of a little-known section of the Northwest Power Act known as 4(h)(10)(c). That section of the Act allowed BPA to receive credit for its spending on fish protection that went beyond BPA's basic obligation to offset the impacts of the hydroelectric system. The credits had accumulated since the passage of the Act, but the keeper of federal coffers, the Office of Management and Budget, had never granted BPA access to the credit that had accumulated in previous years.



*Vice President Al Gore (fourth from left) joins Northwest lawmakers in Washington, D.C., to announce a deal to fund fish protections while helping keep BPA rates competitive. From left: Commerce Secretary Ron Brown, Sen. Conrad Burns of Montana, Sen. Larry Craig of Idaho, Gore, Sen. Mark Hatfield of Oregon, Sen. Patty Murray of Washington and Sen. Max Baucus of Montana. (Courtesy Randy Hardy)*

If BPA could use it, the money could boost the agency's balance sheet just enough to keep its rates competitive. Sen. Hatfield, chairman of the powerful Appropriations Committee, took up the issue with Vice President Al Gore, who agreed one Friday afternoon in October 1995 to two key actions:

capping BPA's annual fish costs at an average of \$435 million a year through 2001, and granting BPA \$325 million in 4(h)(10)(c) credits. The money would go into a contingency account BPA could draw on in extreme drought years. Then Hatfield took one more step. He called a press conference with Gore



and other Northwest lawmakers on Monday morning to announce the deal.

“The brilliance of it was in the timing,” Hardy recalls. “I was on the phone to OMB the whole weekend working out the details, right up to the 11<sup>th</sup> hour.” The fast-approaching press conference left no time for hitches or complications in what could have otherwise turned into lengthy negotiations. The press conference came off just as Hatfield had planned, and the money came through just in time. BPA no longer had to raise rates to insure against the dent a drought would leave in its finances. “That made a big difference in terms of the rate we could offer,” Hardy recalled. “If we would have had to charge a higher rate, the DSIs would have left and probably some of the publics too.”

At the bipartisan press conference of Northwest lawmakers, Hatfield called the agreement “one of the most inspiring experiences in my tenure in the U.S. Congress to see the region come together.” The deal halted talk of curbing the reach of the Endangered Species Act, a move the Clinton administration had threatened to veto. “This agreement proves that Bonneville’s financial problems can be addressed without abandoning or overriding environmental laws,” Gore said. “It is clear the steps outlined in



*BPA Administrator Steve Wright, left, and Congressman Peter DeFazio tour hydroelectric projects.*

## Looking out for the Northwest on Capitol Hill

If you don’t think bipartisanship exists, you haven’t met the group of U.S. lawmakers from the Northwest with a record of supporting the value of the Columbia River and the power it provides for the region.

Representative Peter DeFazio, an Oregon Democrat, and Representative Bob Smith, an Oregon Republican, in 1997 organized the Northwest Energy Caucus in the U.S. House of Representatives. They joined at the time to see that a national energy industry restructuring bill retained cost-based rates for federal power in the Northwest, while protecting the interests of taxpayers. Their success created a lasting bond that has often proved valuable to the region in the years since.

The Northwest Energy Caucus includes all members of the U.S. House of Representatives from Oregon, Washington, Idaho and Montana, no matter their political affiliation. They agreed to three principles from the start. First, the Caucus would work to keep the benefits of Columbia River hydroelectric power, a Northwest resource, in the region. Second, it would ensure that the region would meet its financial obligations to the

U.S. Treasury. And third, members would avoid partisanship, and cooperate on behalf of the region. These principles still guide the Caucus today.

The Caucus has spoken with a clear voice on key energy issues:

- Alerting congressional leaders that any cap-and-trade rules on carbon emissions should recognize longstanding Northwest investments in conservation and renewables.
- Calling on the Bush administration in 2005 to withdraw a budget proposal that would have increased power rates in the Northwest by 10 percent or more.
- Cautioning that requiring BPA to join a regional transmission organization could jeopardize BPA’s contractual agreements.

The Caucus also refutes misperceptions of subsidies or special benefits for the Northwest, noting that the government still owns the dams ratepayers have paid off. As Rep. DeFazio put it, “To those who criticize the Northwest and say we are getting a sweet deal, I would like to offer them the same deal on their house mortgage, which is, they pay the house mortgage for 30 years, and then the bank owns the house.”



*With about 15,000 miles of high-voltage transmission lines, BPA operates and maintains approximately 75 percent of the high-voltage grid in the Northwest.*

this agreement will achieve our twin goals of protecting Bonneville and salmon.”

It would not be the last time the 4(h)(10)(c) credits would provide BPA a financial lifeline.

BPA offered the DSIs five-year power contracts through 2001 in which the plants agreed to buy a certain amount of power at \$22.50 per megawatt-hour instead of the \$28 they had been paying. The deal was

controversial, but it locked in a crucial portion of BPA’s revenue at an especially critical time and gave the DSIs power they could either use in their plants or resell in the market if they preferred. They also got permanent protection against stranded costs that BPA might incur to deal with deregulation.

Hardy flew off to Washington, D.C., to get Secretary of Energy Hazel O’Leary’s blessing.

But her deputy secretary, Charles Curtis, had serious reservations about the stranded cost provision, and O’Leary balked. Word quickly got out that the deal was off and, said Hardy, “Enron was waiting to move in” to supply the DSIs.

Recognizing the risk to BPA, Sen. Hatfield called Hardy, O’Leary, Curtis and a coterie of members of the Northwest congressional delegation to the Senate Appropriations Committee hearing room. “He began the meeting with a 10-minute speech that was extremely critical of the department’s action and that opened the floodgates for the other members to pile on,” Hardy remembered. Things went just as badly for O’Leary and Curtis at a subsequent meeting in the office of Sen. Patty Murray of Washington, where Rep. Norm Dicks of Washington emphatically warned that they were endangering the economic health of the region if the industrial agreement fell through.

O’Leary withdrew her objection after Intalco Aluminum confirmed that it would not agree to service without stranded cost protection. BPA retained about 85 percent of its industrial load, thanks to Sen. Hatfield. It wasn’t the last time Hatfield would step in to rescue BPA in this period.

BPA also took the risky step of granting its public utility customers freedom to begin



purchasing a share of their power from the market. The freedom served as a “pressure relief valve for customer angst and concern” about losing out on an attractive market, recalls Drummond, who later became BPA’s deputy administrator. While the step meant a drop in revenue for BPA, “In hindsight it was a brilliant move,” Drummond said. “It showed the agency was willing to take the risk that they could compete.”

Competing was tricky, though. With utilities and industries getting more power elsewhere, BPA had surplus electricity to sell. But the 1964 Regional Preference Act required any electricity sold outside the region to carry a 60-day recall provision allowing BPA to take the energy back. That catch was designed to protect the Northwest, but it had become an anachronism in the new marketing landscape and tended to discourage potential customers. Hatfield was instrumental in winning new authority for BPA to market a new class of energy outside the region for up to seven years without the recall provision. The change helped BPA lock in new power sales beyond the region at rates just above the spot market.

By 1996, BPA had cut costs and reduced rates 13 percent. Through revised power sales contracts and new sales beyond the region, it also stabilized rates and revenue. But it



*A punch bowl filled with straws commemorated BPA Administrator Randy Hardy’s quip that with so many demands on the agency, “those who suck the hardest get the mostest.”*

wasn’t all hurrahs. Hardy said, “During much of 1993 and 1994, we had Congressman Peter DeFazio calling hearings, the whole premise being that we were grossly overreacting,” and that BPA should stick to its traditional mission and public purposes.

Hardy had once famously quipped that BPA, so often pulled in many different directions, resembled a punch bowl with many straws. “Those who suck the hardest get the mostest,” he said. Aluminum entrepreneur Wilcox later memorialized the remark by presenting Hardy a crystal punch bowl with numerous straws that remains on display in the administrator’s office.

## The region reconsiders BPA

Given BPA’s see-sawing fortunes as deregulation took hold, new questions emerged about the agency’s long-term value and role in the Northwest. Did competitive markets make BPA a bureaucratic relic or did the agency still have a place delivering the value of the Columbia River through the power it produces? In 1996 Northwest governors convened a year-long “Comprehensive Review” of the region’s energy system and BPA’s role in it. Chuck Collins, an



*Northwest governors discuss BPA's role in the region as part of the 1996 Comprehensive Review. From left, Washington Gov. Mike Lowry, Montana Gov. Marc Racicot, Idaho Gov. Philip Batt, and Oregon Gov. John Kitzhaber. (Associated Press/Barry Sweet)*

original member of the Council and its chair in the mid-1980s, led the review's steering committee, which outlined its central question: What is the role of a federal power marketing agency in a competitive energy market? Could BPA survive, let alone thrive? Could the Northwest continue to benefit from low-cost hydroelectric power?

The panel heard many suggestions for

restructuring or dismantling BPA. But the group noted in its final report that while competition can help meet consumer demands, competition may not necessarily meet other important Northwest public policy goals such as environmental protection, energy efficiency, and service to rural and low-income customers. The value of the Columbia River in the region

gave rise to the review, the report said, and the overriding goal was to "protect and enhance the assets of this great natural resource for the people of the Pacific Northwest."

Ultimately the review concluded that BPA should retain its traditional role as a power marketing agency, with two specific changes:

- It should market existing resources and not acquire new ones unless requesting customers agreed to shoulder the costs and risks; and
- It should split itself by legislation into two separate entities, one to market Columbia River system power and the other to build, maintain and operate the transmission system.

The Comprehensive Review proposed a "subscription" system for customers to commit to purchasing specific amounts of power at cost, with incentives for longer-term subscriptions. The goal was to provide freedom for customers to decide how much power they wanted for how long, with the revenue stability for BPA that longer-term customer commitments would mean. The final report noted that to attract long-term customers, BPA would have "to take actions that push the envelope of cost reductions."



## BPA faces pressure in Washington, D.C.

If the value of the Columbia River hydroelectric system is clear to the Northwest, it isn't lost on other regions or in Washington, D.C., which have long looked toward it as a promising potential source of federal revenue. Occasionally the longing looks gave rise to proposals to make BPA's rates match the market and even to sell or privatize the federal agency. The theme reappeared in different forms through the 1980s and 1990s, in both Republican and Democratic administrations.

Recognizing that missing BPA's scheduled payments to the U.S. Treasury on the federal investment in the Columbia River dams and transmission system exposed BPA to critics, Administrator Peter T. Johnson ensured the agency brought itself current with a record \$682-million payment in 1985. BPA hasn't missed a payment since, a streak that no administrator wants to break. That consistent record has helped keep the benefits of the Columbia River hydroelectric system in the Northwest, while building BPA's financial credibility. The Northwest Power



*A federal commission appointed by President Ronald Reagan and headed by J. Peter Grace, center, in 1984 recommended selling the federal power marketing administrations, including BPA. The Grace Commission also advocated sale of hydroelectric power from federal dams at prevailing market rates to produce more revenue for taxpayers. (Ronald Reagan Presidential Library)*

Act and subsequent appropriations acts have increased BPA's line of federal credit from \$1.25 billion to \$7.7 billion.

Perhaps the most direct attempt to dismantle BPA came in the 1980s as part of a serious effort during President Ronald Reagan's

administration to scale down government. The Heritage Foundation, a conservative think tank, issued a report calling for sale of the federal power marketing agencies, including BPA. Reagan set up a panel of prominent private sector executives led by



*Sen. Dan Evans of Washington defended BPA against Reagan administration efforts to accelerate BPA debt repayment to the Treasury.*

industrialist J. Peter Grace, called the Grace Commission. The commission said in its wrap-up letter to the president in January 1984 that selling federal hydroelectric power at market rates could generate billions for taxpayers in other parts of the country who were otherwise subsidizing the Northwest. Sale of BPA and the other agencies would “disengage (the federal government) from the commercial enterprise of selling electricity,” and help ease the federal deficit, the commission opined.

With a Republican majority in the Senate and a Democratic majority in the House, and the opposition of Sen. Hatfield, the Grace Commission’s report brought no changes. But the Reagan administration was not finished with BPA. David Stockman, director of the Office of Management and Budget, proposed that BPA be placed on a fixed repayment schedule to accelerate its payments to the Treasury.

This time, Republican Sen. Dan Evans of Washington came to BPA’s defense, condemning

“the totally misguided attempt of this administration to reform BPA’s debt repayment as a way to extract as much revenue as possible from the ratepayers of the Pacific Northwest.” Factoring in the economic blow of such a change on the Northwest, he argued there would be no tax benefit at the end of the day.

President Reagan’s fiscal 1987 budget proposed the sale of BPA, projecting revenues of \$12 billion. Lest such proposals ever get serious legislative consideration, Sen. Hatfield made crystal clear his position, saying that sale of BPA “will happen only over my dead body.” At the Department of Energy’s direction, BPA drew up plans for a sale that would include review and renegotiation of thousands of contracts, and the complex handling of some \$6 billion in outstanding nuclear plant debt.

Sen. Hatfield, again riding to the rescue, authored legislation prohibiting any use of federal funds to “solicit, prepare, review, study or draft proposals” to sell BPA and the other power marketing agencies. President Reagan objected to the bill as an “unreasonable restriction” on pursuing the recommendations of the Grace Commission. But he signed it. The repeated attempts to go after BPA through most of the 1980s prompted Rep. Al Swift of Washington to quip, “Every year the trolls come out from under the bridge to gnaw on Senator Hatfield’s leg.”









Vice President Al Gore smashes an ashtray on David Letterman's late-night talk show as evidence of the cost of federal red tape he wanted to cut through. BPA employees who helped with cost-cutting received silver hammer lapel pins in return. (Worldwide Pants Inc.)



## Hammering down BPA costs

As BPA was looking for ways to become more efficient and business-like in the early 1990s, so was Al Gore. Starting in 1993, the vice president led the Clinton administration's National Performance Review to create a government that "works better, costs less and gets results Americans care about."

With support from Energy Secretary Hazel O'Leary, BPA applied to become a "reinvention laboratory" and was selected. Employees who offered cost-cutting suggestions received tiny silver hammers reminiscent of an appearance by Gore on David Letterman's late-night talk show where he smashed an ashtray that was subject to complex government procurement rules.

The effort paid lasting dividends. A BPA team searching for red tape to cut won

special delegations and waivers from the Department of Energy, General Services Administration and others in 1993 and 1994, freeing BPA from costly and time-consuming procedures and saving millions of dollars annually. President Clinton signed an order giving BPA permission under the Bonneville Project Act to handle its own property disposals, which remains in effect and has saved the agency millions of dollars.

BPA also received protection from further rules and restrictions with a delegation by the secretary of energy in 1996 that exempted BPA from future departmental orders unless they named BPA specifically. The delegation has been renewed by each succeeding secretary and remains in effect.

But his leg would prove tough indeed. Democrats tried to squeeze more from BPA too, with Vice President Al Gore's 1993 cost-cutting study recommending "increased revenues from hydroelectric power operations." Rep. Peter DeFazio of Oregon saw debt repayment plots and privatization as serious threats to BPA's conservation and fish and wildlife programs and pushed back with Hatfield.

## Direct funding offers new tool

At about the same time, though, Northwest lawmakers were working on a new funding mechanism that would promote more efficient maintenance and improvements of the hydroelectric system while reducing the demands for federal appropriations. It was called direct funding authority and would prove to be a model partnership between the agencies responsible for the federal dams.

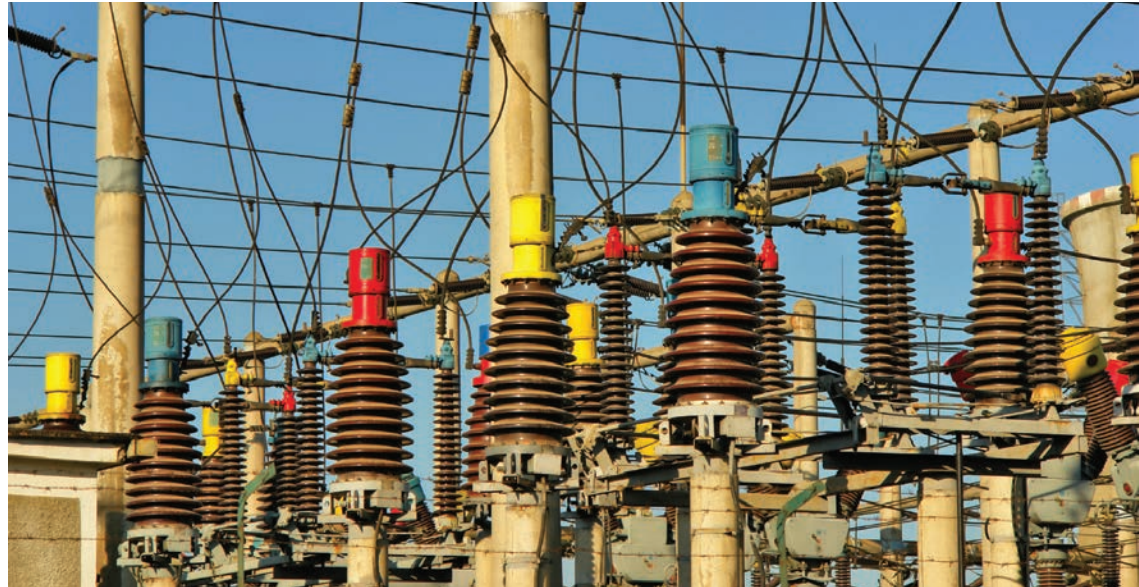
The problem was a web of financial red tape. Although BPA financed its own costs with power sales and transmission revenues, it was an exception among federal agencies. The U.S. Army Corps of Engineers and Bureau of Reclamation required appropriations from Congress to pay for operations and





*A turbine shaft spins at Grand Coulee Dam.*

improvements at their dams. Northwest ratepayers then covered those costs through their rates and, in turn, BPA's payments to the federal Treasury. The appropriations process was slow, inefficient and far from business-like. The Corps and Bureau could not always respond fast enough to fix deteriorating equipment or pursue operational improvements. Equipment might sit idle, instead of producing power, until funding came through to fix it. By contrast, BPA's freedom from the appropriations process allowed the



agency to make timely investments in its transmission system as long as it had sufficient borrowing authority.

The complexity of the process became especially apparent in the early 1990s when increasing protections for salmon reduced the output of the federal system, forcing BPA to purchase market power to make up the difference. BPA identified improvements at the dams such as updating generator controls and rebuilding turbines that could produce nearly 200 average megawatts of additional output,

but could not fund their installation without congressional appropriations. Sen. Hatfield and Rep. DeFazio led the charge in Congress to change that with an amendment to the National Energy Policy Act of 1992 allowing the Corps and Bureau to accept funding directly from BPA. Rep. Tom Foley, a Spokane Democrat and Speaker of the U.S. House of Representatives, also backed the move.

"If this amendment is accepted, not only will there be no cost to the federal taxpayers, there will actually be a profit in it for them





*Anderson Ranch Dam on the South Fork of the Boise River north of Mountain Home, Idaho, is one of the smaller dams in the federal system. Its two generating units were updated in 1986 to a combined capacity of 40 megawatts.*

[through interest] every time BPA borrows money for these investments,” Hatfield told the Senate. “Because BPA ratepayers will be on the hook to pay for any of these investments, you can be assured that there is a self-regulating mechanism to assure that unnecessary investments are not made.”

The amendment succeeded, effectively expanding BPA’s self-financing authority up the river to include the Corps and Bureau dams and providing more flexibility and certainty in funding to maintain them. It also strengthened the relationship between BPA and the agencies that operate the dams, with later Administrator

Steve Wright calling it “one of the very most important things that has happened in my time at the agency.” The dividends of the change grew over time, with the Corps eventually receiving more than \$300 million a year in BPA funding from ratepayers.

“What a great funding mechanism this has proven to be,” Brig. Gen. John McMahon, the Corps’ Northwestern Division engineer, told a conference of engineers in 2011, “with the ability to go directly from those who are the beneficiaries to the production side.”

## The subsidy arguments die hard

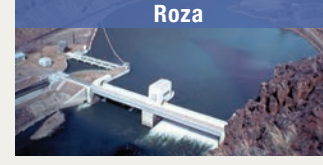
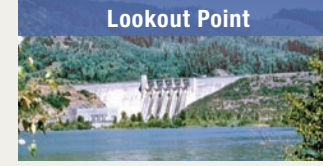
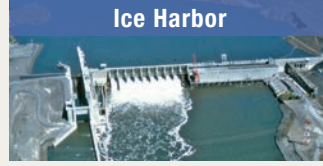
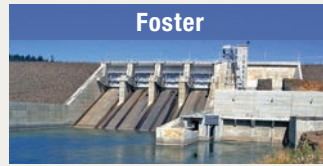
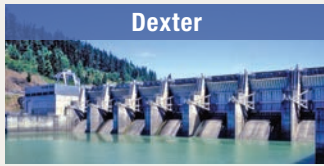
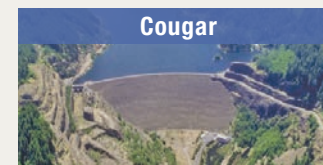
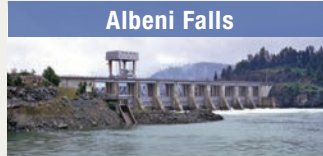
Making BPA a government corporation was an idea that caught the fancy of regional interests in the 1990s. BPA funds its operations from revenue, not tax-supported appropriations. Yet it must adhere to all of the rules and regulations the tax-funded federal agencies do. In 1994 BPA, the Department of Energy and the Northwest Power Planning Council held hearings on proposed legislation to convert BPA to a government corporation to



# Making good on the federal investment

BPA has repaid the original federal investment in power generation at 25 hydroelectric projects and most of the original investment in the Northwest transmission grid. BPA receives no federal appropriations and recovers its costs through wholesale electric rates.

**15,000**  
MILES OF LINES



BPA is still repaying the original investment on six projects and two powerhouse expansions:  
Dworshak • Green Springs • John Day • Libby • Lost Creek • Lower Granite • Bonneville Second Powerhouse • Grand Coulee Third Powerhouse

*NOTE: BPA is still paying off investments in later improvements, including fish protections, at projects where the original investment was fully repaid.*

“Because BPA ratepayers will be on the hook to pay for any of these investments you can be assured that there is a self-regulating mechanism to assure that unnecessary investments are not made.”

Sen. Mark Hatfield

free it from red tape, but the draft legislation died when the Office of Management and Budget declined to support it. A proposal by the Clinton administration, advanced to Congress by Energy Secretary Hazel O’Leary, to refinance BPA’s federal debt (other than its borrowing authority) in the private market was seriously considered, but met a similar fate because of adverse budget scoring.



*Fish ladder at Bonneville Dam.*

Another important move to eliminate any perception of special treatment for the Northwest came in 1996 appropriations legislation. Sen. Hatfield included provisions that called for refinancing BPA’s appropriated debt at current interest rates. BPA also paid the Treasury \$100 million to handle the refinancing, just as typical borrowers pay their lenders. BPA refinanced its old federal debt at 1997 market interest rates averaging 7.3 percent, and any new debt has since been issued at prevailing market rates. That has further buttressed the agency against subsidy claims.

Steve Wright, then managing BPA’s Washington, D.C., office, heard the subsidy claims plenty of times. What was important, he says, is that BPA did not discount them. “The key to that, I think, was going through and testing all of the places where people asserted that there were subsidies and trying to divine whether, in fact, there really were. And to the extent that there was a cogent argument that there was one, to fix it.” A prime example, he says, is that BPA pays the Treasury for the pension costs of its employees and may be the only federal agency that does.









*Bonneville Dam*

Jack Robertson, deputy administrator through much of the 1990s and later acting administrator, came to BPA after serving on Sen. Hatfield's staff. He recalls testifying before a hostile congressional committee bent on the subsidy argument. In his response, he compared BPA paying debt on federal dams at current interest rates with paying off a home mortgage.

"We have actually paid off the original Bonneville Dam, and at the end of the mortgage the bank in the form of the United States got the dam. They still own it. That's the best deal the federal government has anywhere," he asserted. Nowhere in the U.S. is a region paying more for a government asset, and "I think it's the right thing to do ... but don't tell me it's subsidized," he insisted.



## There's no place like home, and BPA

Randy Hardy was getting tired. Six years was a long tour of duty as administrator, and 1997 seemed like a good moment to bring in fresh leadership. Since 1991 he had stabilized the agency financially by making tough calls to reduce costs. He had guided cultural changes to make BPA more nimble and competitive. Meanwhile, a semblance of normalcy was returning to the electricity market. Customers were again showing confidence that BPA



offered the region's best value. Jack Robertson became acting administrator upon Hardy's departure in the fall of 1997.

"I remember one owner of [an aluminum] plant who had taken a significant part of his load off of Bonneville's system," said Robertson. "After we'd gotten things under control, I asked, why did you guys bet against us? And he said, 'I never believed you guys were going to come out a victor. I never thought you could control your costs. I thought the politics were all wired against you.'"

With 1981 power sales contracts nearing expiration and customers uncertain about staying with the agency, BPA prepared to negotiate new long-term contracts for what the Comprehensive Review had called "subscriptions" to federal power. Robertson went out to the region's public utilities with a clear message: BPA would remain the long-term best choice. All the recent turmoil in the market notwithstanding, he pledged, the agency's fixed costs would not rise much over time and could even decline. Retiring the nuclear and other debt would help.

But market prices still undercut BPA's lowest cost-based rate. So Robertson tested customer interest in new contracts with an offer. BPA would sell up to 1,300 average megawatts of firm power under "pre-subscription" contracts

## Slicing the system proves complex

During development of BPA's Subscription strategy and sales contracts, some of BPA's larger public utility customers that managed their own generation wanted to use their in-house expertise to also manage their share of federal output for load service and resale. They were participating in the deregulated market anyway, so why not purchase federal power on the same basis? They asked BPA to sell them power representing a "slice of the system," or a proportion of planned federal generation.

BPA first concluded that the idea was inconsistent with BPA's marketing program and presented too many management and equity issues, but its proponents insisted. So BPA attempted to design a modified "Slice" product that would not interfere with federal system obligations, statutes, or other products, or shift costs to other customers.

The new Slice contracts set a new standard of complexity when implemented on a pilot basis on Oct. 1, 2001. Customers purchased all 22.6 percent of the federal system capability offered. BPA divided it among customers by comparing their planned annual loads with an annual federal system capability. Customers accepted the vagaries of high and low water conditions, resource outages, and swings in market prices — risks that BPA otherwise



managed for its customers. Actual rates for Slice would be trued up to actual costs annually by BPA, which unfortunately led to litigation.

The Subscription Slice contract expired in 2011 with the final cost true-up occurring in fiscal 2012. BPA reviewed Slice and decided to offer a modified version in its new Regional Dialogue contracts, with costs based on new tiered rates. The modified Slice product increased the amount of power available for Slice and improved its implementation. A sophisticated computer model was developed to help Slice customers understand hourly changes in federal system operation, helping them calculate how much surplus federal power they were likely to have to either use or sell.





*BPA's headquarters building in northeast Portland houses about one-third of the agency's workforce.*

at \$22 per megawatt-hour. The sales would run from 2001 through 2006, although a few sales ran through 2010 with rate adjustments.

Paul Norman, then head of BPA's Power Business Line, was astounded by the enthusiasm of the response. "If a year ago anyone had told me we'd have [just] 20 small, full-requirements customers stepping up to buy BPA's pre-subscription power, I would have giggled," he said. As it was, about 40 utilities signed for about 1,000 average megawatts.

BPA power was starting to look competitive again.

This success set the stage in 1998 for what BPA called the Power Subscription Strategy, fashioned after the recommendations of the governors' cost review.

Then came a change in leadership. In June 1998, Judi Johansen became BPA's 17<sup>th</sup> administrator (including acting administrators), and the first woman to fill the post. She had worked briefly at BPA as a law clerk in the frenzied years just after the Northwest Power



*Judi Johansen served as administrator from 1998 to 2000.*

Act. When the agency had no jobs for a new lawyer she had moved on, returning for a series of positions in the 1990s ranging from fish and wildlife to power. She had left for a job at Avista, and when Randy Hardy stepped down, Johansen got a call asking if she was interested. During a tug-of-war largely between Oregon and Washington candidates, she was championed by Sen. Patty Murray and others from Washington, and ultimately got the job. She loved the diversity of the agency's work and respected its public service mission. When





taking over as administrator, she reflected the optimism that BPA felt after finally finding its footing in the new world of deregulation.

“I inherited a stable and well-run agency,” she announced at the time. “This has given me a solid foundation to move forward with initiatives to increase BPA’s value to its customers and constituents, and to contribute to the economic and natural resource health of the Northwest.”

Soon she announced a subscription proposal with contract lengths ranging from three to 10 years. BPA offered something for everyone. The agency figured it had

about 6,300 megawatts of power to sell from the federal system and estimated that preference customers might take as much as 5,500 megawatts. Residential and small-farm customers of IOUs would be eligible for 1,000 average megawatts of power and another 500 average megawatts of either power or the financial equivalent. Direct-service industries could also purchase power, but the amount would depend on how much others claimed first. Johansen explained that the proposal was “the result of balancing many interests and complexities.”

But the complexities would soon multiply.

## The market swings back in BPA’s favor

As the millennium dawned, good water years in 1999 and 2000 made for good fiscal years. Market prices increased. BPA’s reserves approached \$1 billion. BPA considered offering its traditional 20-year contracts under the subscription process, but amid the uncertainty of deregulation decided instead to offer preference and IOU customers 10-year



contracts and DSIs five-year contracts. Johansen planned for BPA to hold rates for preference customers near flat from 2002-2006 to remain competitive.

BPA opened the door for customers to sign subscription contracts in the spring of 2000, setting a deadline of September. Preference customers would get the bulk of the power from the federal system, but IOUs and DSIs had both pressed for shares and received attractive offers too. The agency offered 1,000 average megawatts for residential and small-farm customers of IOUs, plus cash payments equal to another 900 megawatts, double the rate benefits they had received over the previous five years. BPA offered another 1,500 megawatts to DSIs. Subscription contracts included a cost-recovery adjustment clause allowing BPA to raise rates if its costs went up more than projected, or distribute a “dividend” back to customers if BPA over-collected.

The contracts would also provide some security against political maneuvering in Washington, D.C., Johansen said. However, IOUs argued that they locked in benefits for public utilities for too long.

Beyond the favorable terms, what soon made the offers enticing was a sudden volatility in market prices emanating from

power shortages in California. BPA appeared a safe haven from the market, and customers wanted even more power than it had offered. Most sought 10-year contracts.

At first, it seemed doable. BPA had been buying some additional power and prepared to acquire another 1,700 megawatts to meet the additional demand at a cost of \$28 a megawatt-hour. Selling more power than the federal system could generate departed from the direction set by the Comprehensive Review only a few years before. It would put BPA back in the business of acquiring energy. But customers wanted it. So BPA proceeded with its rate filing in May 2000, committing to the terms.

“We wanted to create some certainty for the agency with these 10-year contracts,” Johansen recalled years later. “Based on what everyone was thinking about loads and resources and rates it made sense to seek stability in terms of revenue and obligations. And it was just turned upside down by the energy crisis.”

Suddenly the reasonable cost estimates BPA had counted on vanished. Electricity prices that had been in the \$20 to \$40 per megawatt-hour range shot up to \$80, \$90, even into the thousands of dollars per megawatt-hour at times. Suddenly it was much tougher to find extra power at affordable



prices. BPA suspended signing contracts while it conferred with customers and in September announced it would re-open its rate case to account for the unforeseen costs. Soon customers that had fled BPA just a few years earlier were desperate to return. The political and public relations pressure mounted by customers to get BPA to take on more load was intense. When the dust settled at the end of October 2000, subscription sales added up to 9,082 megawatts, requiring 3,307 more megawatts of electricity than BPA had to sell.

And the only place to get it was an energy market gone mad.







*Evolution of a partnership ~*

# BPA *and the* TRIBES of the PACIFIC NORTHWEST

The Indian drum talked to the U.S. dam for 50 hours.

It was a long, grave conversation, an expression of grief, of loss beyond words. It was very overdue and there was a lot to cover. Fifty years in 50 hours.

Some of the 100 people of the river who came to Bonneville Dam to beat the big drum over those two days in August 1987 told their family stories on TV and in articles published as far away as The New York Times. Some wept as they tried to explain what the ancient communities along the Columbia River lost to the federal dams.

Meanwhile, the Bonneville Power Administration's long-planned birthday celebration was just hours away, with more than 1,000 guests expected at the same site. Its theme: "Power at cost." The demonstration at its doorstep asked: "At cost to who?"



*Levi George (center), who served on the Yakama Nation Tribal Council for two decades and became tribal chairman in 1989, took part in the drumming demonstration at Bonneville Dam, then attended BPA's 50<sup>th</sup> party with leaders from across the region.*





*Wasco Chief Nelson Wallulatum, who served for 50 years on the council of the Confederated Tribes of the Warm Springs Reservation of Oregon, at BPA's 50<sup>th</sup> anniversary celebration at Bonneville Dam in August 1987.*

The moon came up. As people napped in a tepee and awakened to drum on through the night, something larger was awakening. The tribes' message was finally beginning to resonate within the powerful federal agencies.

To the surprise of some, the demonstration at the dam was set in motion by Roy Sampsel.



*As this image from a local TV report shows, nearly 100 tribal members and others took turns drumming for 50 hours leading up to BPA's 50th anniversary party at Bonneville Dam to draw attention to the damage wrought by the construction of the dams on the Columbia River system.*

A towering man of Choctaw and Wyandotte heritage, Sampsel had both physical and political stature. He had served in three Republican administrations — Nixon, Bush Sr. and Reagan — including under Interior Secretary Don Hodel, a former BPA administrator. Sampsel also had long-standing ties to both of Oregon's Republican senators, Mark Hatfield and Robert Packwood.

If The New York Times article that day called him "an American Indian activist," the dignified Sampsel was anything but. He'd been among the Interior Department negotiators during the 1969-71 American



*Tim Wapato, executive director of the Columbia River Inter-Tribal Fish Commission, told the audience at BPA's 50<sup>th</sup> that "the verdict isn't in" on whether the agency was fulfilling its responsibilities to the tribes.*

Indian Movement takeover at Alcatraz Island.

That someone with his governmental background would organize a public demonstration spoke volumes about the seriousness of the tribes' message. The event he designed was carefully calibrated to make the maximum impression while giving the minimum disrespect.

"It was done not to disrupt," Sampsel says today, "but to recognize."

Recognition was dawning. However slow-footed the pace of change seemed to the tribes, the U.S. agencies that managed the dams were now clearly listening. In other times, there might have





*Darrell Eastman, former BPA Tribal Relations manager (center) helps lead a 2004 tribal economic development conference sponsored by BPA and the Bureau of Indian Affairs in Pendleton, Ore., with BPA tribal account executive Bob Shank, left, and John Barkley of the Confederated Tribes of the Umatilla Indian Reservation, right.*

been arrests, but the drumming was handled respectfully, allowed to move on uninterrupted from the visitor center across the dam to the Washington shore.

Newspaper accounts described a “funeral” drum. As BPA’s 50<sup>th</sup> party drew nigh, however, the big drum began to tell another thread of the story. It was all about hope and resilience, hope the beleaguered

fish runs would yet be renewed, not lost forever; hope that governments, including tribal sovereigns, could still learn to consult and coordinate as equals for the benefit of the river.

Finally, before the first guests arrived for BPA’s birthday, the drum finished its song and fell silent. Many of the tribal leaders changed clothes, shifted cultural gears and walked across the dam’s spillway to join Sen. Hatfield and other dignitaries at the BPA and Army Corps of Engineers’ celebration. Prominent among them were Wasco Chief Nelson Wallulatum; Tim Wapato, the Columbia River Inter-Tribal Fish Commission executive director; and Yakama leader Levi George.

The late 1970s and 1980s were an era of reckoning in BPA’s relationship with the Columbia River tribes. It was a time when the agency, encouraged by the Northwest Power Act, began to actively develop its relationships with the tribes. Early steps came under Administrator Hodel, who hired Wyman Babby as BPA’s first tribal adviser and oversaw BPA funding to establish the Columbia River Inter-Tribal Fish Commission in 1977.



*In 1997, Nez Perce tribal members regained 10,300 acres in Northeast Oregon called Hetes’wits Wetes, or Precious Land. The tribe is managing the land, purchased with funding from BPA, as a wildlife preserve. (Associated Press)*

Meeting in a government-to-government structure and recognizing a joint responsibility for co-management of the river was a big start. But BPA, no longer under the Department of the Interior but part of the new Department of Energy, still had to figure out how to perform its unaccustomed role.

“Integration and acceptance of the new relationship were not immediate,” Sampsel says. “It hadn’t been part of who they [BPA] were. And how do you make



that fit with your culture and sense of responsibility in your agency? What is meant by having this new responsibility? How do you talk to tribes? What is consultation and how does it work?”

To understand and build functional relationships with the tribes would take BPA decades. Milestones along the way were the development, under tribal liaison John Smith, of the first tribal policy in 1996, formalizing government-to-government relations with individual tribes in the region, and the signing of the landmark Columbia Basin Fish Accords with tribes and states in 2008.

“We went in as adversaries, as litigators, and we came away with a new partnership, with a different vision,” said Ron Suppah, chairman of the Confederated Tribes of the Warm Springs Reservation.

“These Accords move the focus away from gavel-to-gavel management and toward gravel-to-gravel management,” said Administrator Steve Wright.

BPA has strengthened its relationships with tribes such as the Nez Perce, who did not sign the Accords, too, as bilateral contracts define and propel cooperation on significant projects.



*Members of the Nez Perce Tribe ride Appaloosas across part of their ancestral homelands near Oregon's Wallowa Valley during ceremonies in June 1997 following the tribe's purchase of 10,300 acres with funding from BPA. (The Spokesman-Review)*

“People who were at war, literally, are now working on these massive projects together, working on healing rivers and helping enjoy the fruits of a river economy,” said John Platt, special adviser to the executive director of the Columbia River Inter-Tribal Fish Commission.

BPA's efforts extend well beyond its array of fish and wildlife projects across the region. The agency has also assisted tribes with energy programs, education and land acquisition. Many are practical actions aimed at daily life in Indian Country, whether making homes more economical to heat,

sending students to college or providing fish and wildlife jobs on the reservation. Among the successes:

- **Nez Perce land acquisition:** In 1997, the Nez Perce purchased 10,300 acres in the heart of their ancestral territory near northeast Oregon's Wallowa Valley with funding from BPA. The Nez Perce manage Chief Joseph Ranch as wildlife habitat, helping fulfill BPA's obligation to mitigate the impacts of federal dams. Newspapers as far away as St. Petersburg, Russia, covered the tribe's ceremonial return. “We always called this home,”



Jeannie Redthunder Moon, great-great-granddaughter of Chief Joseph, told the Spokesman-Review.



*An all Native American line crew from Yakama Power replaces a damaged power line in June 2011 with a truck on loan from BPA. The Yakama Nation formed its own utility, with assistance from BPA, and began purchasing power to serve members near Toppenish, Wash., in 2009. (Yakama Power)*

- **Tribal utilities:** The Yakama Nation formed its own hydroelectric utility, with assistance from BPA, and began purchasing power in 2009, achieving direct control and lower rates. Yakama Power supplies electricity to its government offices, casino, sawmill, senior housing project and Indian Health Services, west of Toppenish, Wash. Another BPA tribal customer utility is the Cow Creek Band of Umpqua Tribe of Indians.
- **Tribally managed utility:** BPA has partnered with the Confederated Salish and Kootenai Tribes for 25 years and supplies 80 percent of the electricity used by Mission Valley Power, based in Pablo, Mont. The federally owned nonprofit electric utility, which is managed by the tribes and had 2011 revenues of \$22.36 million, prides itself on providing reliable and safe power delivery at a cost-effective price. Mission Valley Power serves about 12,000 customers (19,000 electric meters) with some of the lowest rates in the region. It operates a highly regarded energy efficiency program in partnership with BPA. More than 75 percent of its 80-plus employees are tribal members.



*Fawn Metcalf, one of the only certified energy inspectors in Oregon who is a Native American woman, helps families save money and stay healthy through the Siletz Tribal Energy Program, funded in part by BPA.*

- **Energy efficiency:** Energy inspector and auditor Fawn Metcalf of the Confederated Tribes of Siletz Indians in Oregon was trained and certified with funding provided in part by BPA. Since 1999, BPA has set aside funds to improve Native American homes. The current annual budget is \$5 million, with \$500,000 going directly to qualified tribal low-income weatherization programs across the region. Metcalf has assisted Siletz members in



making their homes safer, more comfortable and less expensive to heat.

- **Education support:** Among those who have received BPA scholarships are 16 Native American students who graduated from Eastern Washington University between 2001 and 2011. These graduates represent Colville, Yakama, Spokane, Couer d'Alene and Nez Perce heritage.
- **Intergovernmental exchange:** BPA participates in personnel exchanges with regional tribes to build expertise to guide their energy futures. In mid-2012, two tribal members were serving in multiyear assignments at BPA with their salaries paid by their respective tribes, learning skills to take back to their utilities. Pi-Ta Pitt of the Confederated Tribes of the Warm Springs Reservation, an economics graduate of Columbia University, said he felt blessed to have had three years of experience at BPA. He foresees benefits to both BPA and the tribes: "Bridges being built, wounds being mended."

In the second decade of the 21<sup>st</sup> century, Roy Sampsel moves with grace and acuity as an elder statesman. An in-demand mentor



*BPA Deputy Administrator Bill Drummond, right, and Daniel Howlett, tribal energy coordinator for the Confederated Salish and Kootenai Tribes, took part in an April 2012 tour of Kerr Dam and a ceremony at tribal headquarters in Pablo, Mont. The events celebrated an agreement sending Howlett to BPA on an intergovernmental exchange for two years of training in preparation for the tribe's purchase of Kerr Dam in 2015. (Buzz Cobell/BPA)*

and adviser, his smart phone rings nonstop, with calls from Washington state to Washington, D.C. He serves as executive director of the Institute for Tribal Government in the Hatfield School of Government at Portland State University, his alma mater. Lately, that has meant being deeply involved in getting a Northwest tribal energy consortium off the ground.

He thinks back to the demonstration at BPA's 50<sup>th</sup> anniversary and the changes that have come to the river and those who steward it. The fish are coming back, the new fishing spots gradually gaining their own traditions.

He points out that the tribes played an active part in BPA's 75<sup>th</sup> celebration, and reflects on a quarter century's hard-won progress.

"We're operating differently now because we're operating more correctly," he says. "The 75<sup>th</sup> is a snapshot of where we are, but also a reflection of where we want to go. It doesn't have to be specific as long as it is founded on respect, humility and recognition of the sovereignty of the tribes."



5

# The Power to Pull Together

**SURVIVING THE WEST COAST ENERGY CRISIS**





Steve Wright was scared. Sitting in the Renaissance Denver Hotel at an urgent meeting of governors from across the West on Dec. 20, 2000, he sketched numbers on the back of a napkin. Electricity prices were out of control. The napkin showed that the financial reserves BPA had so carefully tended over the previous decade could evaporate inside a month. BPA could go broke. Who knew what would happen then.

About a month earlier, on Nov. 17, Wright had been appointed acting administrator upon Judi Johansen's departure. He had once imagined a career in sportswriting, but turned to public service instead. He had spent his career at BPA, starting as a GS-9 in the fledgling conservation program in 1981 with a new master's degree in public affairs from the University of Oregon. He soon gained a deep respect for BPA's role in the Northwest and the value of the Columbia River and its hydroelectric system. He moved to BPA's Washington, D.C., office in 1984 and then ran its California office for three years. In 1990 he returned to lead the D.C. office, learning from political leaders including Mark Hatfield. He headed back to Portland in 1998 as corporate senior vice president and, briefly, deputy administrator.



*Utah Gov. Mike Leavitt (far left) questions Energy Secretary Bill Richardson (standing) during an emergency meeting of the Western Governors' Association in Denver to discuss the power crisis affecting the West. Also pictured, from left: Colorado Gov. Bill Owens, Jim Souby of the Western Governors' Association, Wyoming Gov. Jim Geringer and Oregon Gov. John Kitzhaber. (The Denver Post)*

"I was so fortunate to have Steve Wright in the D.C. office," says Johansen, who went from BPA to PacifiCorp and later became president of Marylhurst College. "He was a smart, savvy, strategic thinker."

Wright had political support from his time in D.C., but no one knew how long he would keep the top job at BPA. The contested 2000 election had just been settled in favor of George W. Bush, so a new administration





*Steve Wright took over as acting BPA administrator in 2000, just as western power markets veered toward an unprecedented crisis. Former administrators look out from portraits on the wall. (Portland Business Journal)*

would soon take over and could well install someone else.

In typical times, an acting administrator fills a kind of placeholder position, keeping the ship running pending a permanent choice. Bill Richardson, the secretary of energy, had said as much when selecting Wright: “Steve’s

experience will help him guide BPA until a permanent administrator is named.” But the fall and winter of 2000 were about as far from typical as the energy world has ever been.

Wholesale electricity prices that had rarely surpassed \$30 a megawatt-hour in recent years had over the past few months spiraled

well beyond \$1,000, even close to \$2,000 at times. Nobody knew how high they would go or what exactly was driving them. California was locked in drought. Only two weeks earlier the California Independent System Operator, which manages most of the state’s grid, had declared a Stage 3 power alert, signaling that it was running short of electricity and rolling blackouts were imminent. BPA had been trying to help by feeding power south. But now the Northwest winter was looking like a dry one that could shrink the region’s own energy supply at the very time it was needed most.

Wright vividly remembers the 2000 Denver meeting with the governors, the secretary of energy, the chairman of the Federal Energy Regulatory Commission and utilities from around the West. “I’m going to be honest,” he recalls. “I was scared.”

“Here I am at the big table representing Bonneville. And people were talking about how bad can this get? And I hadn’t really thought that through, so I was drawing some numbers on the back of a napkin and I concluded that with the numbers that I knew about — what we were showing as a deficit for January and what the prices could be — that we could lose a billion dollars in the month. And I remember saying that in the meeting, that we’re at risk of losing a billion dollars or more in the month.



It was a way of saying, 'This is a big problem. This is not a little problem. This is a really big problem.'

"Being in that situation the issue was, just do something. Don't just sit there and take it. So what if you are the acting administrator? You are in charge, so do something."

What he and BPA would do in the coming months would test the Northwest's resolve to pull together in an unprecedented crisis. Only a few years before, in the Comprehensive Review, the region had concluded that BPA should limit itself to little more than selling power from the federal system. Now utilities

**"Being in that situation the issue was, just do something. Don't just sit there and take it. So what if you are the acting administrator? You are in charge, so do something."**

Steve Wright

clamored for BPA to provide far more power than it had by purchasing it at skyrocketing prices that could bankrupt the agency. The region's livelihood and BPA's future — and by association the future of the power system — would depend on using the affordable power of the Columbia River as carefully and as wisely as possible.

"We had started to realize that the market was shifting. All of a sudden people were giving us notice they wanted power from us," Johansen recalls of the few years before she left BPA for PacifiCorp. "Almost overnight everyone was going to come flocking back to Bonneville." In her two years leading BPA she became known for her candid approach to difficult issues and for engaging with employees at all levels, even taking the controls of a backhoe during a visit to a substation. Johansen remembers prices hitting \$1,000 a megawatt-hour the day she arrived for her new job at



*Governors, from left, Gray Davis of California, Gary Locke of Washington and Kenny Guinn of Nevada listen to energy executives including BPA administrator Steve Wright during a Feb. 2, 2001, meeting of western governors and Bush administration officials in Portland. Several governors called on the administration to cap electricity prices. (John Gress/Getty Images)*

PacifiCorp. "I felt horrible for leaving," she recalls. "I still mentally was with Bonneville."

## Early warning bells

There had been warning signs of what would go down in history as the West Coast Energy Crisis, at least for those who were watching closely. BPA had sounded an alarm more than two years earlier in August 1998, when Johansen had gone before the Northwest Power and Conservation Council to warn that in a dry year with high demand for electricity,





*Spillways stand empty at John Day Dam while available water turns turbines.*

the Northwest could find itself 7,000 average megawatts short, with the federal system alone 3,000 average megawatts short. Since the Comprehensive Review had recommended that BPA not pursue new generation, she asked for help in identifying who should. BPA could not import enough power to make up the difference, she warned. “The BPA administrator didn’t show up at the Council very often, so it got their attention,” she recalls.

Deregulation had disconnected the relatively placid world of retail electricity delivery, with its captive markets and steady

revenues, from electricity generation, now dominated by independent developers fiercely competing on price. “This froze potential investment in new power plants on the West Coast,” Steve Hickok, then BPA’s chief operating officer, recalled in a later speech. “Retail utilities could not know what loads they would have to serve in the future. Merchant power plant developers did not know what their opportunities would be to compete for retail customers.”

The last thing utilities wanted was to sink money into new power plants that might be

undercut on price, so they instead relied on market purchases of electricity. Many, including BPA, dismantled their resource planning departments in a frantic effort to cut costs and remain competitive. At first, market purchases made economic sense, because the West as a whole had a surplus of power.

But economic growth through the 1990s quietly eroded that supply, while a string of good water years masked any need to do much about it. Epic floods hit the Willamette Valley in 1996, and the following years of 1997, 1999 and the first half of 2000 were also wet, keeping the power plentiful.

States embraced deregulation: Montana’s largest power company sold off its generating plants and shifted to the hot field of telecommunications. Utilities stretched their marketing far and wide, with Louisville Gas and Electric setting up shop and offering contracts in Montana. Freewheeling Enron looked to sign up power buyers with deals that were impossible to refuse. “It was almost a Wild West atmosphere as everyone tried to capture the market,” recalls Bill Drummond, then manager of Western Montana Electric Generating and Transmission Cooperative.

But the Council concluded in early 2000 that Johansen’s warning was right. “The utility industry is in a new world compared to





*Freighters back up where the Columbia and Willamette rivers meet in Portland, Ore., as river commerce comes to a standstill because of flooding in February 1996. (Associated Press/Jack Smith)*



*As the power crisis deepened, BPA sought to buy power back from its industrial customers, including the Reynolds Metals Co. plant in Longview, Wash. (Roger Werth/The Daily News)*

what existed just a few years ago," it said. It estimated an almost one in four chance the region would run short of power in the coming winters and could run as much as several thousand average megawatts short in a dry year. The region had become heavily dependent on imported power, the Council said, and new generation would probably not come on line soon enough to avoid shortages.

"Letting the market develop is inherently messy," the Council concluded. "The public is relatively tolerant of power interruptions that can be attributed to acts of God. They may be less tolerant of interruptions that they might

attribute to a failure of trusted institutions to carry out their responsibilities."

## California sparks price explosion

While many states pursued deregulation in hopes of lowering electricity prices for consumers, California was among the most aggressive. Legislation in 1996 created the California Independent System Operator to run most of the state's transmission system. It also encouraged utilities to sell off their

power plants, while still serving retail customers at prescribed rates. Utilities then had to buy electricity on short-term spot markets run by the newly formed California Power Exchange, where competition was expected to hold prices down. At first it worked out; BPA even served as a beta test site for the California pricing systems.

Like the Northwest, California had become dependent on imported electricity. Much of it came from the Northwest on the interties BPA had pioneered. Historically that had worked out well for the Northwest, where power demand ebbed in spring and summer. Surplus power





*Coordinated management of federal dams on the Columbia and Willamette rivers kept the Willamette inches from topping the seawall in downtown Portland, Ore., during the flood of 1996. Locals piled sandbags along the seawall to keep the water back. (AP Photo/Jack Smith)*

## Hydroelectric system protects Portland

The 1990s brought several wet years to the Northwest, but none more memorable than 1996.

Heavy rains saturated the ground across northwest Oregon through the winter, followed by heavy snowfall of several feet a day in parts of the Cascades and Coast Range in January. Freezing temperatures and freezing rain in the Willamette Valley followed. The accumulated ice and snow held many reservoirs worth of water.

Then BPA and National Weather Service meteorologists warned that an unusually strong influx of warm tropical moisture was headed for the region. “Right away we had a signal that we had to start getting the system ready,” recalls Bill Berry, a BPA power scheduler. Berry worked with the Corps of Engineers and the Bureau of Reclamation to prepare for flooding that few in the Willamette Valley would forget.

The tropical surge brought record rainfall to the Willamette Valley and surrounding mountains as warming temperatures melted snow rapidly. The river rose, flooding low-lying areas and

coming within inches of overtopping the seawall in downtown Portland. The role of Corps of Engineers dams in reducing flood risk on the Willamette and Columbia became clear.

Water managers from the Corps and Bureau in coordination with BPA had cleared space behind Grand Coulee Dam in previous days and then cut back flows. BPA marketers made more than 100 purchases of replacement power within six hours to make up for the reduced generation. That helped ensure that all the water headed down the Willamette could make it into the Columbia without backing up into Portland. “Everything that could be regulated upstream had been reduced to a minimum,” Berry recalls. “There was only so much room to hold water back, so the timing had to be just right.”

The events demonstrated the benefit of flood control operations, regional collaboration and assistance from Canada in managing flows at a critical time.

from high river flows that time of year flowed south to California, where air conditioning loads drove high summer demand. California in turn sent power north in winter, when Northwest demand peaked.

But early in the summer of 2000, the Northwest runoff the West Coast had counted on began to ebb. BPA began purchasing power to meet Northwest demand as hydroelectric generation dropped. Fish managers had to choose between refilling Lake Roosevelt behind Grand Coulee Dam to provide water for fish later in the year and maintaining flows for young salmon on their way to the ocean; there wasn't enough for both.

At the same time high temperatures and a booming economy in California, which was already much deeper in drought, helped expose a shortage of generation mirroring what BPA and the Council had foreseen in the Northwest. As temperatures in San Francisco hit 103 degrees in June, California power demand reached an all-time high and utilities in the Bay Area cut power to nearly 100,000 customers through rolling blackouts. Record-high natural gas prices drove up the cost of what electricity was available, since California depended heavily on gas generation. Californians spent more than \$1 billion on electricity in one week, an amount that would





have paid for a month's worth of electricity or more the year before.

The high prices rapidly overlapped into other western states. "Northwest markets are sailing at warp speed into uncharted territory," BPA's internal newsletter told employees in June. Electricity costs surpassed \$1,000 a megawatt-hour. Manufacturing companies began curtailing operations: Kaiser Aluminum & Chemical Corp. suspended production at smelters in Washington, and Louisiana-Pacific's

Missoula particle board plant shut down after its contract for inexpensive power from Enron expired. BPA turned down new requests for power to help keep industries such as a Butte, Mont., copper smelter running, explaining the Northwest Power Act no longer allowed it to supply new direct-service customers.

## Crisis spreads northwest

Northwest power supplies had grown so tight that when Columbia Generating Station went off line in June 2000, BPA declared a power emergency and briefly reduced spill for salmon to avoid outages. Later in the summer, after the nuclear plant reduced its output, BPA instructed traders to buy power at any price to keep spill going. When they couldn't, BPA reduced spill over one night in August to eke out another 210 megawatts to keep Northwest lights on. As more power emergencies struck in California, Johansen, in her final months at BPA, cautioned that BPA would limit spill to send power south only if it was an issue of human health and safety, noting that the Northwest might need the favor returned that winter. In September, the California ISO publicly thanked BPA for helping the state narrowly avoid rolling blackouts.



*Traffic backs up in San Francisco on Jan. 18, 2001, as rolling blackouts cut power to traffic signals. Nearly 2 million homes and businesses from Bakersfield to the Oregon line lost power in California's second day of rolling blackouts. (AP Photo/Jakub Mosur)*





*A law student at the University of California Hastings College of the Law in San Francisco is helped from an elevator stuck between floors during a rolling blackout that cut off power to hundreds of thousands on Jan. 17, 2001. (AP Photo/Jakub Mosur)*

Following word of her departure from BPA, Johansen implored the region at a November press conference “to rally around Bonneville and Steve Wright to preserve what we have.” Secretary of Energy Bill Richardson praised Johansen as “an outstanding leader during a very interesting and hectic time in the energy industry. In the face of many challenges — ranging from industry deregulation to a chaotic energy market — she guided the Bonneville Power Administration to financial stability,

helped forge a unified Northwest fish and wildlife plan and forwarded conservation and renewable resources.”

Suddenly Wright was in the spotlight. “This is the most horrendous time to take over as administrator of BPA,” U.S. Rep. Peter DeFazio said in a newspaper profile of Wright. Sen. Mark Hatfield, by then retired from office, noted that he had learned from and depended on Wright. “I never saw him agitated,” Hatfield said. “He was always very calm, very cool.”



*Water surges through spillways at McNary Dam. BPA reduced spill at some dams to generate power when traders could not purchase enough power to meet demand.*

That was fortunate. Because the chaos in the energy market was far from over.

By December, California authorities lifted electricity price caps so they could offer more for what little was available. But some power producers refused to sell power to California because of the debt its utilities had racked up trying to keep energy flowing. Energy Secretary Richardson invoked the Federal Power Act and ordered generators to sell power to California at reasonable prices. BPA sent electricity south during peak hours in the form of energy exchanges where California sent twice as many



megawatt-hours back in off hours, allowing BPA to reduce hydroelectric generation at night and store water for the following day when demand was highest.

## Winter snow doesn't show

Average prices rose into the many hundreds of dollars per megawatt-hour. "Day after day, people were saying, how long can this keep going on?" recalls Steve Oliver, who was then managing BPA's bulk marketing section.

But a harder reality set in at BPA with the chill of winter: The usually abundant Northwest snowpack was going missing at the worst possible time. Snowpack during the winter of 2000 to 2001 amounted to only around half the historical average, cutting runoff to nearly the lowest on record and reducing hydroelectric power capacity by some 6,000 average megawatts. And the seasonal electrical symbiosis the Northwest and California had enjoyed for so long vanished, with surprisingly little California energy available to the Northwest for its peak heating season. "It had always worked out," recalls Greg Delwiche, then vice president of power supply. "Then all of a sudden, it wasn't there."



*Low water exposes wide shorelines along the Columbia River.*

Many California power plants curiously went out of service, again at the worst possible time, causing blackouts even when power demand was not especially high. Runoff projections dropped almost as fast as prices rose.

"No matter how much power we tried to buy, the amount of inventory seemed to just go down by the amount we bought," Delwiche recalls. He remembers power prices hitting

\$750. "That would be like gasoline prices going up 300-fold." He and Steve Wright told other federal executives in mid-January that BPA faced a 1,000 megawatt deficit in power generation for the following week. They committed to spend up to \$10 million a day, or \$50 million for the week, buying enough power to avoid tapping into water intended for spring fish flows. That same day, a Wednesday,



BPA spent more than \$10 million on power. Spending topped \$10 million Thursday, too, and the \$50 million ran out by Saturday as prices hit \$450 per megawatt-hour. BPA declared a temporary power system emergency.

"I don't use the term 'crisis' lightly, but I think we are truly facing an energy crisis on the West Coast," Steve Wright told BPA employees in his first all-employee meeting, days before heading to the Denver meeting with the governors, where he'd sketch telling

**"We were really out on the edge beyond anything anyone had seen before. Everything we model is that markets would react normally. But things were happening that we could never have expected."**

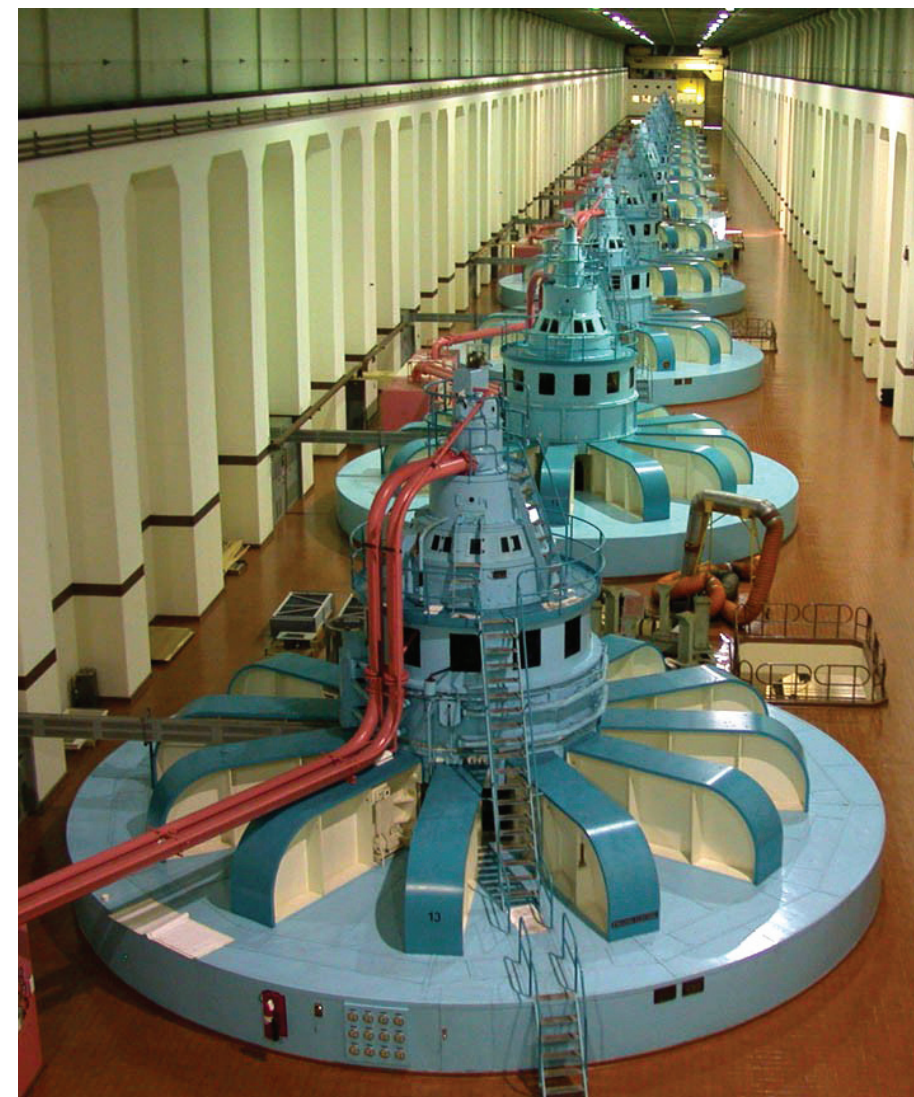
Claudia Andrews

numbers on a napkin. "These are critical moments for BPA."

One dark night that winter Claudia Andrews, then a BPA financial analyst, sat in a headquarters cubicle with fellow financial and risk analysts Byrne Lovell and Juergen Bermejo. They were supposed to model scenarios to assess the financial risk to BPA.

"Juergen said, 'How high do you think prices could go? \$5,000?'" Andrews recalls. "I thought, why is he asking me this? I don't know this. And then it struck me. Nobody knows what could happen. We were really moving into a twilight zone. And that's really what it was, a twilight zone. We were really out on the edge beyond anything anyone had seen before. Everything we model is that markets would react normally. But things were happening that we could never have expected."

They modeled \$5,000 per megawatt-hour and concluded BPA could burn through up to \$2 billion in a month. BPA's reserves totaled about \$800 million. "We didn't know how we were going to pay our bills," Andrews says. Jim Curtis, then chief financial officer, thought BPA could run out of money and began considering which creditors would get paid first. What would happen if BPA ran short of money to buy enough power to supply the



Northwest? Some power producers were already declining to sell to California utilities that were on the verge of financial collapse. At times power was not available at any price.

"It was hard for people outside BPA to see how dire things looked," Delwiche recalls.



## Shrinking water and power

As demands increased on the Columbia River's shrinking volume, fish also had a higher priority than ever. A new biological opinion adopted in 2000 to govern operation of the hydroelectric system included a greater commitment of increased flows and spill to help juvenile fish heading to the ocean. BPA officials had recognized that the spill could limit power generation at critical times. As a last resort, the biological opinion allowed BPA to declare a power system emergency and reduce spill in extreme conditions if necessary to avoid power outages. As available water and power shrank, the new commitment to fish became increasingly tough. And unimaginably expensive.

The Northwest had to pull together to help safeguard the value of the Columbia River system, Wright told employees. "We in the Northwest tend to be parochial and focus on allocating the benefits among ourselves. That's okay when there's no outside threat. But now there is. We need to position ourselves as aligned in the region and not expose ourselves to threats from outside."

He and others at BPA were determined to do something, but saw few good options.



*Washington Gov. Gary Locke, at microphone, flanked by business and energy leaders including BPA Administrator Steve Wright, far right, announces actions to address power shortages March 2001 in Tacoma, Wash. (Associated Press/Lauren McFalls)*

FERC declined to impose price caps on electricity. BPA could do little but raise questions — which the agency did — about the many California power plants strangely out of service. "What we could do was, we could address our supply and demand," Wright recalled. "The things we could control were to increase supply from our generation and decrease demand on our system."

BPA and the region did both. Northwest governors asked everyone to cut power use by 10 percent. Rising prices underscored

the pitch: Tacoma City Light proposed an 86 percent surcharge on residential customers through September 2001 to cover the costs of market power. "If we don't stretch, if we don't try, we run the risk of having to buy more electricity" at exorbitant prices, said Washington Gov. Gary Locke, "raising utility rates for everyone." Conservation helped cut regional demand by 835 megawatts during the first big winter storm. BPA, usually conservative on advertising, bought ads in major Northwest newspapers to publish a joint letter from Locke,





*Kaiser Aluminum plant near Spokane, Wash., with BPA's Bell Substation in the foreground.*

Oregon Gov. John Kitzhaber and Wright urging citizens to use energy wisely.

BPA told its own employees in December, “Give the region a gift and save some watts over the holidays.” The agency increased incentives for others to save, offering to pay farmers for electricity they would otherwise use to power their irrigation pumps.

The next major step to address skyrocketing prices reduced demand and boosted supply, but was more controversial: BPA began buying power back from aluminum smelters — the direct-service industries it had been so anxious to keep as customers a few years before. The move revealed how much

the energy world had changed since the early 1990s, when BPA power costs outpaced the market and sales to DSIs were central to the agency’s survival. Now that extra load was an enormous liability.

## Prices force DSIs off market power

Many DSIs had already halted operations except those that relied on less expensive BPA power. When Alcoa merged with Reynolds Aluminum, it shifted BPA power from a Reynolds plant in Troutdale, Ore., to an Alcoa

plant and laid off 525 workers in Troutdale. Later BPA struck a deal with Alcoa to pay the company to cut its power consumption, saving BPA the high cost of acquiring the power, but still benefiting the company and avoiding further layoffs. The company also shifted some of its power use to lower-demand spring months.

Three DSIs had an even better deal through contracts signed in 1995: They could choose to close their plants and resell their BPA power at market rates, keeping the proceeds. They got the flexibility in exchange for committing to buy BPA power at a time when it seemed pricey; now the BPA power itself was a valuable commodity. BPA pushed the companies to keep paychecks flowing to their employees even if their power wasn’t. Many such as Columbia Falls Aluminum Co. in Montana did that. So did Golden Northwest Aluminum, which provided 25 percent of resale proceeds back to BPA.

A glaring contrast was Kaiser Aluminum, which closed its Mead, Wash., smelter near Spokane and laid off more than 500 workers while selling its \$23 per megawatt-hour power back to BPA for about \$500 per megawatt-hour in December and \$280 in January. The company pocketed the proceeds, recording its first profit in many quarters, but refused to share it with employees or the region. Kaiser



“At first I felt our fortunes are at the whim of nature. Then, I realized there are things we can do to make a difference. And that’s what we’re doing – taking actions to try to control our destiny.”

Steve Wright

stood to gain \$500 million from power resales through the end of its contract in September 2001, which several members of Congress called a “fleecing of America” in a letter to the secretary of energy.

BPA’s discussions with DSIs were “incredibly difficult,” Steve Wright told employees. BPA’s own “cash management problem is severe,” he warned. “At first I felt our fortunes are at the whim of nature. Then, I realized there are things we can do to make a difference. And that’s what we’re doing —



*A retail employee in Santa Ana, Calif., works by flashlight as power shortages lead to rolling blackouts. (David McNew/Getty Images)*

taking actions to try to control our destiny.”

By mid-January, BPA had spent about \$130 million to secure more than 800 megawatts of energy through buybacks and power purchases. Still looming was its obligation to find more than 3,000 additional megawatts of power by Oct. 1, 2001, for regional power customers that had rushed back to the BPA fold by signing up for the subscription contracts. Northwest generation would likely be unable to supply that power until at least 2003. BPA had been trying to contract for supplemental power but steadily rising prices made it nearly impossible. In late January, the agency warned the cost of acquiring the additional power would drive wholesale power rates up as much as

90 percent in the first year under the new rates and an average of 60 percent over the next five years.

“The risk posed by the crisis was that we were going to raise rates substantially and still be at risk of missing our Treasury payment and be perceived as not able to cover the costs of the system,” Wright recalls.

Western governors in early February convened what they called an Energy Policy Roundtable at the Hilton in downtown Portland, with four Northwest governors meeting first with state lawmakers to circle the wagons around BPA. They feared anxiety over power supplies could lead other parts of the country to grab for the federal power that had always gone first to the Northwest.





*Energy Secretary Spencer Abraham, left, speaks with Oregon Gov. John Kitzhaber during the Western Governors' Association's Energy Policy Roundtable in February 2001 in Portland. (John Gress/Getty Images)*

"It is an asset that could be seized at any time from outside the region," Washington Gov. Gary Locke said. Oregon Gov. John Kitzhaber and Gene Derfler, president of the Oregon Senate, suggested a Northwest takeover of the agency. "We are determined to stick together for the Northwest," Montana Senate President Tom Beck said. "We do not want to take any chance of losing the largest power grid in the Northwest to some out-of-state interest."

Hundreds packed into a Hilton ballroom as eight of 11 governors — including Kitzhaber and Locke — called for price controls on wholesale electricity. But Spencer Abraham,

the new secretary of energy, and Curt Hebert Jr., the newly appointed chairman of the Federal Energy Regulatory Commission, both cautioned against price caps, with Hebert noting that federal utilities such as BPA would not have to comply with them. Wright surprised the crowd by offering that BPA would voluntarily comply with caps, but federal authorities did not move forward with them.

That same day, the Northwest Power Pool warned that electricity supplies would teeter on a "razor's edge" through the winter. Newspapers cited the potential for rolling Northwest blackouts like the ones in California.

## Getting through the here and now

In late February 2001, BPA executives threw their long-term strategic planning agenda out the window and considered how to survive the immediate future. Power market prices had multiplied nearly 100-fold at times. BPA had already accelerated a \$200-million program of financing and discounts for conservation or renewable energy initiatives that looked far cheaper than buying more power on the market. A new preliminary rate settlement would adjust rates every six months based on how much electricity customers used and how much it cost. The only hope was to be as self-sufficient as possible.

"We have to get out of this market," Wright told the group.

By March, BPA had spent \$1 billion in the first six months of the fiscal year buying electricity to keep the region going and water flowing for fish. And neither the prices nor the emerging drought — by now the year was the second-driest on record — showed any signs of easing.

Temporary emergencies had led to small reductions in the spill of water for salmon before, such as when the 1996 West Coast blackout shut down the interties. But the power





*Specially designed U.S. Army Corps of Engineers barges transported young salmon and steelhead downriver past dams as the drought and emergency cutbacks in spill made river conditions treacherous for fish. (Above: U.S. Army Corps of Engineers; right: Natalie Fobes/Corbis)*



crisis represented a new degree of emergency. BPA could not consistently buy enough power to free up water for fish without risking power shortages. Any natural bailout in the form of precipitation seemed increasingly unlikely. Rolling blackouts had become regular events in California and, while helping California was a goal, the Northwest feared it would face them next.

That drove federal agencies to what Wright now says was the toughest call of the crisis: curtailing spill for fish to generate enough power for the Northwest and California. From the perspective of the power system it was the right choice, he believes. Some thought that low river conditions were so poor for young fish that more would survive on transport barges. But the move jeopardized relationships with

tribes and environmental groups just as federal agencies hoped the new biological opinion set a new and more cooperative way forward.

“Salmon did not create the current crisis and the Columbia River cannot continue to be run on their backs,” Antone Minthorn, chair of the Confederated Tribes of the Umatilla Reservation, told a meeting of the Western Governors’ Association.

Reductions in spill were small and occasional at first — a few percent over a few hours. But by February 2001, Lake Roosevelt behind Grand Coulee was dropping toward empty and other reservoirs were falling as the region tapped them for power and fish needs. With the sparse snow, they probably would not refill enough to provide full spill and flow for fish through summer. Not to mention power generation.

## Little water to spill

Federal agencies outlined principles for invoking emergency operations in the Columbia River system to keep the region from running out of power. Part of the calculation was that if BPA ran out of money to buy power or fund other critical programs, it might find itself unable to afford to keep the lights on. The biological opinion allowed for emergency action when public safety was at stake, such as when outages threatened.

Agency leaders tried to make the point that the drought would make the year rough for salmon and people regardless of spill. Federal agencies held public and individual meetings with states and tribes to discuss the circumstances and consider alternatives. BPA spent \$2.1 million





*Docks wait for Franklin D. Roosevelt Lake behind Grand Coulee Dam to rise in April 2001, following an extraordinarily dry winter. Low reservoirs left limited water to generate electricity at the dam, the largest power producer in the Northwest. (David McNew/Getty Images)*

buying power to allow for 12 hours of spill at Bonneville Dam over three nights to boost young fish from Spring Creek Hatchery, an important contributor to tribal fisheries.

But when the runoff forecast fell further, on April 3 BPA declared a power system emergency, limiting spill to about 15 percent of normal at key dams and times. “The fact is that we have VERY limited flexibility with

the amount of water at our disposal and the amount of money for energy purchases,” Delwiche wrote to his staff. “This is all about risk management, and the fish benefits of spill now are small relative to the reliability and financial risks.”

He thanked the staff for working tirelessly through the winter to keep power flowing in some of the toughest conditions ever, but also

cautioned of “formidable challenges and difficult decisions ahead.” With little spill likely, he said, “the media coverage may not be pleasant.” But keeping the lights on is a human safety issue, “and the reliability of the Northwest power supply is currently on shaky ground.”

At a public meeting with state and tribal officials in mid-April, Wright said he had little choice but to continue the declaration of a power system emergency. Spilling water for salmon would put the region’s electricity supply at too much risk. Donna Darm, acting regional director of the National Marine Fisheries Service, agreed. “If we spill water now and are wrong about the forecast, we risk rolling blackouts this summer,” she said. But tribal leaders predicted dismal consequences for fish. Wright woke up the next day to a front page headline in *The Oregonian*: “BPA again puts power before fish.”

By summer, all but one of the threatened or endangered species of salmon and steelhead were downriver and the Northwest Power and Conservation Council (then called the Northwest Power Planning Council) told BPA that reliability of the power system should come before spill. Federal agencies then decided not to provide spill through most of the summer and added another \$20 million in emergency mitigation projects to help offset



the impacts. While some argued that BPA should raise rates to buy additional power and free up more water for spill, Wright said the decision was based not on money but on maintaining the reliability of a power system that was stretched to its limit.

“I never felt good about going to zero spill,” Delwiche says. “Gradually for a decade we had been increasing spill. Suddenly we went to zero. All that contributed to skepticism about our commitment to the BiOp [Biological Opinion]. It was a tough position. I remember feeling that we really didn’t have good choices.” Lorri Bodi, a longtime fish advocate who had joined BPA as a senior policy advisor on fish issues a year before, said that although BPA had exhausted its alternatives before cutting back spill, “no one trusted us. There was huge suspicion. We never dug out of that hole.”

## The make or break moment

The region got a clearer picture of how bleak the outlook was when reporters and television cameras gathered for a press conference at BPA headquarters on April 9, 2001. It was probably the biggest crowd of reporters a BPA administrator, acting or otherwise, had faced



*BPA transmission lines carry power from Grand Coulee Dam, one of the largest power plants in the nation, throughout the Northwest and beyond. (David McNew/Getty Images)*

since Peter T. Johnson’s decisions on nuclear plant construction. Wright told the Northwest that the situation was even worse than BPA had warned in January. Runoff projections had fallen to 53 percent of normal. If the region didn’t do something, he said, BPA’s wholesale rates could soar by 250 percent in a year, doubling retail prices.

He sketched a dark picture: businesses closing, job losses, less support for actions to protect wildlife and the environment. And

he said BPA was already worried that, with reservoirs already drawn down and unlikely to recover soon, even less water would be there the following winter.

The region had two options, he said: Do nothing and see what happens. Or immediately cut back its use of the most expensive power in history to make the most of what little the river had to offer. BPA needed commitments within three months to reduce energy use by 2,400 average megawatts.





Administrator Steve Wright urges conservation at a press conference in spring 2001. BPA spokesman Ed Mosey stands on the right.

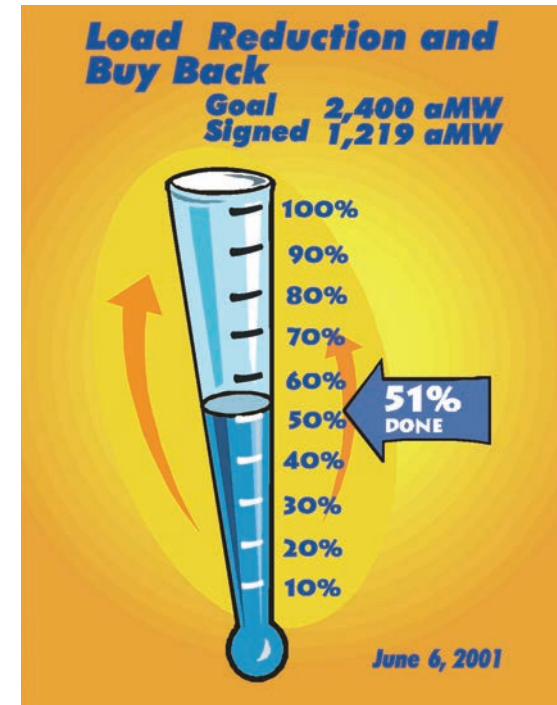
“This needs to happen across all four states, across public and private power, and across all sectors of energy use — industrial, commercial, agricultural and residential,” he said. “It will take all of us working together if we are to avoid severe economic hardships for the region. Let me be clear: What I am about to suggest requires a great deal of sacrifice, but the alternative is to suffer far more serious consequences.”

The press conference was a call to action on four fronts:

- Public preference customers should reduce power purchases from BPA by up to 10 percent.

- Investor-owned utilities should reduce their power benefits under the residential exchange, which had escalated in value by 10 times projections.
- DSIs should agree not to take BPA power for up to the first two years of the rate period.
- Everyone should heed the governors’ call to cut power use by 10 percent.

The Northwest responded like the crew of an off-course ship that finally got its bearings. Many were shocked by the size of the potential rate increase. But they got the point. “This is



Colorful charts illustrated how far the region had come and how far was left to go.

no drill,” The Oregonian said in an editorial the next day. “Consumers can’t afford to ignore the urgency of BPA’s appeal.” The Seattle Times said the prescription “is brutal, but longer term, the picture is not so gloomy. BPA still produces low-cost power that is the envy of the nation. Keeping BPA solvent and paying its Treasury debt is good for ratepayers and fish.”

The four governors called it an “all-or-nothing commitment.” PacifiCorp agreed to a cash



payment to maintain residential exchange benefits instead of BPA power. Clark Public Utilities was the first BPA public customer to cut its take of power under its new contract by 10 percent. Many more, from Pend Oreille in eastern Washington to Idaho Falls, followed. BPA's account executives coaxed utilities to pursue new energy savings.

All the Northwest aluminum producers agreed to reduce power use except Kaiser, which continued to reap the riches of power resales. About 500 worried plant workers from across the region rallied in front of BPA headquarters on May 4 in T-shirts reading, "Wright is Wrong," calling for full worker pay and benefits and demanding an audience with the administrator by chanting, "Come down, Steve."

BPA spokesman Mike Hansen and Wright looked down on the crowd from a window and weighed the options. Wright said, "Let's go." Hansen quietly tried to play the role of a bodyguard, watching the crowd for angry fists or other hazards. But there was none of that. Wright waded through the mob in the headquarters driveway now known as Woody Guthrie Circle, smiled at the T-shirts and spoke with populist energy. BPA was on their side, he reassured them, and was pressing



*Administrator Steve Wright speaks to aluminum workers gathered in protest outside BPA headquarters, many wearing shirts reading, "Wright is Wrong."*

as hard as anyone for their continued pay and benefits.

"Bonneville has been a huge supporter of unions and of the aluminum industry," he said. "We did ask a huge sacrifice of you, but you should not have to walk away bearing all the sacrifices." By the time he finished, Hansen recalls, the crowd was on his side, too.

## Pulling together to conserve

BPA also accelerated conservation through new credits it had planned to introduce in new rates later in 2001, discounting customer bills for every kilowatt-hour saved through a menu of efficiency measures. A new Regional Technical







Forum searched out and analyzed new energy-saving measures; BPA conservation manager John Pynch likened it to the amazon.com of conservation. “Utilities can pick out what they want, put it in their shopping bag, and see what it does for them. The program will calculate the numbers.” Utilities could act locally without waiting for BPA; 41 signed up by June. The program continued through 2005, saving 61.4 average megawatts for \$109 million.

Hansen kept a running count of the conservation commitments on a board by his desk on the seventh floor of BPA headquarters so he could give reporters the latest numbers. Other BPA staff started making regular visits to his cubicle to check. Two weeks before BPA’s deadline to submit rates to FERC, public utilities had contributed just 11 percent of their share of the conservation BPA had called for and private utilities 25 percent. BPA warned that even those deals could unravel if more didn’t participate. It was crunch time, and the future of the region’s power supply — and the economy — hung in the balance.

But on June 29 Wright announced “the absolutely stunning success that we, as a region, have been able to accomplish.” Utilities had ultimately cut their power demand by 2,277 average megawatts for the first six months of 2002, far more than Wright himself

had imagined they could. What got the most attention, though, was the proposed rate increase of 46 percent and, more specifically, how far below the potential 250 percent it turned out to be. The success “should make us all proud to be citizens of the Pacific Northwest,” he said, not to mention better off financially. The lesser rate increase saved ratepayers about \$4 billion a year and avoided the loss of an estimated 25,000 jobs.

“This is a great relief for Washington families, businesses and partners,” said Sen. Maria Cantwell of Washington. Secretary of Energy Spencer Abraham also praised the regional response.

## The bitter aftermath

Just as the Northwest pulled together on conservation and Congress considered legislation to impose price caps, FERC capped the prices of spot-market electricity sales in the Western Interconnection. About the same time California secured long-term power supplies. Suddenly prices collapsed about as fast as or faster than they had taken off.

In the aftermath it also became clear that the new breed of energy marketers — high-flying

companies such as Enron — had been manipulating prices amid the crisis.

“Power is the most volatile commodity in the world,” Hickok said. “You can’t be a little bit short. You will pay anything, anything, to keep the lights on ... On the West Coast, no one built any transmission or generation in the 1990s. There were transmission bottlenecks. This was masked by several years of good water. When the Northwest is wet, the whole West enjoys low prices. So it wasn’t the Enrons that concocted the shortage. They did play the shortage to their maximum advantage. With a system on the edge, they were pushing it over.

“Technically, it’s not illegal for an owner to take a plant off line for maintenance. But why were so many out? Well, if you have five plants, and the system’s short, and you take one out, you can make more money from running the four plants than you could all five. Utilities will pay the moon.”

Another behind-the-scenes triumph helped save the day. The Northwest Power Act had provided BPA with financial credits for fish protection that went beyond mitigation for the power impacts of the dams. They were the same credits Sen. Hatfield had helped BPA gain access to during the deregulation struggles of the 1990s. The credits accumulated in what was called the Fish





*Regional Dialogue meetings in the years following the power crisis drew representatives of BPA's customer utilities to discuss the agency's future role in the region. (PNUCC)*

Cost Contingency Fund, which became part of the agency's risk strategy — a backup for very dry or difficult years such as 2001. BPA earned additional credits from the high prices it paid for power in 2001 to keep water in the river flowing for fish. Accessing the 2001 credits of about \$600 million was critical because they would count toward BPA's Treasury payment, but proved to be a major undertaking amid the uncertainty of a change in administrations.

BPA leaders had been briefing career staff in Washington but the new Bush administration would have to make any decision. In a key turning point, the Treasury Department agreed to accept and apply the fish credits toward BPA's obligation. Finally the administration

Appeals called BPA's buybacks of power from aluminum companies "eminently businesslike." The court said, "We will not second-guess the wisdom of BPA's winning business decisions, especially when it was responding to unprecedented market changes." The court also found that BPA had treated salmon equitably, as the Northwest Power Act required. That ruling, though, did little to reduce the suspicion and skepticism that followed the emergency declarations and cutbacks of spill and fueled litigation over fish protection for years to come.

The profit Kaiser Aluminum reaped from power resales remained a bitter pill: BPA stressed that Kaiser's next contract would eliminate the option, but that mattered little

decided — in BPA's favor. "We were all nervous about that," says Claudia Andrews, who became BPA's chief financial officer in 2012. "We wouldn't have survived in 2001 if we hadn't gotten the \$600 million in fish credits."

The Ninth U.S. Circuit Court of

because the plant never reopened and Kaiser filed for bankruptcy. Other smelters went the same way as the power crisis delivered the knockout punch to DSIs that had watched their profitability eroded by rising power prices and foreign competition for years. McCook Metals bought an Alcoa plant in Longview, Wash., and agreed to sell its power back to BPA through the summer of 2001, figuring it would use the time to modernize the plant while paying workers. But it eventually went bankrupt too.

## The business of the future

The 46 percent rate increase BPA unveiled in June, though smaller than feared, was the largest since the nuclear debacle of the 1980s. BPA and other utilities had locked in power supplies and reductions at prices that, while justified during the power crisis, proved high when prices fell sharply afterwards. That left them like homeowners underwater on houses worth less than they paid. The region's success at conserving power instead of just buying more of it positioned BPA better than many utilities, but 2001 losses still totaled about \$700 million and set off financial struggles that would last through the early 2000s.



Rates ticked down and then back up a few percent through a series of automatic adjustments built into the post-crisis rates. BPA imposed severe cost-cutting amid the recession following the Sept. 11 terrorist attacks. A public lessons-learned report spelled it out: BPA had spent \$3.9 billion on electricity and buy-backs to meet ballooning customer demand plus millions more than expected on fish and wildlife protection and maintenance of the hydroelectric system, while low power prices depressed revenue. Had BPA not declared power emergencies, its costs would have climbed even higher. Secondary revenues from surplus sales also dropped once market prices fell. And then there were bills left unpaid by companies that went bankrupt during the crisis.

“A particularly important finding in the report is that BPA’s culture is one in which we seek to find ways to say ‘yes’ to a variety of requests from our stakeholders while also seeking to avoid rate increases,” Wright wrote to the region. The report concluded BPA had taken too much risk in acquiring energy supplies at a time of extremely volatile markets, just the opposite of what the Comprehensive Review had recommended. It was a signal that BPA could not merely wait in the background during good times and ride to the region’s



rescue during rough times. The region needed to settle on a new 21<sup>st</sup> century business model for BPA, one with the right degree of security and predictability.

The question would form the crux of new Regional Dialogue discussions that sought once and for all to find the right formula for equitably sharing and sustaining the value of the river. The self-reflection that followed also produced a stronger BPA, with a clearer sense of direction and rigor in making decisions, Delwiche said.

“Our commitment to take action across the board — shut down aluminum plants, get publics to reduce their load, increase supply

by reducing spill — they were hard decisions,” Wright reflected years afterward. “But in the end, people looked around and said, ‘We need to do something. At least there’s a plan and somebody’s doing something, so let’s go try to make this work.’”

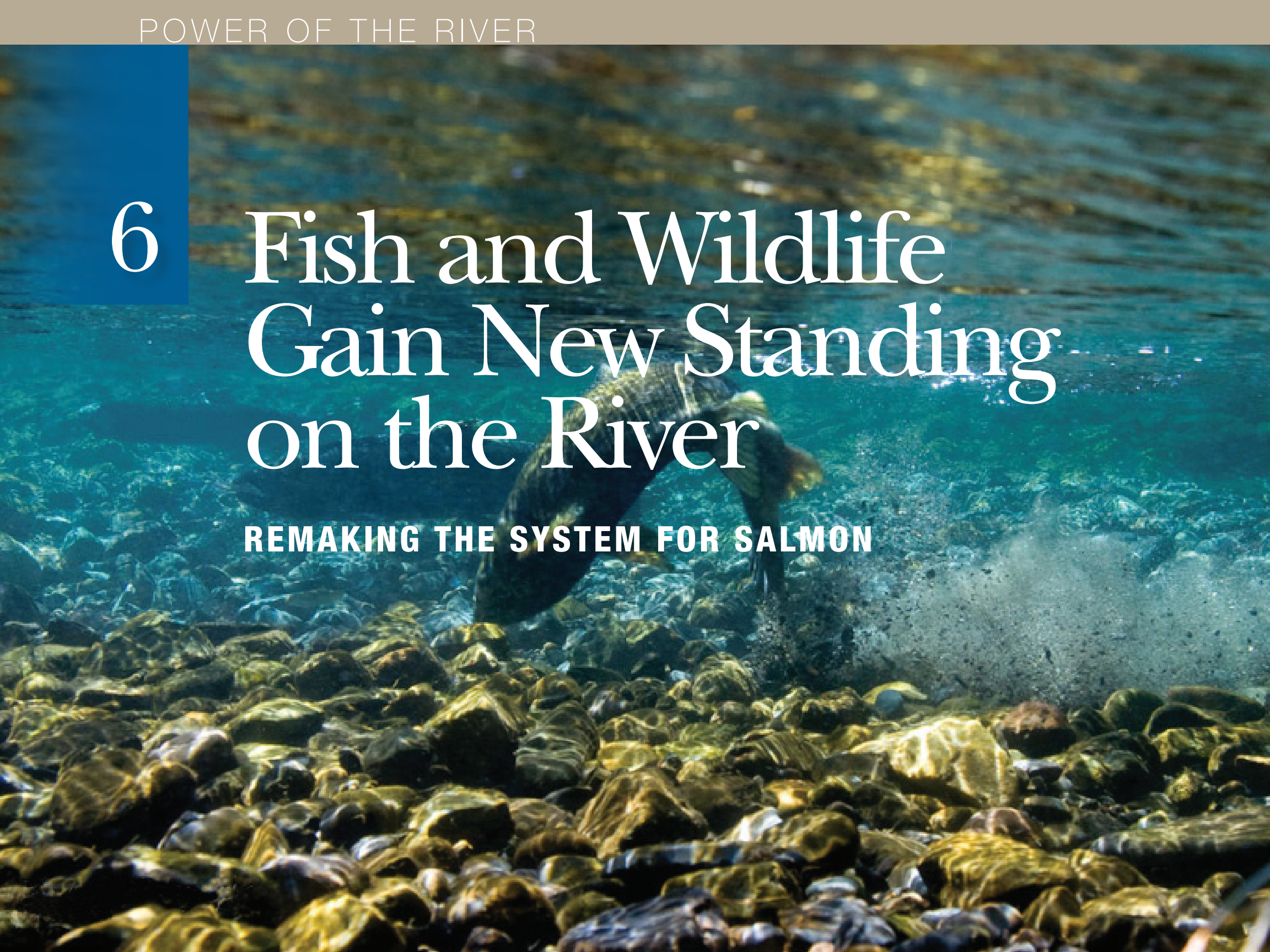
“It was a tremendous learning experience about when you have a leadership role, if you have a plan and you commit to it and you really focus on it, people will follow. Many times, people will follow.”



6

# Fish and Wildlife Gain New Standing on the River

**REMAKING THE SYSTEM FOR SALMON**





Newspaper reporters described it as “one of the strangest vessels ever to travel the Columbia River.” Designed by the U.S. Army Corps of Engineers and fabricated at a Vancouver, Wash., metal works in 2004, the enormous metal structure weighed 1.7 million pounds, cost nearly \$13 million and resembled a small office building in size. BPA power revenues would repay much of its costs. Called a spillway weir, it was in effect a giant water slide. It soon journeyed behind a tug up the Columbia and Snake rivers, where it became a modern element of the Corps of Engineers’ Ice Harbor Dam. Submarine technology allowed it to submerge and resurface on command.

But most important was what it promised to do for the river’s protected salmon and steelhead by helping water move past dams more like a natural river.

Biologists had realized that dams had, in effect, turned the flow of the river upside down. Spillways that often provided the safest and fastest passage past dams for young fish migrating downriver drew their water from deep below the river’s surface. Water at the surface itself slowed to an unnatural stop behind spill gates. From an engineering standpoint, it made



*Water rushes over a spillway weir at McNary Dam, easing the downstream migration for juvenile salmon and steelhead by providing passage at the river’s surface — where they naturally migrate. (Scott Bettin/BPA)*

sense. From the standpoint of young fish that travel hundreds of miles near the river’s surface to the ocean, it was a serious roadblock. They could spend hours searching for the underwater outlet leading downstream, all while exposed to hungry predators. “From a fish’s perspective,

it means diving 40 to 45 feet, undergoing an instantaneous pressure change of one to two atmospheres, and being squirted out onto an abrasive concrete spillway,” said Bob Lohn, former regional administrator of the National Marine Fisheries Service, also known as NOAA





*Coho salmon tussle over spawning beds in the upper Columbia River system, where tribal biologists rebuilt populations beginning in the 1990s.*

Fisheries. He had earlier headed BPA's Fish and Wildlife program.

The steel spillway weir would put the river's flow right side up again. Water at the surface where fish naturally travel would rush over the weir's slide, past spill gates and into the river below. The water movement at the surface would quickly attract the migrating salmon and steelhead to the safest route through. The river, in a sense, would flow more like a river again. Another benefit was that, by spilling surface water most likely to carry fish, the weir leaves deeper water the juvenile fish do not frequent to continue generating power.

"Now, that's what a fish has been dreaming of," Lohn was quoted in *The New York Times* as exclaiming while watching a test of the new weir at Ice Harbor Dam on the Snake River.

The Ice Harbor weir and other so-called surface passage systems have been installed at all federal dams on the lower Snake and Columbia rivers. In concert with expanded releases and spill of water, the weirs have the rivers flowing more like natural rivers than they have at any time since the federal dams were built. Over the past few decades, flows have also shifted so that about 10 million acre feet more water — greater than the volume behind Grand Coulee Dam — now rushes downstream in spring and summer to benefit fish instead of being used for fall and winter power generation. The dams have been overhauled from the inside out to be safer for fish in ways never contemplated when they were constructed, and they operate, individually and as a system, to better match the needs of salmon and steelhead. While fish once took a back seat to economic development and the national goal of expanding the reach of electricity, the Northwest Power Act, the Clean Water Act and, later, the listings of salmon under the Endangered Species Act have changed that picture.

But litigation and emotion still swirl around the protection of salmon, perhaps the one

issue where the region has struggled longest and hardest to agree on its evolving values for the Columbia River system. Some still contend that nothing short of breaching dams would be enough to fully address the impacts of the hydroelectric system on salmon and steelhead.



*Water from the surface of the Snake River swirls over a spillway weir at Lower Granite Dam. (Scott Bettin/BPA)*



As much as salmon protection revolves around biology and hydrology, it also revolves around history, culture and emotion — an obligation to live up to the Northwest Power Act, the Endangered Species Act and, more fundamentally, the nation’s deep responsibility to Northwest tribes that had lost far more than they had gained from development of hydroelectricity.

Commitments by Northwest ratepayers through BPA have become the world’s largest program to protect and rebuild fish species, involving cutting-edge science and technology, reservation of water as far away as Canada

“For an issue with that much alignment in people’s intent, the fact that it was so divisive made you wonder, could we find a path that would work?”

Sarah McNary

and habitat restoration across a region the size of France. What would make the most difference, though, was not a physical fix or operational strategy. It was a difficult regional collaboration among states, tribes and a federal government that would finally come to see each other as equals with a true shared stake in the future of Northwest salmon.

“There was never really anyone who didn’t want to do good things for fish, who didn’t want them to thrive,” said Sarah McNary, the BPA administrator’s senior policy advisor on fish issues and former manager of BPA’s fish and wildlife program. “For an issue with that much alignment in people’s intent, the fact that it was so divisive made you wonder, could we find a path that would work?”

## A legacy of decline

Northwest salmon began fading long before federal dams were built, in an era when natural resources in the West appeared endless. Cannery nets and fish wheels in the lower Columbia River swept up millions of pounds of salmon a year, with little regard for tribal fisheries or how many fish remained to spawn the next generation. The first fish hatcheries in



*Wild steelhead leap over falls on Hay Creek in Oregon.*

the Columbia Basin were built in the late 1800s to boost fish numbers for harvest.

Sediments in Idaho’s Redfish Lake, the best-known spawning place of one of the Columbia’s most remarkable fish, show that the number of Snake River sockeye returning to the lake began to collapse in the late 1800s with the rise of commercial fishing and never recovered. A crude dam built in the early 1900s to power a mine also blocked sockeye returns (until it was blown up a few decades later) and combined with logging, grazing and other impacts of a rising human population to leave





*Lower Granite Dam, the final federal dam on the Snake River that adult salmon and steelhead cross on their way upriver to spawn.*

fewer and fewer adult fish to swim 900 miles up the Columbia and Snake rivers into the Idaho mountains to spawn.

Federal and utility dams for flood control, power and irrigation also took a toll on salmon and steelhead, blocking access to habitat in the upper Columbia, including the important tribal fishing site at Kettle Falls and most of the Snake

River's most productive fall chinook habitat. In 1957, The Dalles Dam flooded another renowned tribal fishing location at Celilo Falls. Fish hatcheries helped mask the impacts and boost fish abundance in the absence of their historical spawning grounds. Federal dams in the lower Columbia and Snake rivers were built with fish ladders for adult fish heading upstream.



*Fish ladders provide effective passage for adult fish migrating upstream to spawn.*

The bigger challenge, overlooked at first, turned out to be the downstream migration of juvenile fish to the ocean.

Instead of riding the current downriver, the small fish struggled to swim through slower water behind dams. They had to find their way through spillways or turbines at dams that operated according to the human pattern of energy use rather than the seasonal rhythms the fish evolved with. Fewer made it to the ocean, and as many as 10 to 15 percent of those passing through turbines were lost. Juvenile fish had an especially hard time in drought years such as 1977, when flows dwindled to about half of average. Federal agencies for the first time released water to





*Idaho's Little Redfish Lake, just downstream of Redfish Lake, the final destination for Snake River sockeye salmon.*





*Crimson adult sockeye salmon gather over spawning beds in Redfish Lake, Idaho, where increasing numbers of adult fish have returned to spawn naturally. (Greg Baesler/BPA)*

help young salmon downstream while BPA cut power to direct-service industries.

Although salmon returns always rose and fell depending on ocean and river conditions, they declined at a distressing pace through the 1970s. Federal biologists considered listing Northwest salmon for protection under the Endangered Species Act, but put the idea on hold as momentum built behind the 1980 Northwest Power Act. The prospect of legislation turned attention to an influential congressman from Michigan who enjoyed fishing trips to the Northwest. Rep. John Dingell would become one of the most

powerful voices insisting that the Act rebalance the values governing the Columbia River system to give much greater weight to fish. Chairman of the key Energy and Power Subcommittee of the House Interstate and Foreign Commerce Committee, which reviewed the bill, Dingell built on language, added by Sen. Frank Church of Idaho, requiring BPA to assist in preserving and enhancing fish runs. The final wording directed BPA and other agencies not only to “protect, mitigate and enhance fish and wildlife, including related spawning grounds and habitat” affected by dams, but to do so “in a manner that provides equitable treatment for fish and wildlife with the other purposes” of the hydroelectric power system. Fish were now on par with power.

While power provisions of the Act sought equitable sharing of the river’s hydroelectric benefits between public and private utilities, the fish and wildlife provisions called for sharing

the river itself. The section would “give fish and wildlife a property right on the river,” said BPA Administrator Peter T. Johnson, among the first charged with carrying it out. “The law ensures that a debt to the past be honored,” he said, “and an obligation to the future be fulfilled.”

## ‘Here comes fish’

The wording worried irrigators and power customers, who realized that fish protections would reduce the volume of water committed to generating power. But it delighted tribes and environmental groups. “It was the threshold to a whole new world,” recalls Lorri Bodi, at the time a young NOAA attorney pressing for fish protections and later a leading salmon advocate and BPA critic. “We thought that now we had the regional solution for the fish.” She recalls speaking at a utility meeting at the time: “I said it’s now the Bonneville Power and Fish Administration, and I thought everyone would laugh. No one laughed.” Bodi would eventually join BPA to help lead its efforts on salmon protection.

Mark Maher, a young engineer with the U.S. Fish and Wildlife Service, helped launch a new organization called the Water Budget Center, forerunner of today’s Fish Passage Center. His



job was to figure out how to rework river flows that power managers had shifted from spring and early summer to fall and winter to match peak power demand. “What I was trying to do was reverse that to benefit fish,” recalls Maher, who navigated negotiations with BPA power managers and other agencies and would later join BPA in leading power and transmission positions. “It was a whole change in mindset from before the Northwest Power Act. They’d spent their careers trying to optimize power production and then suddenly, here comes fish.”

The “water budget” Maher helped shape was a centerpiece of the first Fish and Wildlife Program outlined in 1982 by the Northwest Power and Conservation Council (then called the Northwest Power Planning Council). Congress set up the Council to give Northwest states a voice in energy and river issues and in how BPA spends ratepayer money, while coordinating what had often been divided and parochial management of the Columbia River system. The Fish and Wildlife Program spelled out the Council’s priorities for fish and wildlife mitigation and protection, based on recommendations from tribes and state fish and wildlife agencies.

The water budget, first applied in 1983, set a volume of water to remain in reservoirs



*The Corps of Engineers completed flow deflectors at Chief Joseph Dam in 2009. The deflectors send streams of water upward at the base of the dam to help dissolved gas dissipate so it does not harm fish. (Scott Bettin/BPA)*

through the winter when it would otherwise be used to produce power. The stored water would then be released in spring to help speed young fish to the sea, mimicking the natural spring freshet. The Council’s program also called for spilling water past dams to help carry juvenile fish through spillways instead of turbines. Large volumes of water plunging through spillways in heavy water years could, however, drive up dissolved gas levels in the river, endangering young fish. So the Corps

of Engineers designed and installed flow deflectors at many dams, with much of the cost to be repaid by BPA ratepayers, to control dissolved gas levels while spill continued.

Power generation was steadily yielding to fish protection.

The Fish and Wildlife Program also supported the Corps’ continued installation of bypass systems such as screens on turbine intakes to divert young salmon through safer passages. At some dams the conduits





*Federal agencies have committed to spill increasing volumes of water at dams such as Lower Monumental on the Snake River to help speed migration of juvenile fish downstream.*

funneled the fish into trucks or barges that then carried them downstream, avoiding exposure to predators or the risks of other dams. This strategy made sense based on survival data but rubbed many fish advocates and tribes the wrong way. By 1987, the Corps of Engineers had installed screens and bypass systems on many of the federal dams.

The Council recognized that the Northwest Power Act had not been intended to turn back the clock and restore the Columbia system to pre-dam conditions, but rather to “provide a reasonable equivalent for what was lost.” It was lofty but general enough wording to expose what would become central questions

in the protection of Northwest salmon. What is reasonable? And what was lost? For some, missing salmon equated to loss of food or recreation. For others, it meant lost businesses and income. For tribes, it meant vanished cultures and lives.

## Revolution in salmon science

BPA’s increasing commitment to addressing the loss reflects the rising value the region has placed on making it right. Prior to the Northwest Power Act, BPA’s fish and wildlife division had

two people. By 1982 it had multiplied to about 25. The fish and wildlife division eventually became one part of BPA’s larger Environment, Fish and Wildlife organization, which includes about 100 full-time staff in disciplines including fish biology, ecosystem restoration, contracting, pollution prevention and abatement, cultural resource protection, and environmental review.

The Council estimated in 1982 that all measures in its initial Fish and Wildlife Program, funded by BPA and other agencies, would cost a total of \$650 million to \$750 million over the next 20 years — through 2002. By 2012 BPA’s on-the-ground actions alone ran close to \$300 million a year. “If in 1980 you would have said we would have thought we’d have a \$300-million program, people would have thought you were crazy,” says Bodi, who became BPA’s vice president for Environment, Fish and Wildlife in 2011.

By 1983, BPA had tripled the number of projects under way to help fish to nearly 100, including improvements in hatcheries and habitat restoration. But a big issue remained, because, as much as the Northwest Power Act had stepped up commitments to fish, biologists still needed to learn lots more about their life cycle — especially how they traveled through dams.

Biologists had initially freeze-branded fish, recapturing and examining them at successive





*A team, including one person with a snorkel and dry suit, anchors a PIT tag antenna on the bottom of Idaho's Lemhi River in 1989.*

dams to determine how many made it downstream safely. But the practice was disruptive and stressful. Earl Prentice, then a National Marine Fisheries Service (now NOAA Fisheries) biologist, heard about tiny electronic chips being developed to track livestock and commercial materials. He wondered, could it work for fish?

With BPA funding in the mid-1980s, he and other biologists began implanting dummy chips into fish to test the concept. They tried plastic casings, which didn't work very well, then shifted to glass. Soon they had developed a glass-enclosed chip about the size of a grain of rice that could be injected into young fish



*A technician wires a PIT tag antenna stretching across the remote South Fork of the Salmon River in Idaho to a telemetry station that can beam data to scientists. The antenna is among the largest of its kind.*

and later detected by antennas without ever touching the fish again. Since the tags function for years, fish could also be detected when they return as adults.





*A NOAA Fisheries research vessel reels in a mobile PIT tag detector that captures data from tagged salmon and steelhead migrating to the ocean.*

Suddenly the lives of Columbia River salmon emerged into sharper focus: Biologists could see when and where juvenile fish set out downriver, when and how they maneuvered through dams, and which ones returned as adults. The knowledge helped adjust dam operations and fishing seasons to better protect more sensitive stocks. Scientists learned more about how young fish transitioned from the river to the ocean and, more recently, the importance of the time juvenile fish spend

gaining strength in the Columbia River estuary before heading out to sea.

The so-called Passive Integrated Transponder, or PIT, tags proved so successful that their use has helped make Columbia and Snake river salmon the most highly tracked and monitored fish on earth. PIT tags are now used around the world for many fish and land species. Early on, PIT-tag antennas could identify tagged fish only when they passed through narrow flumes of slow moving water. Eventually advanced



*BPA funding supported the development of PIT tags for fish. Improving technology has led to smaller and more effective designs. (Dave Marvin/Biomark Inc.)*

antennas installed at dams, in rivers and towed behind boats could detect fish speeding by several feet away, at upwards of 25 mph. The antenna at Bonneville Dam's corner collector, the dam's surface passage system, is the largest PIT-tag antenna of its kind in the world. More than 31 million juvenile fish have been tagged since 1987, their history recorded in a BPA-funded database maintained by the Pacific States Marine Fisheries Commission, perhaps the world's greatest trove of data for understanding the behavior and survival of fish in a river system.

"It's a tool that has allowed a lot of important scientific and management questions to be asked and answered," said Sandy Downing,





*In 2006, workers lower a square PIT-tag antenna, the largest of its kind in the world, into the outlet flume from the Bonneville Dam corner collector, the dam's surface passage system for juvenile fish. (Scott Bettin/BPA)*

who leads a team at NOAA's Northwest Fisheries Science Center that continues to push PIT tag technology forward and is now developing a PIT-tag detection system to track fish traversing dam spillways. "It has been a revolution in helping to increase our knowledge of salmon and made people much more aware

of their life cycles and what they need to do to recover endangered and threatened salmonid stocks." PIT tag tracking has helped tailor measures at dams, such as screens and bypass systems, to best protect fish. "PIT tags were used to evaluate all the changes that have been made at the dams over the past

20 years. The monitoring and research efforts using PIT tags have definitely been used to greatly improve survival of salmon stocks through the years," Downing said.

Salmon numbers climbed for a few years in the 1980s, creating optimism that the expanding protection was working. The Council set an interim goal of doubling the average run size of 2.5 million adult fish counted in the roughly five years before the Act was passed. It set no target date and recognized that it might not be possible to double all species in all of the region's sub-basins. But the goal reflected the optimism the Northwest Power Act had set in motion.

## 'Lonesome Larry' makes a point

Salmon numbers did not track the goal, however, plunging to new depths during the late 1980s and 1990s. Snake River coho salmon disappeared. The decline coincided with years of deteriorating ocean conditions driven by an influx of warmer water that pulled the floor out from under the marine food chain, heavily dependent on zooplankton, that salmon relied on at sea. Not only were salmon not rebounding, they were declining at a chilling





*Salmon swirl in northeast Oregon's Lostine River, once sapped by irrigation diversions. BPA helped fund water leases and conservation measures to restore flows to the river.*





Idaho biologists (top photo) collect sperm from Lonesome Larry, the only Snake River sockeye to return to Redfish Lake in 1992. The famous fish was later mounted for display (bottom) while its genes live on through an Idaho hatchery program funded by BPA. (Top: Idaho Department of Fish and Game; bottom: Idaho Statesman)

pace. Sen. Mark Hatfield of Oregon organized a “Salmon Summit” in late 1990, hoping for an accord to avoid with salmon the kind of firestorm brought on by the Endangered Species Act listing of the northern spotted owl earlier that year.



Bonneville Dam visitors watch a chinook salmon swim by the dam’s viewing window. (Associated Press/Rick Bowmer)

But it was not enough. Exhibit A was the crimson Snake River sockeye salmon.

The southernmost sockeye species, Snake River sockeye swim higher and farther to spawn than any other Columbia Basin salmon. Once thousands returned to Idaho’s Redfish Lake — giving rise to talk of building a cannery — but in 1989 biologists could find only one of the fish that gave the lake its name. In 1990, there was none; the Shoshone-Bannock Tribes petitioned the National Marine Fisheries Service to list Snake River sockeye as endangered. Three males and one female returned in 1991. Biologists captured and spawned them in

“PIT tags were used to evaluate all the changes that have been made at the dams over the past 20 years. The monitoring and research efforts using PIT tags have definitely been used to greatly improve survival of salmon stocks through the years.”

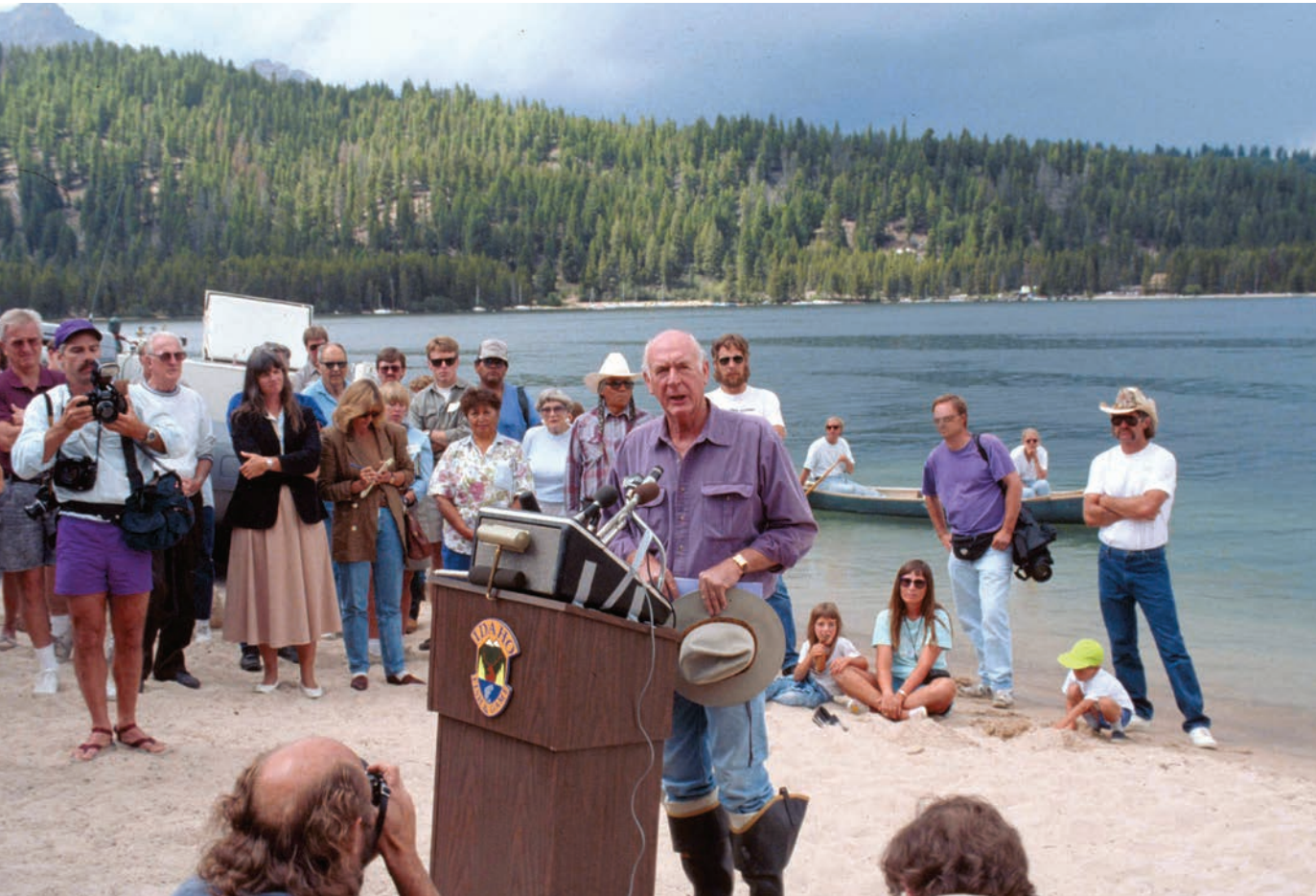
Sandy Downing,  
NOAA Northwest Fisheries Science Center

captivity in a last-ditch strategy to hang on to what little remained of the species.

NMFS declared Snake River sockeye endangered in late 1991, citing hydropower development, water diversions and storage, harvest and predation.

As if to underscore the urgency of the listing, one male sockeye in 1992 made the epic swim





*Idaho Gov. Cecil Andrus speaks on the shore of Redfish Lake in August 1993, calling for restoration of Snake River sockeye salmon. (Idaho Department of Fish and Game)*

from the mouth of the Columbia, past eight dams, 6,500 feet high in the craggy mountains of central Idaho — only to find himself alone. The daughter of a hatchery employee named the fish “Lonesome Larry,” a name that Idaho Gov. Cecil Andrus repeated in press conferences and to The New York Times. Andrus, a longtime fisherman and Interior Secretary in the Carter

administration, kept the famous fish mounted in the Idaho Statehouse as a symbol of his push to restore salmon as part of Idaho’s heritage. “I know I’m right on this and I’m not going to stop until these rivers have salmon in them again,” he said.

It would take years, but Lonesome Larry’s dogged determination would live on through

his genes and eventually give rise to new generations of Snake River sockeye.

Sockeye were not alone. The following year Snake River spring and summer chinook and fall chinook salmon were listed under the Endangered Species Act as threatened. Another 10 runs of salmon and steelhead from the Snake and upper, middle and lower Columbia River would be listed later in the 1990s. The Endangered Species Act holds federal agencies to a high standard of protection, so the listings focused further scrutiny on federal dams and provided a strong legal lever for others to press for more action. New biological opinions issued by NOAA Fisheries under the act soon outlined what the Corps of Engineers, the Bureau of Reclamation and BPA had to do to protect salmon from the impacts of the dams.

## Into the courts

But beginning what would become one of the longest-running legal struggles in the Northwest, the state of Idaho, joined later by Oregon and some tribes, argued in court that what the federal operating agencies were doing was not enough. U.S. District Court Judge Malcolm Marsh in 1994 agreed, saying the federal agencies had attempted only “relatively small steps, minor improvements and adjustments





*Robert (Bob) Lohn, whose career spanned BPA, the Northwest Power and Conservation Council and NOAA Fisheries. (NOAA Fisheries)*

— when the situation literally cries out for a major overhaul.” He said: “Instead of looking for what can be done to protect the species from jeopardy, NMFS and the action agencies [the Corps of Engineers, the Bureau of Reclamation and BPA] have narrowly focused their attention on what the establishment is capable of handling with minimal disruption.”



*Spill surges through John Day Dam. Spill combined with passage improvements at federal dams has become a core piece of the federal strategy to protect salmon and steelhead.*

The signal was that a much greater shakeup was yet to come.

Broad-thinking and optimistic, Bob Lohn may be one of the few people lured to Northwest fish and wildlife issues by litigation. The graduate of University of Montana Law School headed the legal staff at the Ninth Circuit Court of Appeals when he kept seeing

“these so-called Bonneville cases — big, complicated cases that struck me as very interesting.” That drew him to a job as general counsel for the Northwest Power and Conservation Council, where he came to believe that BPA, which dominated fish and wildlife decisions and funding, was missing an opportunity to expand fish and wildlife





*Spray rises from the spillways at Chief Joseph Dam.*

protection into much more of a regional undertaking.

But that would mean yielding control, which wasn't a natural fit with the utility mindset. "It was a very different thing for the culture," Lohn recalls. "In a utility, you have high responsibility, whether it's for keeping the power on or for fish, and if you're responsible for it, you want to be in control of it." Tribes and others sometimes felt shut out or left hanging on funding for major projects. What he heard from BPA was, "If you have such big ideas, why don't you apply for a job

over here?" So he did, and in 1994 became manager of BPA's Fish and Wildlife Division, just as Judge Marsh told the federal agencies they were too beholden to the status quo.

## Pounding the table for salmon

His arrival also came just as BPA was feeling the financial squeeze of deregulation, with power customers arguing that the agency

could never remain competitive if it couldn't get control of fish costs that seemed only to go up. In October 1995, Sen. Mark Hatfield brokered a deal with the Clinton administration that limited BPA's annual fish costs to an average of \$435 million each year through 2001. It also gave BPA access to \$325 million in credits for spending that went beyond the agency's obligation to mitigate the hydroelectric impacts of the federal dams.

Federal executives then tried to get alignment on the costs, hammering out an



agreement outlining the funding commitments for the next five years. Then they announced it in a packed conference room at BPA headquarters. What they heard would loudly echo what Lohn had already concluded. Attorney John Ogan, then representing the Yakama Nation (and later the Confederated Tribes of Warm Springs), pounded his fist on the table and said no agreement on a budget could be legitimate until the agencies had discussed it with others in the region, especially sovereign tribes.

“It was a pretty masterful moment,” said John Shurts, general counsel at the Northwest Power and Conservation Council and authority on natural resources policy and history. “It was a moment when there was a broader realization that there was a different way to work.”

It was enough of a wakeup call that BPA Administrator Randy Hardy and other federal leaders committed to a year-long process of meetings and negotiations to gather feedback and expand the scope of the budget agreement. The agreement signed in September 1996 by the secretaries of Commerce, Interior, Energy and the Army provided the first long-term funding commitment — boosting BPA’s program budget from about \$70 million to \$100 million annually — for steps to improve the dams, as



*Will Zack pulls a sockeye salmon from a hoop net on his family’s fishing scaffold along the Columbia River just east of Bonneville Dam in 2008. (Associated Press/Yakima Herald-Republic, Gordon King)*

well as to provide hatchery improvements and habitat restoration.

It also explicitly recognized the tribal role, with federal agencies committing to regular

consultation with tribes and “to building more effective day-to-day working relationships with the tribes regarding the tribes’ co-management of affected fish and wildlife resources.” And it





*In 2010, BPA funded the protection of habitat in Montana's Swan Valley, home to species ranging from bull trout to grizzly bears. (Chris Robinson/BPA)*

## Providing a place for wildlife

Where dams and the reservoirs behind them inundated land once inhabited by deer, sage grouse and other species, the Northwest Power Act called for BPA to make up for that lost habitat through mitigation. Ratepayer funding through BPA has since protected and helped restore more than 500,000 acres of wildlife habitat throughout the Columbia Basin.

The habitat protection is based on loss assessments that examined the quality and quantity of habitat affected — and created — by the dams and reservoirs. The Northwest Power and Conservation Council relies on the assessments to help guide BPA's mitigation efforts. Tribes, states and conservation organizations such as the Nature Conservancy and the Trust for Public Land use BPA funds to purchase and often restore habitat to preserve its value to wildlife.

In some cases the land would otherwise be vulnerable to development. In 2010, BPA and the state of Oregon signed an agreement committing to the protection of nearly 17,000 acres in the

Willamette River basin to offset the impacts of dams constructed on the river's tributaries by the Corps of Engineers for flood control, hydroelectric power generation and other purposes.

Habitat protection in many cases aids local economies. BPA contributed \$4 million to help protect more than 140,000 acres of Montana timberland from development while public access and forestry continue. By acquiring grazing leases from the Yakama Nation, BPA has helped rest the land from livestock impacts while the habitat restores itself naturally.

In other instances BPA set up trust-like funds for management by states and tribes, with interest on the funds extending their value over time. A Montana trust created in 1988 has protected more than 70,000 acres, while a similar trust established in Washington in 1993 has secured more than 134,000 acres so far. BPA believes it has fully mitigated most of the effects on wildlife habitat from the construction of the federal dams, with some mitigation for dams in Idaho remaining.

called for coordinated work plans laying out fish protection projects. The Council gained a greater role in prioritizing the projects, which was to include advance review by independent scientists. The shift helped provide more public oversight of BPA and other federal funding of fish and wildlife projects.

One of the most significant amendments in the history of the Northwest Power Act came the same year, when Republican Sen. Slade Gorton of Washington locked in a public and scientific review process. His change created the Independent Scientific Review Panel to examine projects proposed for BPA funding and to publicly recommend to the Council which it should ask BPA to fund.

The new selection process raised the standards of projects, Lohn recalls. "You never have enough money for everything. This allowed people to ask, 'What are the very best things we can do for fish?'" At the same time, the stable funding levels helped BPA manage costs while still demonstrating its commitment. "What it did for tribes was help them realize BPA would keep its word," Lohn said. "Money would be there. They stepped up and their fish and wildlife staff proved to be very competent people with great professional pride. It was not just, 'We're tribes, give us something,' but, 'We're proud of our staff and we belong on a level playing field.'"





*Lower Granite Dam on the Snake River. Some argued for breaching the earthen section of the dam on the left. (Idaho Statesman)*

## The question of breaching

More change was also coming to the hydro-electric system. A new biological opinion in 1995 mirrored many elements of the Council's 1994 Fish and Wildlife Program by advancing more dramatic changes in the operation of the dams, including immediate increases in spill

and flow to boost the passage of juvenile fish. Spill increased to as much as 80 percent of the river's flow at Snake River dams at night. The new opinion also raised a longer-term prospect championed by Andrus: drawing down water behind the Snake River dams, particularly in spring, to recreate the fast-flowing river that once carried young fish to the sea. That set in motion an evaluation by

the Corps of Engineers of alternatives to further improve juvenile passage. The option that got the most attention was also the most extreme: breaching the Snake River dams.

Dam breaching would be so involved, with so many implications for the power system, shipping traffic on the river, agriculture and the region, that the Corps planned a four-year assessment of options for improving fish passage. The result would be an environmental impact statement and decision due in 1999. That would come just as the 1995 biological opinion ran out, setting the end of the decade as a pivotal point in the region's efforts for salmon.

## Looking beyond the dams

While breaching focused attention on the dams, many in the region were also looking beyond them for ways to help salmon. The Columbia River Inter-Tribal Fish Commission, modeled after an inter-tribal committee that once governed fishing practices at Celilo Falls before The Dalles Dam submerged it, released a salmon and steelhead restoration plan in 1996 called Wy-Kan-Ush-Mi Wa-Kish-Wit, or Spirit of the Salmon. The plan assembled by





*A BPA helicopter equipped with an infrared camera, typically used to search for hot spots on transmission lines, lifts off on a survey of Idaho rivers. The infrared camera revealed river temperatures that could help inform habitat restoration plans.*

the Warm Springs, Yakama, Umatilla and Nez Perce tribes was at once impassioned and realistic, saying, “The salmon’s spirit has not changed; the human spirit has.”

It said: “Rather than a dignified cultural icon, the salmon is being redefined as a problem, as something that makes unacceptable the human laws designed to protect the environment.”

The tribal plan called for “gravel to gravel management” to better protect salmon in the tributaries where they spawn, the mainstem

river where they migrate, the estuary where they gain strength and the ocean where they spend most of their lives. It included aggressive actions at the dams, but also focused on reclaiming lost habitat, restoring water diverted by irrigation, making more aggressive use of hatcheries and managing the ocean harvest. “It had the effect of putting a marker down with the federal government — not just regarding the hydroelectric system — that the tribes were committed to what we would call a life-cycle approach and a need for addressing all



*Oregon Gov. John Kitzhaber, right, and Idaho Gov. Dirk Kempthorne announce a set of principles developed with the governors of Washington and Montana to guide salmon and steelhead recovery. They spoke at a news conference in Salem, Ore., in July 2000. (Associated Press/Jack Smith)*

sources of mortality in a way that was fair,” said Rob Lothrop, manager of policy at the Inter-Tribal Fish Commission.

For Lohn and others, too, “It was becoming increasingly obvious that there were many other parts of the problem that weren’t being solved,” he recalls. All the improvements at dams would matter little if adult salmon migrating back to spawn found their home stream dry and barren because of water diversions. “Because dams are large and visible and so easy to point at, they get the attention,” he says. “But if you’re going to solve



the problem, you need to solve the limiting factors, not just the obvious ones.”

Increasing knowledge of the fish also helped expand the region’s view beyond the dams, where agencies might spend millions of dollars pursuing incremental improvements in fish survival, to other areas such as tributaries, where eliminating obstacles such as diversion dams might help double or triple a run, Lohn says. “Whatever you do at the dams would be useless if adult fish come back and cannot reach the place they need to spawn.”

The thinking came together in what the federal agencies called the “All-H” strategy (originally the “4-H” strategy until the National 4-H Council requested a change) because it addressed not only hydroelectric power impacts, but also encompassed hatcheries, habitat and harvest in a more comprehensive approach like the tribal Spirit of the Salmon plan. The challenge was whether the region, not to mention federal agencies that had been openly bickering over science and strategy, could also come together. “Frankly, the region’s fish recovery program is a mess,” BPA Administrator Judi Johansen said in a 1998 speech. NMFS “has a plan; the four states have plans; the tribes have plans. There is little coordination and much waste.

What’s worse, we have spent \$3 billion already since 1980 with no firm evidence that we are effectively helping the fish.”

## Changing the game

Johansen wanted to change the game, so the same year she called someone with a game-changing record: Lorri Bodi, the former NMFS attorney and BPA critic who had worked for American Rivers and served as president of the group Save Our Wild Salmon. Bodi had worked on fish protection agreements for Seattle City Light’s Skagit Power Project and salmon runs in the Columbia’s Hanford Reach. The 1988 Hanford Reach deal, called the Vernita Bar Agreement, committed BPA and operators of mid-Columbia dams to maintain flows that guarantee spawning habitat and protect the redds, or nests, of one of the strongest wild and fishable runs of salmon in the Columbia River.

“I used to say, ‘There’s no negotiating table for Columbia River issues. There’s no forum,’” Bodi recalls. Johansen’s reply: “Come work for Bonneville and let’s create one.” Johansen offered Bodi a job as a senior adviser on fish

issues. Bodi offered Johansen her conditions, including an assurance that fish and wildlife would really hold the same priority as BPA’s power interests. Johansen agreed, though she knew that hiring Bodi would raise eyebrows both inside and outside BPA.

Bodi “was a tough negotiator but was portrayed to me as someone who wanted to find a solution,” Johansen recalls. “She’s just always trying to find a win-win, and at that time everyone was just polarized. Her tenacity and temperament were what we needed.”

“Because dams are large and visible and so easy to point at, they get the attention, but if you’re going to solve the problem, you need to solve the limiting factors, not just the obvious ones.”

Bob Lohn





*Vernita Bar (left) on the Columbia River in Washington serves as spawning habitat for one of the river's strongest wild and fishable runs. Senior biologist Chris Carlson of Grant County PUD, above, identifies a nest, called a redd, in the gravel. (Joel Scruggs/BPA)*

Federal agencies formed what they called the Federal Caucus to diminish dissension and provide better coordination among themselves leading up to the next biological opinion. They also launched an extensive campaign to explain the All-H approach and seek feedback, combining it with 15 meetings in late 1999 and early 2000 that also sought input on the Corps of Engineers' draft environmental impact statement on improving fish passage. The preferred alternative in the EIS called for

improvements to the hydroelectric dams, but breaching was also an option. Adding to the mix was an updated Council document called "Return to the River." It concluded that past attempts to control and replace natural processes through hatcheries and other means had failed and attention had to shift to restoring those processes as the Vernita Bar Agreement had done. "Technology," it said, "provides no lasting substitutes for the benefits of ecosystem functions."

Publicly, though, the meetings turned into a referendum on dam breaching. Held throughout the Northwest and Alaska (at the request of the governor, given implications for Alaska fleets that catch Columbia salmon), they attracted nearly 10,000 people, with accompanying rallies at almost every stop. More than 1,000 people lined up in the cold outside a packed conference room in Clarkston, Wash., some waiting more than 12 hours for a chance to make a three-minute statement. Nez Perce drums echoed





*Colorful protests enlivened public meetings, including one in Missoula, Mont. (Michael Gallacher/Missoulian)*

outside. Buses brought sawmill workers from Lewiston, Idaho, which would lose its inland port to breaching. Local police kept watch. So many people wanted to register their views on breaching, federal organizers gave everyone



*An overflow crowd lines up for a public meeting in Clarkston, Wash., in February 2000 to discuss strategies to protect imperiled salmon and the possibility of breaching dams on the Snake River. Police were on hand, but calm prevailed. (The Lewiston Tribune)*

a bean to drop in one of three jars — breach dams, keep dams and other options.

Johansen recalls meetings in the Old Executive Office Building in Washington, D.C., where the Clinton administration tried to sort out a direction and ultimately settled on one. The 2000 election battle between George W. Bush and Vice President Al Gore raised the

stakes, with Bush stopping in Spokane to insist that if he were elected, the dams would stay. The four Northwest governors called for an “aggressive nonbreach” strategy to help salmon, providing more support for the All-H approach covering the whole salmon life cycle.

The result was a 2000 biological opinion that set a new direction but did not end the





*President George W. Bush speaks at Ice Harbor Lock and Dam in Washington in August 2003: “We can have good, clean hydroelectric power and salmon restoration going on at the same time.” (George W. Bush Presidential Library)*

debate. It set breaching aside and instead adopted the All-H approach, with an aggressive habitat restoration program that hinged on a Council strategy to develop grass-roots subbasin plans to rebuild the ecological integrity of the Columbia Basin, piece by piece. The Northwest Power Act had introduced and both the Council and BPA had pursued the concept of “off-site mitigation” to offset the impacts of dams, but the new biological opinion made it a backbone of the federal strategy. For the first time it required development of genetic management

plans for hatchery production and fisheries. And it introduced a concept championed by Bodi: specific performance standards for safe passage of juvenile and adult fish through the dams, establishing a clear target for improvements such as spillway weirs.

In the wake of the West Coast power crisis and BPA emergency declarations cutting off spill to keep power flowing, then acting Administrator Steve Wright acknowledged to the Portland City Club in 2001 that, “We compromised our commitment to fish protection because of

concerns over electricity reliability and financial solvency.” But he warned that the region must save salmon and steelhead, because anything else would compromise the economic heart of the region. “Put starkly, if we fail to save these fish, we will have put at risk the region’s richest resource — its hydro system.”

## A comeback quietly begins

But the new federal plan was not enough for a new judge on the Northwest salmon case: James A. Redden, who in 2003 said the plans for off-site mitigation were “not reasonably certain to occur,” because habitat funding, dependent in large part on Congress and electric ratepayers, was uncertain. He ordered the federal agencies to rework the plan amid the more suspicious atmosphere that followed the West Coast power crisis.

In the river, though, a brighter trend had emerged in 2000: Salmon returns began rebounding in an upward trend that would carry counts to their highest levels since Bonneville Dam was completed in 1938. River fisheries closed since the 1970s began to reopen. The upsurge continued beyond the 2001 drought. Cold, nutrient-rich ocean conditions got much





*President George W. Bush speaks with Witt Anderson of the U.S. Army Corps of Engineers during a tour of the fish ladder at Ice Harbor Dam in 2003. (George W. Bush Presidential Library)*





*Sockeye salmon hover over spawning beds in Idaho's Redfish Lake. (Greg Baesler/BPA)*

of the credit. But the Council noted that similar conditions had occurred in the 1950s without such a rebound, a sign that the region's many steps to help salmon were contributing. Nearly 300 Snake River sockeye returned past Lower Granite Dam in 2001, the most since the 1970s. A panel of scientists in 2006 recommended cutting off BPA funding for the hatchery program to rebuild the species, but at the urging of Idaho Gov. Jim Risch, the National Marine Fisheries Service and others, the Northwest Power and Conservation Council kept it going.

Chinook salmon that had nearly disappeared from the Lostine River in northeast Oregon began returning in larger numbers, boosted by a BPA-funded Nez Perce hatchery program focused on preserving the genes of native salmon and the leasing of water to maintain sections of the river that would otherwise run dry from irrigation diversions.

While reworking the 2000 biological opinion, the Corps, Bureau of Reclamation and BPA noticed some developments that promised potential for improved fish survival at the dams. For example, biologists recognized an unusually high proportion of juvenile fish made it safely past the Douglas County Public Utility District's Wells Dam, designed with its spillways above instead of beside its turbines so the dam would fit in a narrow section of the middle Columbia River. The finding suggested that more fish passed dams safely when they could follow their natural migration path at the surface, so the Corps of Engineers developed spillway weirs to provide similar surface passage at other dams, boosting the survival benefits of spill while leaving more of the water fish did not use to generate electricity.

Over the next decade, more efficient spill and surface passage — often combined with other improvements — boosted juvenile fish survival at dams on the lower Snake and Columbia, in some cases as high as 99 percent. Tracking showed that each additional surface passage that was installed sped juvenile steelhead migration downriver, helping the young fish move more quickly through areas with predatory birds and fish so that more could reach the ocean.

President George W. Bush told a crowd at Ice Harbor Dam in August 2003, "We don't need to be breaching any dams that are



*U.S. District Judge James Redden presided over litigation on the protection of Columbia and Snake rivers for a decade. (Associated Press/Rick Bowmer)*

producing electricity. And we won't." He also praised a soon-to-be-installed weir as evidence "the federal government is doing its part by gathering the technologies that will make the salmon runs stronger and better over time." Fish went from having to puzzle their way past dams to migrating down "a river in which for much of the year there is passage that is really high quality," says Lohn, who left BPA in 1999 for two years as fish and wildlife director at the Council and in 2001 was appointed by the Bush administration as regional director of NOAA Fisheries. "You don't measure success by how many gallons you spill, you measure success by whether you provided the passage the fish are looking for."



## Another loss in court

But a reworked biological opinion in 2004 earned opposition from most tribes and the states of Oregon and Washington. And it soon received an icy reception from Judge Redden, who called it an exercise “more in cynicism than sincerity” that had the effect of “substantially lowering the bar” for salmon protection. He ordered additional spill at many dams and gave new and more specific instructions, telling the opponents in his packed courtroom “to take advantage of this moment to get together and start talking.”

As the second major court defeat on salmon BPA Administrator Steve Wright had lived through, the ruling evoked frustration and some anger. But Wright and others at BPA also felt a sense of opportunity.

He returned to the principle of public involvement Peter T. Johnson had established, meeting with leaders of the states and tribes that had fought the biological opinion. He wanted to tell them something and ask them something. “Tell them, I know we lost,” Wright recalled. “I’m not happy about it, but that’s the past and we’re going to move on. And now the question is: ‘What do you want?’ Because sometimes people



*Sinuous raceways at the Nez Perce Tribal Fish Hatchery mimic the curves of natural rivers and streams so fish raised at the hatchery are better prepared for life in the wild. (Jonathan McCloud/BPA)*

want something and the only way they can express it is by suing you. But that may not be able to get them to where they really want to go.”

He learned something surprising about the states and tribes. “I thought I knew what they wanted,” Wright recalled. As it turned out,





*Fishing from scaffolding at Celilo Falls on the Columbia River before the falls were submerged by the water behind The Dalles Dam in 1957.*

“I didn’t actually understand what they wanted really that well.” In the course of conversations, he and others at BPA recognized two factions. One believed that a combination of adjusting dam operations and restoring habitat was the right path to make a difference for salmon. The other believed the only way was to alter

the hydroelectric system, even to the point of breaching dams.

That realization led to the development of perhaps the most important commitments by the federal government to Northwest tribes and states: the Columbia Basin Fish Accords. The agreements signed in 2008 by the Corps

of Engineers, Bureau of Reclamation and BPA and the Yakama, Warm Springs, Umatilla, Colville and Shoshone-Bannock tribes; CRITFC; and the states of Idaho, Montana and Washington locked in federal funding — most of it from BPA — making it “reasonably certain,” as the judge had asked. The commitment of funding was unprecedented — more than \$900 million over 10 years, 70 percent of it to improve conditions for threatened and endangered species, with the rest for other fish and wildlife including lamprey and bull trout. The Accords also provided regional support for the expanded elements of a new biological opinion, including higher performance standards for fish survival, while giving tribes and states a long-promised but rarely delivered voice in the management of the Columbia River system.

## The right thing for the right reason

But for Wright, the Accords revealed something else — how much the tribes had lost to the dams that had done so much for others. He said he will forever remember Terry Goudy-Rambler of





*Antone Minthorn, left, chairman of the Confederated Tribes of the Umatilla Indian Reservation, and BPA Administrator Steve Wright.*

the Yakama Nation speaking through tears at the signing of the Accords on the banks of the Columbia, upstream from the long-drowned tribal fishing site at Celilo Falls.

“She talked about remembering feeling the mist of Celilo Falls on her face as a child and how much had been lost for the tribes when Celilo Falls had been inundated by The Dalles Dam and how hard that had been for them as a community,” Wright recalled. “But she also talked about how the signing of the Accords



*Tribal and federal leaders display the hide signed May 8, 2008, commemorating the Columbia Basin Fish Accords. From left: Col. Steven Miles, Northwest Division Commander, U.S. Army Corps of Engineers; Antone Minthorn, Chairman, Confederated Tribes of the Umatilla Indian Reservation; Mike Marchand, Chairman, Confederated Tribes of the Colville Indian Reservation; Ralph Sampson, Chairman, Confederated Tribes and Bands of the Yakama Nation; Tim Personius, Deputy Regional Director, Bureau of Reclamation; Steve Wright, Administrator, Bonneville Power Administration; Ron Suppah, Chairman, Confederated Tribes of the Warm Springs Reservation of Oregon; and Fidelia Andy, Chairwoman, Columbia River Inter-Tribal Fish Commission and Yakama Nation Fish and Wildlife Committee.*

represented a turning point, an opportunity to restore at least some of what had been lost, an opportunity for partnership with the federal government where previously there had been none.

“I thought the Accords were important, but sometimes somebody has to tell you in a way that really hits you. And when she talked about that, I began to realize just how important it was. And I have to say it increased my





*Water plunges down spillways, left, on the face of Libby Dam during a test designed to help endangered Kootenai River white sturgeon. Young sturgeon, above, at a hatchery operated by the Kootenai Tribe of Idaho with BPA funding.*

## Hatching an ancient species

The Kootenai River white sturgeon, with a lineage dating to the time of the dinosaurs, can grow nearly 20 feet long and live 100 years. The Kootenai Tribe of Idaho operates a BPA-funded hatchery that has raised thousands of young sturgeon to rebuild the species listed as endangered in 1994.

The landlocked species is currently not spawning successfully in the Kootenai River of Idaho and Montana below Libby Dam, completed by the Corps of Engineers in 1975. Biologists believe the dam may have altered the seasonal river flows that prompted the fish to spawn or provided the right conditions for eggs to hatch and young to thrive.

The roughly 1,000 adult sturgeon in the Kootenai River are declining at an estimated 4 percent per year, but hatchery-raised young are adding to the population. The Kootenai Tribe has also launched a BPA-funded restoration project for a 55-mile stretch of the Kootenai River to reduce erosion, revive native vegetation and resurrect side channels that provide refuge for fish. The restoration project may also improve future spawning conditions for sturgeon.

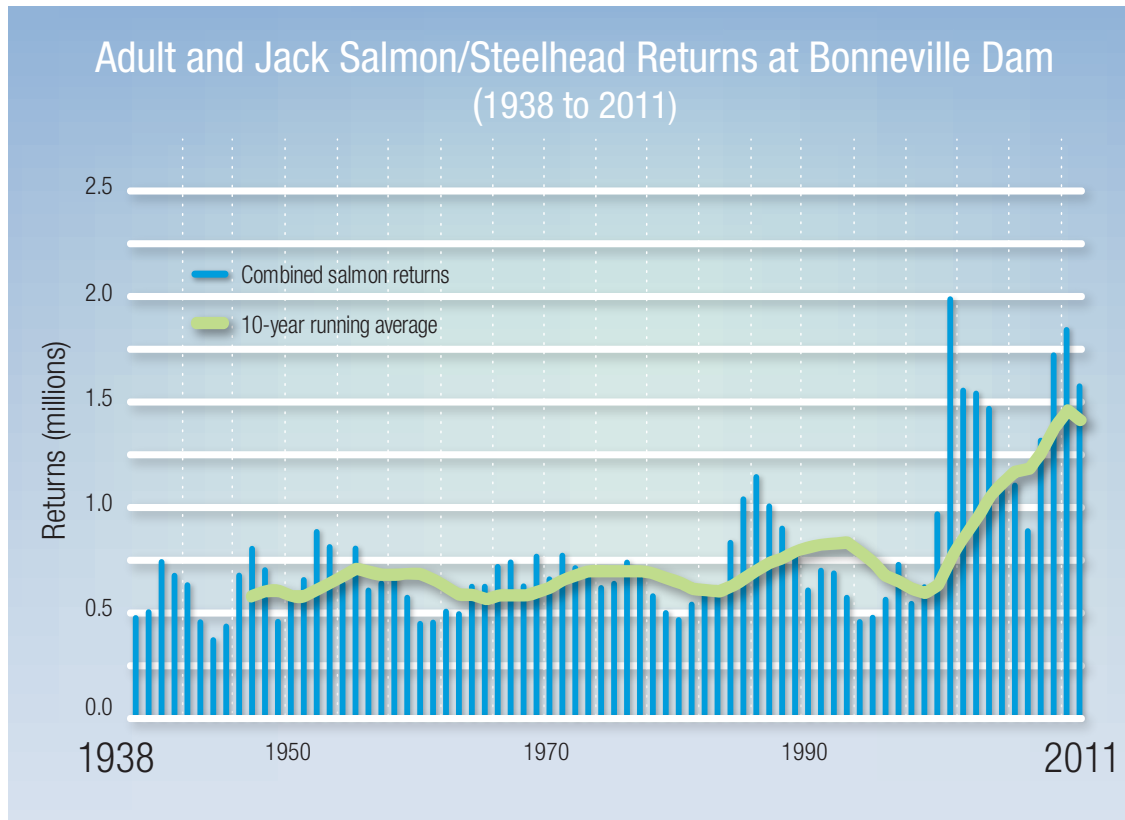
The Corps of Engineers in cooperation with BPA and the U.S. Fish and Wildlife Service has also tested releases of extra water from Libby Dam to recreate more natural spawning conditions.

commitment to the Accords, too. I thought it was the right thing to do, but I began to realize it was more than just the right thing to do for salmon. It was also really the right thing to do for the tribes.”

For Lohn, the Accords and simultaneous release of a new biological opinion in 2008 represented an extraordinary turning point that came closer than ever to his vision of a true regional partnership for salmon. Federal agencies finally chose to set aside their turf battles, while the upsurge of salmon runs that many had feared were doomed to extinction in the 1990s provided new reason for hope. While ocean conditions exert the dominant influence over fish returns, “unless you’ve done the right things in advance, you’ll never be able to take advantage of them,” he says. “Finally people felt we were doing the right things.”

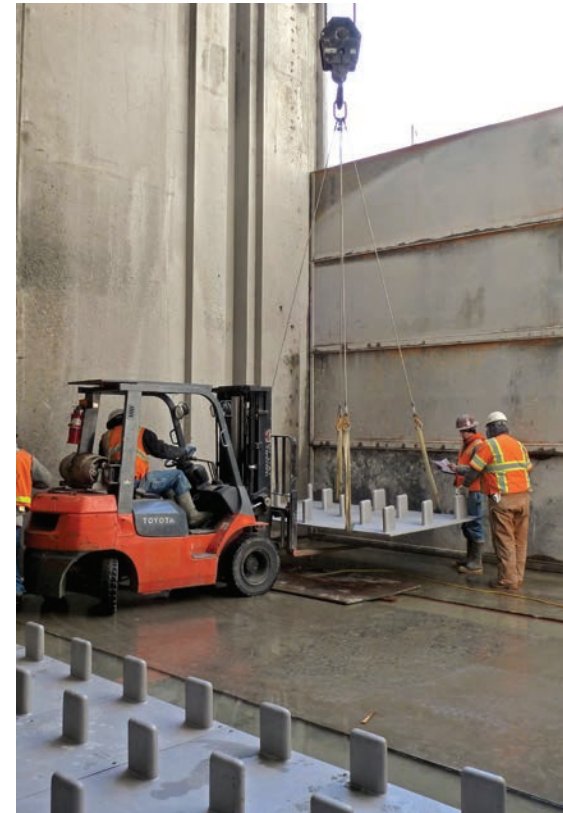
The 2008 biological opinion won more regional support than any previous salmon strategy. It included stepped-up spill and further improvements at dams, setting performance goals of 96 percent survival for most juvenile fish past each dam in the spring, and 93 percent for the summer. Some worried these goals would be impossible to meet. But it again faced litigation, with Oregon and the Nez Perce Tribes among those arguing it did not do enough.





At the court's urging, the incoming Obama administration undertook its own review of the biological opinion. NOAA Administrator Jane Lubchenco, an Oregon State University professor and member of the National Academy of Sciences known as one of the

most often-cited ecologists in the world, led the review over more than six months. The review considered input from federal and state agencies and tribes, agency and independent scientists, and those suing over the biological opinion. NOAA then added stepped-up



Workers, top, install a lamprey passage system at the Corps of Engineers' John Day Dam to assist lamprey, bottom, in migrating upstream through the fish ladder. The fins provide points for lamprey to attach their suction-cup mouths. (Top: Joel Scruggs/BPA; bottom: Freshwaters Illustrated)



POWER OF THE RIVER





measures including acceleration of mitigation, expanded research and contingency options, including further consideration of dam breaching, as a kind of insurance should fish numbers fall into a danger zone. The federal government filed the strengthened strategy in September 2009, saying that it more aggressively protected fish from decline from factors including climate change.

“This plan is scientifically sound and precautionary,” Lubchenco said. “It is flexible enough to adapt to future changes, specific enough to tell us when immediate actions are needed, and forward-looking enough so that it will remain effective over its 10-year lifespan. For the sake of the people and fish of the Northwest, it’s time to set this plan in motion.”

Lubchenco joined federal executives from the region, state and tribal leaders and others in Redden’s courtroom for a hearing on the plan in November 2009. She told reporters afterward she stood “100 percent behind the science” in the plan. “We paid attention to the science; we paid attention to the law.” Redden said, “I think this is the most significant hearing we’ve had so far, and I really think that with a little more work, we’ve got a BiOp.”

At the judge’s urging, federal agencies then formally incorporated the new plan into the biological opinion, producing a new 2010



*Workers install a large culvert to reopen historic wetlands in the Columbia River estuary to provide food and refuge for juvenile salmon and steelhead. The young fish build strength in the estuary before setting out into the ocean. (David Wilson/BPA)*

version. But in court, it ultimately brought what might be called a split decision. Judge Redden said it provided sufficient protection for the time being, but ordered the federal agencies to provide more details by 2014 of specific

habitat projects and benefits they would be implementing over the life of the plan.

Fish returns offered a positive sign. More Snake River sockeye made the journey back into the Idaho mountains, with returns



hitting 1,355 in 2010, the most since the 1950s, before the lower Snake River dams were built. Enough sockeye that hatched naturally in Redfish Lake began returning as adults to replace their parents, an important step toward a self-sustaining population. About 6 percent of the sockeye carry the tenacious genes of Lonesome Larry. Survival of juvenile fish through the dams is on course to meet performance standards once thought impossible. Research by NOAA Fisheries indicates that as many or more fish make it safely down the Snake and Columbia rivers as make it down some undammed stretches of Northwest rivers.

## Enduring rise in returns

Salmon and steelhead returns remain at some of the highest levels in decades, reflecting strength in both hatchery and wild fish. So many Snake River fall chinook returned past the lower Snake River dams to spawn in recent years that biologists in 2010 counted more redds, or nests, than they had since intensive surveys began in the 1980s. Oregon began its first fishing season in recent memory for hatchery-raised fall chinook. Both the



sockeye and fall chinook programs reflect the success of improved dam survival as well as fish hatchery programs tailored to protect the genetic integrity of local fish populations.

But a continued rebound in fish returns is only the first of two legacies that Wright hopes will arise from BPA's decades of work to address the damage that dams did to salmon and all that depends on them. The second legacy, he said, is a more human one.

"I hope that the legacy will also be that there have been a group of people who have been salmon people and a group of people who have been power people or,

even more broadly, a river user community that has viewed itself as being on opposite sides of this issue, who today are aligned and work together at a leadership level, at a management level and at a working level.

"And I hope that that will be as much of a legacy, because the biological opinion and the Fish Accords are 10-year documents. They will expire in 2018. But I hope that what changes here is that we have found a different way of working together. One that will last long after we are gone."







# *A commitment to renewable energy ~* The **POWER** *is blowing* *in the* **WIND**



*Researcher Bob Baker, an Oregon State University meteorologist, takes wind measurements in 1979. Pinpointing areas with the greatest wind potential was essential to siting generators for BPA's wind programs of the early 1980s.*

BPA was into wind power decades before the term “wind farm” became almost as common as “wheat farm” in gusty, rural areas of Oregon and Washington.

In the late 1970s, following the first Organization of Petroleum Exporting Countries (OPEC) oil embargo, the United States began pursuing new, renewable resources for power generation. The aim was to reduce the country's alarming dependence on foreign oil and alleviate energy shortages. The Pacific Northwest already generated most of its energy from renewable hydroelectric power, and BPA began investigating wind as a complementary source to the hydroelectric system.

In 1979, BPA pursued several projects that would put the agency on the map as a pioneer of the modern-day wind power movement.



*Washington Sen. Warren Magnuson is joined by Gov. Dixy Lee Ray (left), Boeing CEO Thornton "T" A. Wilson (dark overcoat) and BPA Administrator Sterling Munro (right) at Goodnoe Hills for the 1980 groundbreaking ceremony for the world's first multimegawatt, commercially viable wind farm. The project, called the MOD-2, was undertaken by USDOE, NASA, Boeing, Battelle, Klickitat County PUD and BPA.*





*The MOD-2 wind project in south central Washington was dedicated into service May 1981. Commercial-scale operation began about a year later and continued over the next five years under this pioneering test project.*

## Small wind generation pilot — ‘SWECS’

The agency’s first wind effort was modest — the Small Wind Energy Conversion Systems pilot. Under a five-year program, BPA would install a dozen family-sized wind generators in Klickitat County in south central Washington.

BPA had funded research starting in 1976 by Oregon State University’s Department of Atmospheric Sciences to determine where the Northwest wind blew best for power production. OSU meteorologist Bob Baker gathered wind data on 50 sites across the region. The hills lining the Columbia River in south central Washington looked especially promising.



*Klickitat County PUD customers Ed and Jeanne Hctor offered their farm near Goldendale as a test site for BPA’s small wind generator program in 1980. Hctor welcomed inquisitive visitors from around the world eager to learn about his pioneering wind generation experiences. (Rod Aho/BPA)*

BPA collaborated with Baker’s team and Klickitat County Public Utility District in 1979 to deploy about 20 wind speedometers — called anemometers — that would measure and record wind around Klickitat County. A year’s worth of data helped narrow down which sites should receive the first 2-kilowatt wind generators.

By modern standards, these units were very small — one thousandth as powerful as the commercial wind turbines now dotting the





*Construction of the MOD-2 wind turbine cluster began in 1980, and the project's three experimental 2.5-MW generators were brought on line over the next two years. (Rod Aho/BPA)*

hills along the Columbia River. One SWECS wind generator would produce just enough power for an electric space heater or hair dryer. All 12 of the units together might power a few all-electric homes ... on a windy day.

The first two generators were installed in the Goodnoe Hills area north of the Columbia River Gorge — one at Ed Hctor's farm near Goldendale, Wash., the other near Elmer Beeks' residence in Murdock, across the river from The Dalles.

The machines were connected to the residences and the Klickitat PUD system, and power meters measured their generation. Whatever power the homeowners did not

use went to the utility. BPA hoped to learn whether small wind machines were dependable and compatible with the grid.

## World's largest wind turbines

Meanwhile, the Department of Energy sought locations for an experimental 2.5-megawatt wind generator. The turbine design, called the MOD-2, would build on DOE's earlier efforts to design a large-scale wind turbine for use in utility systems.

BPA proposed the Goodnoe Hills site. Putting the turbines on a windswept bluff above the Columbia Gorge and tying them

into the transmission grid would test how well the hydroelectric system could back up wind generators. "The Columbia will act like a battery to store wind power for when it's most needed," BPA Administrator Sterling Munro said.

Installing three of the giant MOD-2 machines at Goodnoe Hills was a joint effort by sponsor DOE, project manager NASA, manufacturer Boeing, researcher Battelle, and host utilities Klickitat PUD and BPA. Munro soon found himself breaking ground for the experiment on that windy hillside with Sen. Warren G. Magnuson, Washington Gov. Dixy Lee Ray and Boeing



CEO Thornton “T” A. Wilson. The MOD-2 cluster was dedicated in May 1981 and tied to the grid in October 1982. BPA would operate the machines for two years as the first multimegawatt, commercial-scale “wind farm” in the world.

For the technical enthusiast: the MOD-2 turbine was a horizontal-axis machine with a 300-foot diameter, two-blade vertically spinning rotor atop a 200-foot steel tube tower. From the ground to the tip of a blade at its zenith was 350 feet, more than the length of a football field. The 2.5-megawatt generator was housed in a boxcar-sized nacelle (compartment) atop the tower and connected to the rotor shaft via a massive transmission gearbox.

The output of each machine was comparable to that of a diesel locomotive, and the triad of MOD-2 turbines operating together — a total of 7.5 MW — could supply enough power to pull a mile-long freight train up the Gorge or power several thousand average Northwest homes.

The bottom line: The MOD-2s were a quantum leap above any other wind generation project undertaken at the time.

## Small wind data collection

During this same era, BPA launched another pilot — the Small Wind Data Collection Program — to locate 140 anemometers in a dozen utility service territories around the region. Data collected would identify good locations for future wind farms, where the wind blows consistently at moderate to high speeds.

As the data poured in, researchers were surprised to learn that some areas previously regarded as having good wind potential were disappointingly “calm.” One finding didn’t surprise anyone: Large tracts of land in the vicinity of the Columbia River Gorge would be prime wind country.

Over the next several years, BPA’s diminutive SWECS windmills and the giant MOD-2 turbines demonstrated that wind generation and hydroelectric systems were indeed compatible, at least on this scale.

The principle of Munro’s “wind power battery” was simple enough: When the wind blew, the turbine output allowed BPA to back off hydroelectric generators, allowing more



*Technicians fine tune mechanisms inside a MOD-2 wind turbine. At 200 feet above ground, the generating units required a crane to move heavy pieces of equipment. (NASA)*



water to be stored behind the dams. When the wind dropped off, stockpiled water would rush through the hydroelectric turbines, recovering the stored energy from the “battery.”

However, as with any research effort, there were problems.

## Early SWECS wrecks

Almost as soon as the SWECS units came on line, the generators and gearboxes began breaking, and some anemometers failed. There were problems finding replacement parts and qualified maintenance workers. “It took forever to get someone to repair them,” Mary Jean Lord says, recalling her days as project coordinator at Klickitat PUD.

Because of the problems, she notes, only a handful of the SWECS windmills went into service. “Once the program ended, BPA offered to sell the units to the homeowners at 10 percent of the cost,” Lord said. “When no one took up the offer, BPA agreed to give them away. Only Ed Hocter and one other participant said yes.”

Hocter liked his machine. “You could see it from the highway,” Lord recalls.



*A project engineer inspects anemometers and other sensitive instruments that feed data to computers controlling operation of a MOD-2 unit. (NASA)*

“Visitors from all over the world would stop to ask him questions.” The windmill is still there today, spinning for all the world to see, but it hasn’t produced electricity in many years.

## MOD-2 adventures

BPA technicians had no experience with the one-of-a-kind equipment on the MOD-2. They found it challenging to maintain machinery inside a big metal box 200 feet in the air.

Two major incidents occurred during initial testing. In June 1981, Turbine 1 experienced an overspeed failure during an



*A worker scales a massive blade that drives a modern wind turbine’s power generator. The advent of wind farms in the Northwest has created high-tech jobs and stimulated local economies.*

emergency shutdown, damaging the drive train. In November 1982, a large crack was discovered in its low-speed shaft. The project was put on temporary hold. After redesigns and corrective actions, all units returned to service.



By 1986, the Research Development & Demonstration effort had run its course and the MOD-2 machines were dismantled.

Despite the setbacks, MOD-2 led to improvements in the design of wind turbines, technologies such as the steel tube towers and sectioned rotors for easy transport of the blades. BPA learned early lessons about how to smoothly integrate variations in wind power into the grid. As



*BPA wind program manager George Darr was an acknowledged and much-sought-after expert on wind generation during the 1990s. His efforts helped BPA become a leader in the emerging field of wind integration — connecting wind projects to the power grid.*

anticipated, the Columbia River power system proved admirably efficient at storing wind energy and returning it to the grid when needed.

About a decade later, BPA contracted for a share of the output of early wind projects in Wyoming to test the viability of improving wind energy technology. A section of the Northwest Power Act allows BPA to invest in demonstration projects to support renewable energy.

“We made very conscious decisions along the way to encourage wind power development early,” said BPA Administrator Steve Wright. “The result is that the Northwest has led the way in the development of another renewable resource.”

Today, as more than 2,000 turbines spin within BPA’s balancing area — at times generating the majority of the energy on its grid — those quirky early windmills at Goodnoe Hills take their place as the advance scouts for a vigorous new regional resource.



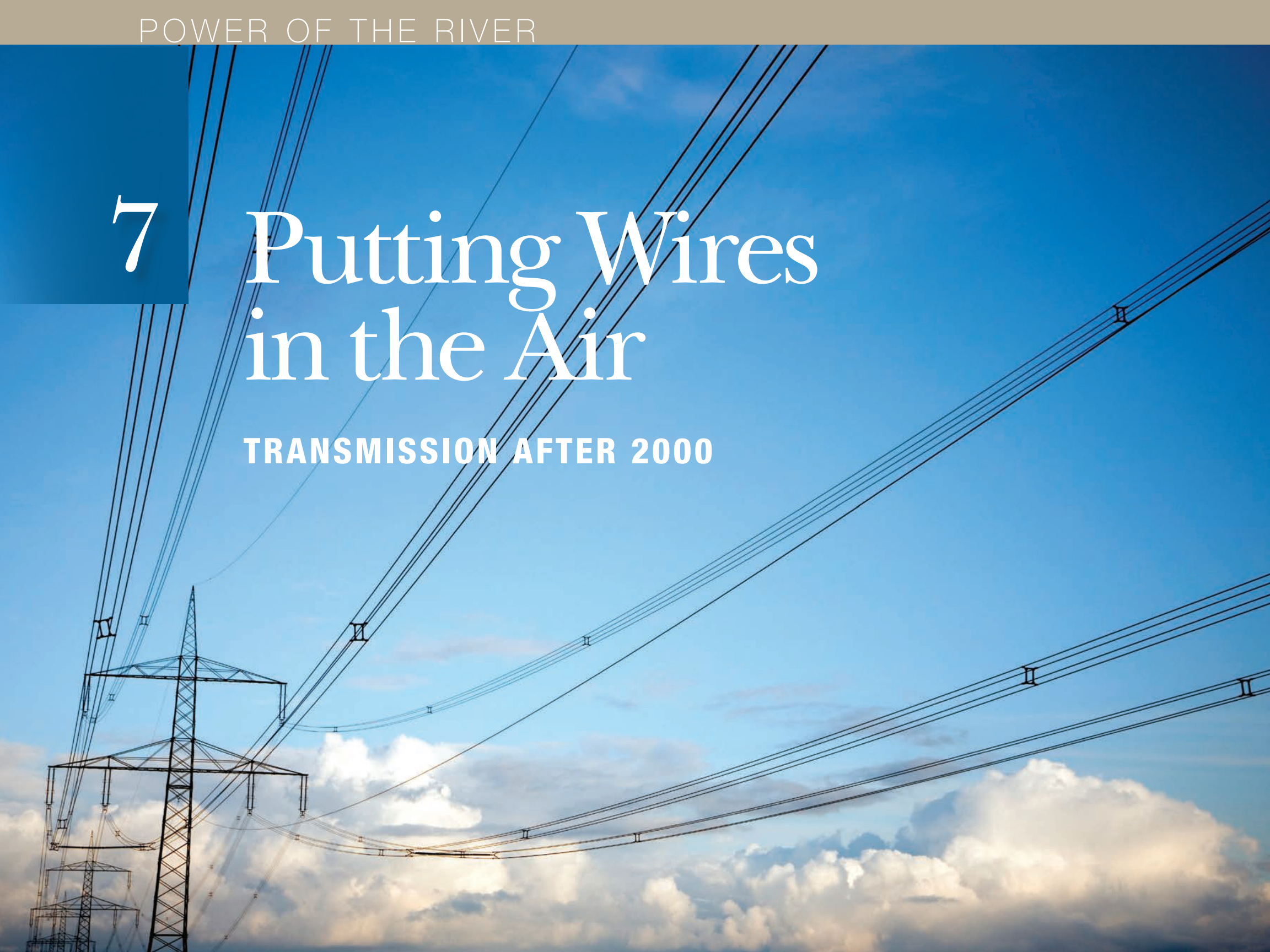
*Recipients of BPA’s small wind generators were proud to participate in the program. This 2-kilowatt machine was installed near the Elmer Beeks residence in Murdock, Wash., across the Columbia River from The Dalles. (Rod Aho/BPA)*



7

# Putting Wires in the Air

**TRANSMISSION AFTER 2000**





“**T**he system is in crisis.” That’s not a declaration a transmission system executive would make lightly. But that is what Vickie VanZandt told Congress in 2001. She not only said it, she convinced them of it.

As the vice president of BPA’s Transmission Operations and Planning, VanZandt oversaw a system that was under significant strain. She was responsible for planning the future of BPA’s 15,000 miles of transmission lines, and she was not about to let them fail.

Critics had once accused BPA of overbuilding its grid with more than enough capacity to serve the region. But that capacity proved important as demand for power grew. Changing markets and limitations on hydroelectric dams to protect fish put further pressure on the grid. Soon any remaining margin disappeared even as the agency stretched the capacity of the system with new technologies.

Yet that was not the only challenge VanZandt faced. The political and financial dynamics influencing the power system had changed. This was the decade of deregulation, when the National Energy Policy Act of 1992 drove a radical restructuring of the U.S. power system. The act was about encouraging competition in the energy market and lowering



prices. It led BPA to fundamentally change its operations. The federal agency had to keep up with private industry, and many questioned whether the bureaucracy could survive the open market.

Under the new rules of deregulation, the use of BPA’s transmission grid — already

stressed from years of doing more with less — increased by a third. Patterns of use also changed. VanZandt and her team had to consider this new demand on the system in their plans. They also had to plan for an influx of new generators, eager to enter the new energy market.





The team studied the system, pinpointed its weaknesses and devised a plan to strengthen it. Innovation alone would no longer cut it. New transmission lines would be needed. To build them, VanZandt would have to persuade the BPA administrator — and ultimately Congress — to support a billion-dollar plan.

Her testimony would launch BPA on the largest transmission expansion program in the nation. And as BPA raced to expand its transmission system, new challenges emerged. The most formidable was a surge of wind generation dependent on transmission availability. It would propel BPA's second transformation in as many decades.

## The decade of deregulation

To implement the National Energy Policy Act, FERC in 1996 required utilities that both sold power and owned transmission to separate those functions and make transmission services available on a non-discriminatory, open-access basis. That wasn't new for BPA. Since the 1950s, BPA "wheeled" power — that is, allowed other utilities to send electricity over its transmission lines to others. "About one-third of transmission



revenues came from wheeling before the 1992 act. It wasn't unusual or unprecedented for us," VanZandt recalls.

But separating its power and transmission functions was another story. And when FERC decided that any generator should have equal access across any transmission system, the industry faced some difficult calls.





*As the vice president of Transmission Operations and Planning, Vickie VanZandt (shown here with Administrator Steve Wright) recognized the need to reinforce the stressed and aging grid.*

“There were a lot of internal discussions about how far would we go,” recalls VanZandt. “We even talked about splitting transmission off and forming a transmission entity — two separate agencies. That was actually my favorite structure, philosophically, but we didn’t do that. We did separate significantly, where we only came together at the administrator.”

Though not subject to FERC’s jurisdiction and its call to separate, BPA did so voluntarily. In October 1996, the agency began operating a



new, self-supporting Transmission Business Line separate from power generation. BPA led many other utilities in the pace and degree of separation of its transmission and power supply functions. It was among the first to post available transmission capacity and rates on the Internet. Through its website, BPA began offering comparable transmission rates and services to all power marketers at the same time. BPA’s Power Business Line also started buying transmission for its own use at the same rates, terms and conditions as all other users of the grid.

And there were more grid users than ever. Deregulation spawned independent power

producers, or merchant generation plants. They could sell their output to anyone who would buy it. A new cadre of power marketers brokered deals linking the merchant power to the purchasers. Both began using BPA’s grid as an open access freeway to reach desired markets outside of the Northwest. By late 1996, BPA found itself managing thousands of transactions from hundreds of utilities and marketers each day, compared to just dozens of transactions from a handful of customers previously.

BPA also had to maintain a competitive position as power prices dropped. Power marketers, with their newfound access to BPA’s





transmission lines, offered prices well below BPA's while BPA also had to compete with others for use of its own lines. BPA cut costs while striving to become "market driven, customer focused, cost conscious and results oriented," as the new mantra went. BPA cut capital borrowing for transmission projects from \$361 million in 1992 to \$123 million in 1998. That translated to staffing reductions,

accomplished through reassignments and leaving positions open. The Transmission Business Line staff dropped 36 percent, from 2,598 in 1992 to 1,665 in 1998. Design engineers and construction crews were hit hardest.

At the same time, the use of BPA's grid increased by about a third. The agency had not built major new transmission since 1987, when development of major new generation

wound down. Throughout the 1990s, BPA managed its increasingly stressed transmission system with very effective short-term fixes. But some of those fixes, while innovative, made BPA more vulnerable by allowing operators to push the system closer to the edge.

## 'Saddling up the kangaroo'

The transmission system was in some sense a highway without clear rules of the road. Philip Moeller, then legislative aide to Republican Sen. Slade Gorton of Washington (and later a FERC commissioner), put it this way: "It's chaos out there."

Market manipulation in 2000 contributed to skyrocketing power prices and power shortages in California. Although few knew it at the time, power traders at the infamous Enron Corp. encouraged power suppliers to shut down plants and create artificial power shortages. The limited power supply raised the wholesale power price 800 percent. The entire West Coast power system found itself in crisis.

The crisis was as much about transmission as generation. Many hours of blackouts in California resulted from transmission congestion rather than inadequate power supply.





*When Judi Johansen became BPA administrator in June 1998, no one could have foreseen a power crisis. But by 2000, the agency entered one of the most worrisome chapters in its history.*



In February 2000, BPA Administrator Judi Johansen called a conference to discuss reliability of the West Coast power system. The problem was not just too little transmission, attendees concluded. The system, they found, faced new demands it was never designed for. Expecting a transmission grid built for relatively predictable regulated utilities to work in a more freewheeling competitive market is “like asking a kangaroo to run like a racehorse,” Ken Peterson of Powerex warned. “We’ve saddled up the kangaroo and are in the middle of a hell of a ride.”

Deregulation had changed the way power flowed across the system. The grid had been designed to carry power from major sources of generation, mainly dams and coal plants, to long-term purchasers. But in a deregulated market, transmission operators could not predict which generators would run or where the power would go from one hour to the next. Dispatchers had to learn to operate the system in ways never envisioned by those who built it.

“It’s asking for a lot of flexibility out of the transmission system to enable a fully competitive,

highly volatile market,” VanZandt explained. “You might need reinforcements, not just experience. It requires experience as well — but you need a flexible system that can take those changes hour-to-hour or minute-to-minute.”

To top it off, BPA faced more than 13,000 megawatts of requests to connect new generation — much of it natural gas turbines — to its system in 2001. But load growth and additional wholesale transactions meant the agency could barely handle what it already had.





“It’s asking for a lot of flexibility out of the transmission system to enable a fully competitive, highly volatile market.”

Vickie VanZandt

## Twenty projects in 10 years

Cost cuts had left BPA with a serious backlog of investment in its transmission system. Aging equipment was not being replaced quickly enough to avoid failures. Engineers saw an immediate need for several new projects to ease congested points in the grid. Some spots were especially critical because they

were “constrained,” which means they could not carry all of the power that transmission customers wanted to deliver.

“Customers experienced increasing curtailments across certain transmission paths on our system,” VanZandt said. To maintain the stability of the system, BPA had to reduce the amount of energy crossing the congested area. That meant some energy could not reach its destination. “And that didn’t make them happy. We had put off investments as long as it was prudent.”

“Orders came from the top to come up with a plan,” recalls Brian Silverstein, then the manager of transmission planning. “The administrator wanted to know, ‘If you were given funding, what would you build, why, and how much would it cost?’”

Silverstein’s team was given one week to do it.

“Generally there’s nothing that planners do quickly,” observes Silverstein, who later became the senior vice president of Transmission Services. “We agree on one thing: We need more studies.”

Luckily, they had already completed many studies. They identified 20 projects to put a little margin back into the grid over the coming 10 years. About half of the projects were building new lines or rebuilding existing ones.



“There is not a substitute for new transmission,” VanZandt said. She had always been a strong proponent of “non-wires” options to ease constraints and increase capacity without new construction. But those techniques could only go so far. New transmission, on the other hand, “is quite flexible,” she said. “It makes for a stable grid. There are instances where nothing else will do.”

But it would be expensive. BPA’s capital budget for fiscal years 2002 to 2006 was already \$1.35 billion, not including the cost of the proposed transmission projects. VanZandt would need at least another \$700 million. Meanwhile, the agency was struggling through the West Coast power crisis, facing the possibility of losing as much as a billion dollars in a single month.

Acting Administrator Steve Wright saw that a lack of transmission capacity had contributed to the problem, and the condition of the West Coast power grid was under national scrutiny like never before. “Our focus was on things that we could do something about,” Wright recalls. “And the things that were within our control were the ability to increase supply from our generation and the ability to decrease the demand on our system. And transmission was a component of helping to bring more supply to the marketplace.”

Nobody knew just how many new power plants would be built. But there was talk of nearly 20,000 megawatts of new generation in the Northwest — about the capacity of 20 Bonneville Dams. “If you’re going to add more megawatts to the system, you’re going to have to find a way to move those megawatts across the system,” Wright said.

He was on board with VanZandt’s plan to build more transmission. The plan assumed that some, but not all, of the new generation would be built. BPA’s proposed projects would support 8,000 to 12,000 megawatts of new generation.

## Convincing Congress

BPA has a revolving fund to pay for capital projects such as new transmission lines. Congress granted Bonneville self-financing authority in 1974 — making it the only power marketing agency that doesn’t require congressional funding for capital improvements. BPA borrows money from the U.S. Department of Treasury and repays all of it, plus interest, eliminating the need for annual appropriations of taxpayer funds.

In 2001, BPA had a \$3.3 billion borrowing limit, but most of the funds were already







*A helicopter lifts tower sections into place on the Kangley-Echo Lake line to minimize impacts on the ground.*

committed. The agency's only option was to ask Congress for more borrowing authority.

So VanZandt went to Washington, D.C. She got right to the point: The problem had been building for a decade, she said, and the quick fixes were exhausted. It would take at least two to five years to plan, site and build a major transmission line, she told Congress.

"The system may fail before we can act," she warned.

In briefings, VanZandt told congressional staff and others at the Office and Management and Budget, "What we have to do is hang some wire." She made a lasting impression in Washington, D.C. BPA also found strong support across the Northwest for increased investments to maintain and improve the transmission system. The projects would pay for themselves over time through revenues from transmission users.

But by 2003, Congress still had not approved BPA's request. BPA's infrastructure program was in jeopardy.

The agency did what it could, preparing the environmental studies for the more urgent projects. But most of the projects hinged on how well BPA pleaded its case to Congress in the wake of the power crisis.

"We described [the power crisis] for what we believed it was — a problem in which we

had allowed ourselves to become victims," Wright recalled later. "Yes, people had taken advantage of us." But with more investment in new generation as concerns about the power supply mounted during the 1990s, "we would have been less susceptible to becoming victims," Wright said. "We were saying, 'We can do something to help control our destiny by seeking to invest in the system and being able to add more supply.' And I think folks looked at that and said, 'It makes sense to us.'"

Congress ultimately agreed. On Feb. 20, 2003, it approved a \$700 million increase in BPA's borrowing authority, which allowed the agency to begin serious work on critical infrastructure projects that had idled on the drawing board since 2001.

"We wouldn't have gotten the \$700 million increase in borrowing authority if it hadn't been for the West Coast energy crisis," Wright said.

## Transmission gets to work

BPA rushed to start work on its first new 500-kilovolt line since 1987 — the Kangley-Echo Lake project, first proposed in 2001. But as soon as it started talking publicly about where





*The Kangley-Echo Lake line crossed the Cedar River Watershed, a pristine source of drinking water for about 780,000 people in the Seattle area.*

it wanted to put the line, BPA realized getting more borrowing authority might not be the biggest challenge.

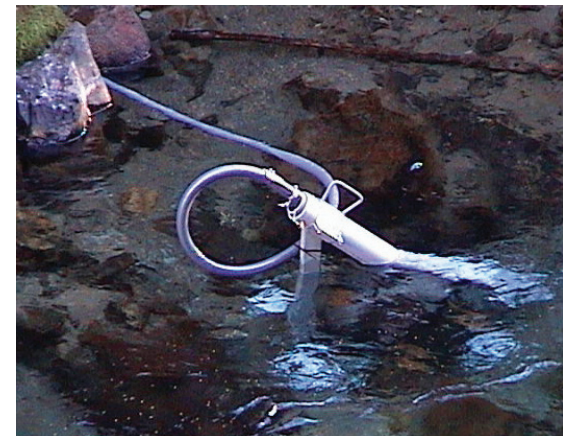
BPA's last major transmission line project — the Colstrip line between Montana and Washington — had proven that public

opposition could alter, stall or even stop a project. Kangley-Echo Lake also sparked stiff opposition.

“It started out simple,” recalled Lou Driessen, project manager. “We just needed this little tie line. We took a look and said we could just parallel an existing line. There were no homes in the area.” But BPA's proposed line would cut through the Cedar River watershed, a source of drinking water for about 780,000 people in the Seattle area. Opponents of the proposed route included the city of Seattle, which owns the pristine watershed and manages it to protect water quality. They argued that construction could contaminate the water supply, damage the environment and harm protected salmon and bull trout.

“Seattle had its own public process to safeguard water quality and wildlife habitat,” Driessen said. “When we began to meet, they said there's just no way BPA is ever going to build a line through the watershed.”

BPA had planned a two-year environmental review process, but delayed the project to look at alternative routes. But, Driessen cautioned in a 2002 interview, “Not building at all isn't an option.” Without the project, BPA was at greater risk of pushing the transmission system beyond its capacity, raising the risk of blackouts. Other



*BPA went to great lengths to protect the watershed, going so far as to place catch cloths under Honey Buckets (top) while instruments monitored water quality (bottom).*





*Double-circuit towers that support two sets of transmission lines helped reduce the environmental impacts of BPA's Kangley-Echo Lake line. (Lou Driessen/BPA)*

transmission line routes were also controversial. They would run close to homes, and some would require the removal of as many as 50 houses. BPA preferred crossing the Cedar River.

The agency said it would take unprecedented steps to protect the water, going as far as using helicopters to access remote areas and avoiding even the slightest contamination from oil that might otherwise drip from trucks. Crews were not permitted to chew tobacco so they would not be tempted to spit on the ground. A key concession: "If we fouled it up, it would be on us to filter it," Driessen said. "We looked worldwide for an insurance company that would back the project. The risk was there, so we were willing to do what we needed to do to prevent it."

The concessions led to an agreement. BPA received unanimous support from the Seattle City Council, and even received praise from environmental groups that just a year before had opposed the construction. It helped that the line provided a form of energy efficiency by significantly reducing power losses as electricity moved through the grid.

BPA partnered with an independent environmental consultant to monitor construction. Seattle Public Utilities, the city of Seattle and BPA worked closely to ensure protection of the watershed.

Helicopters lifted tower sections into place, preventing ground disturbance and helping crews install all 47 transmission towers in less than a week. Trucks and ground-based



*Construction crews didn't know it, but they completed Kangley-Echo Lake just in time to beat a massive 2003 snowstorm. If the line had been energized a few days later, the transmission grid in the area might not have been able to handle the demand.*

equipment carried catch cloths — giant diapers, in effect — to prevent contamination from oil leaks. BPA also funded \$1.9 million in land purchases to further protect Seattle's watershed. Under the agreement, the Trust for Public Land protected 640 acres of sensitive forest slated for residential development.

BPA completed the line on the last day of 2003. The timing was fortuitous. Just days later, a severe storm brought record high power demand to the area. Without the line, the Puget Sound area might have experienced a blackout.



## Building when no one else was

BPA built four transmission projects in the first few years of the 21<sup>st</sup> century, even as it tried to climb out of the financial hole of the West Coast power crisis. The agency had the largest transmission construction program in the country from 2003 to 2005. Nationwide, much of the utility industry was still trying to figure out who should build and pay for transmission in a deregulated market.

Even with the boost in borrowing authority, BPA struggled to finance its transmission infrastructure program. The agency looked for creative, cost-effective financing arrangements.

It found one for the Schultz-Wautoma project — a new 63-mile, \$164.2-million line that would add 600 megawatts of capacity to the heart of BPA's grid in central Washington.

The new approach was called a third-party capital lease agreement. BPA would manage the construction and operate the line, but it wouldn't own it. At the



*Crews install a transmission tower footing during construction of BPA's Schultz-Wautoma line.*



*Wautoma Substation, the southern end of the Schultz-Wautoma transmission line in Washington.*





*BPA used implosive fittings during construction of its Grand Coulee-Bell line. The fittings employ explosives to compress a metal sleeve around the end of the conductor, locking it into place.*



*Modernization of BPA's Celilo Converter Station included replacement of decades-old mercury arc valves with solid-state technology to convert alternating-current electricity to direct-current for transmission to Southern California.*

end of the lease, BPA would have the option of extending the lease or purchasing the line.

By saving its Treasury borrowing authority for other purposes, BPA could move forward on constructing other projects such as the 84-mile, 500-kilovolt Grand Coulee-Bell line. That project removed a critical bottleneck limiting transmission from generators east of Spokane, Wash., to population centers farther west. It went into service in 2005.

That year, BPA reported it had invested

more than \$1 billion in the transmission system in four years. Completed projects included three new 500-kilovolt lines, a new 500-kilovolt substation, two lower-voltage lines and modernization of the Celilo Converter Station, the northern end of the direct-current intertie that connects the Northwest and Southwest grids. At Celilo, BPA finished replacing 30-year-old mercury arc valves with state-of-the-art, solid-state converters — a job the agency undertook in phases starting in the 1980s.

In the Energy Policy Act of 2005, Congress addressed the question of whether the transmission systems of BPA and other government-owned utilities should be subject to the same FERC standards that the Federal Power Act had applied to other, mainly investor-owned, utilities many decades earlier. In promoting deregulation, FERC opened the grid for energy buyers and sellers of all stripes by requiring transmission owners to give others access to their lines under an evolving set of

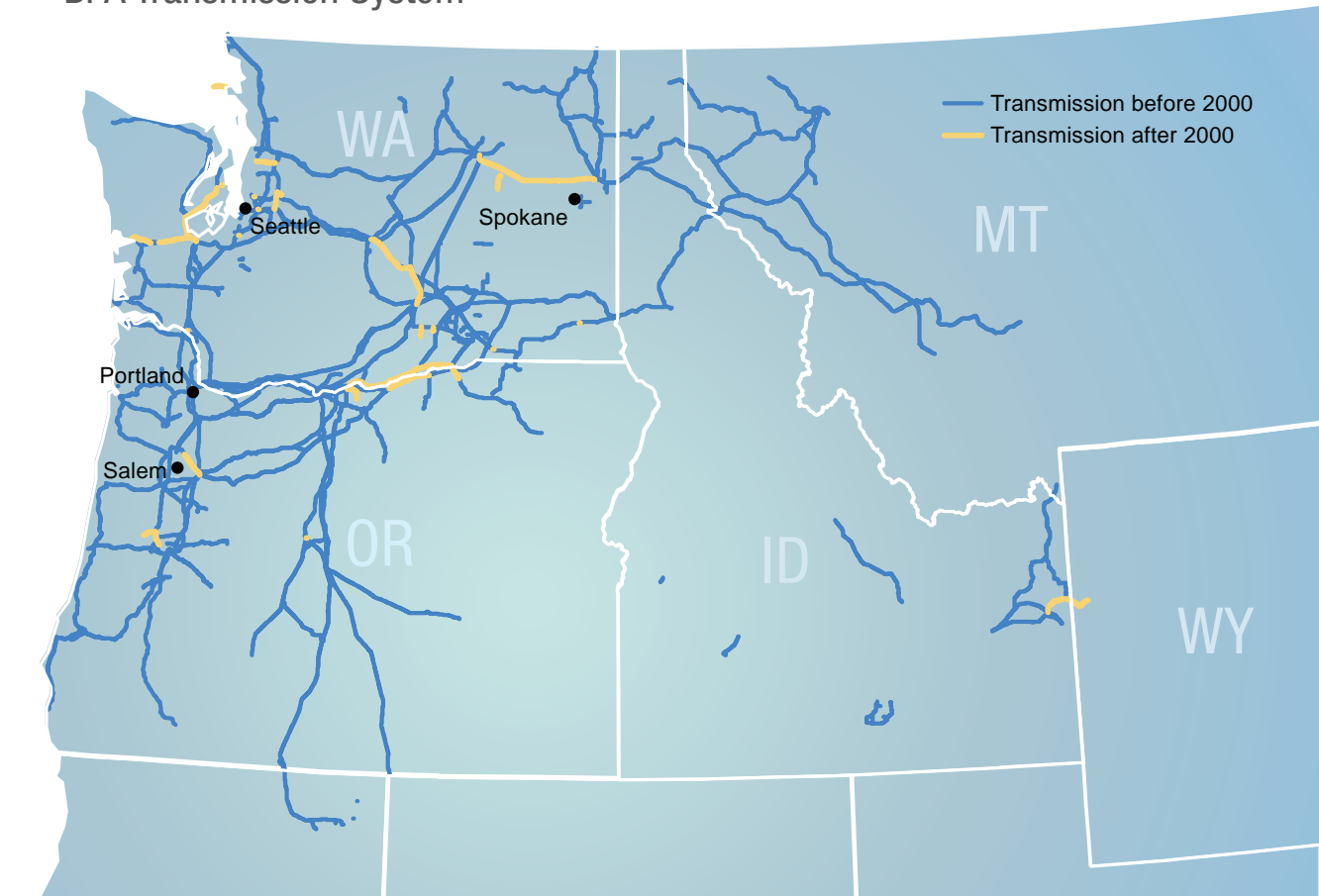


## BPA Transmission System

FERC-mandated provisions outlined in an Open Access Transmission Tariff, or OATT. However, FERC's authority under the FPA over governmental entities such as BPA or other publicly owned utilities — called “non-jurisdictional utilities” — was much more limited.

Consequently, FERC created a “reciprocity” approach that gives non-jurisdictional utilities such as BPA access to transmission under a jurisdictional entity's OATT. In return, the non-jurisdictional utility must voluntarily provide access to its system under an OATT that FERC considers equal or superior to the FERC-mandated OATT. But not everyone agreed. Some argued that BPA and other non-jurisdictional utilities, despite their nonprofit status, should be subject to the same FERC authority as the investor-owned and other utilities, to assure a level playing field.

“This all played out on a national stage,” recalls Randy Roach, BPA executive vice president and general counsel. “On the one hand, local control and self-determination were the hallmark of many non-jurisdictional entities because of their governmental origins and geographic restrictions. Given that they were the product of, and subject to, their own unique and often detailed statutory requirements, and that FERC was viewed by some as having its own unique agenda, the prospect of being



*Transmission congestion contributed to the power crisis, as did a shortage of generation. The lines built before 2000 (shown in blue) could not handle the growing demands, and BPA had to devise a way to strengthen the grid. The yellow lines indicate new BPA construction.*

subject to full FERC regulation was, to say the least, disquieting to many of them. On the other hand, markets were changing and evolving regardless of geographic boundaries and competition was generally viewed as a good thing. A number of publicly owned utilities

were dependent on others for transmission and there was growing recognition that open transmission access and markets could hasten the development of renewable resources.”

Congress took a middle ground under Section 211A of the Energy Policy Act of 2005





*Brown branches, bottom center, were all that remained of a cherry tree after contact with BPA's Big Eddy-Chemawa line in 2008, leading to severe consequences for BPA. See sidebar, page 234.*



by adopting a sort of “do unto others as you would do unto yourself” approach. Section 211A does not mandate FERC action, but instead gives FERC the authority to require a non-jurisdictional utility to provide transmission service at rates “comparable” to what the utility charges itself and under comparable terms and conditions that are not “unduly discriminatory or preferential.”

“What this really does is grant FERC the authority to police whether non-jurisdictional entities are according others comparable treatment when it comes to transmission services,” Roach says. “It does not have to be the same treatment, but it does need to be comparable.”

An issue that has yet to be fully tested is how Section 211A fits with other statutory requirements that apply to non-jurisdictional utilities. In BPA’s case, BPA is subject to environmental, budgetary and other requirements that it may have to meet before it provides service to others. While BPA interprets its own organic statutes, Section 211A empowers FERC to determine whether the service BPA provides to others meets the comparability requirements. (In 2011, FERC concluded that BPA had discriminated against wind generators by limiting their transmission access when high river flows created an oversupply of electricity generated to avoid harm to fish.)



*From left, Deputy Secretary of Energy Daniel Poneman, BPA Administrator Steve Wright, Tri-City Herald reporter Kevin McCullen and Larry Bekkedahl, BPA vice president of Engineering and Technical Services, discuss construction of the McNary-John Day line. BPA funded the project through its increased borrowing authority from the Recovery Act.*

## Recovery Act supports transmission investments

As the costs of updating the transmission and hydroelectric systems mounted through the 2000s, BPA’s borrowing authority was running out. Executives explained the problem everywhere from the Northwest to Washington, D.C. But given the rising federal deficit, Congress was in little mood to raise BPA’s credit line.

Then the recession hit and the incoming Obama administration began looking for effective ways to revive the economy. Infrastructure projects were clear candidates. “What was a non-starter for a long time, all of a sudden, in a matter of a few months, became a real opportunity,” recalled Administrator Steve Wright.

T.J. Glauthier, a former deputy secretary of energy, was the point person on energy issues for President Obama’s transition team. Close to 10 years earlier, Glauthier had selected Steve Wright as BPA’s acting administrator. Wright met with Glauthier, who concluded that BPA spending represented a good investment, especially given the agency’s track record of repaying the Treasury with interest.

Sen. Patty Murray and Rep. Norm Dicks of Washington, both members of appropriations committees in Congress, pushed for an increase

in BPA’s borrowing authority to be included in the American Recovery and Reinvestment Act. But this was no ordinary increase. It nearly doubled BPA’s borrowing authority, boosting it by \$3.25 billion to a total of \$7.7 billion, and was backed by nearly every member of the Northwest congressional delegation. President Obama signed the act into law in February 2009.

“The stars were in perfect alignment,” said Roger Seifert of BPA’s Washington, D.C., office.

The increase supported BPA investments in transmission, much of it to support wind energy; refurbishment of hydroelectric plants; energy efficiency; and fish and wildlife protection. Wright said the most important things that happened for BPA in Washington, D.C., in the last decade were the two increases in the agency’s borrowing authority.

The second and biggest increase also illustrated important lessons, he said. “One is that when you have a problem, if it feels like there’s no way to overcome it, you should still keep talking about it because conventional wisdom frequently changes. The second is the value of relationships in Washington, D.C.”





## Just ‘build the sucker?’

Not so fast. Sometimes new conservation or operational measures can avoid or delay the construction of new transmission lines. BPA has long pursued such “non-wires” solutions.

For instance, in 1991, a ship’s anchor damaged one of three underground transmission cables to Orcas Island in Puget Sound. The damage reduced transmission capacity to the island, putting it at risk of outages at times of peak winter demand. BPA faced a long wait for replacement cable unless it wanted to pay a premium for priority treatment.

Instead, BPA and local utilities pursued conservation measures to cut peak demand on the island about 7 megawatts by controlling electric devices such as residential water heaters. That delayed installation of a new line by nearly eight years.

“If you can put off a capital cost for even a year, that’s worth a lot,” said Brian Silverstein. “Technologies may come along that will make that line no longer necessary.”

But it was not always an easy sell as BPA launched major new transmission projects in the early 2000s.

“Most people in the transmission business are used to the old way of doing things,” said Carolyn Whitney in 2004, then BPA’s vice president of Transmission Business Strategy and Public Affairs. “The traditional mindset is, ‘You’ve got a congested transmission path — so condemn the land and build the sucker.’”

BPA broke the tradition by launching the Non-Wires Solutions Initiative to pursue non-wires options and formed a roundtable to gather insights from experts and interest groups.

Numerous non-wires pilots since 2003 highlighted the need for more lead time. So BPA’s Transmission Planning and Energy Efficiency organizations have since begun pursuing projects five to ten years out, allowing more time for planning and implementation.

## A billion dollars doesn’t fix it

The investments BPA made in the first part of the century relieved the worst of the congested spots in its transmission system, but not all.

In 2005, the agency noticed a sharp increase in instances where the grid was operating outside of industry standards for safety and reliability. It was summer, and air conditioners in both the Pacific Northwest and California were cranked up. Utilities and power marketers in Canada and the U.S., including BPA, were sending large amounts of power into California. Some transmission paths became overloaded.

Dispatchers didn’t have tools or processes to predict congestion ahead of time, so they had no way to prevent it. From June through August, flows exceeded the operating transfer capacity — the industry threshold for safe, reliable conditions — 174 times. Each instance exposed the system to potentially catastrophic consequences. The more often the system operated outside the limits, the greater the risk of outages.

The 1996 West Coast outage that blacked out more than seven million people proved that multiple events on a system can occur at



lightning speed, leaving dispatchers little or no time to react. That event was eclipsed when, on Aug. 14, 2003, more than 50 million people lost power across parts of the Midwest, northeastern United States and Ontario, Canada.

These disturbances led the Western Electricity Coordinating Council to levy penalties on transmission owners or operators when they exceeded operating transfer capacity for more than 20 or 30 minutes, depending on the type of transmission path involved.

In the 2005 cases, BPA dispatchers restored the transmission system to reliable operating conditions in less than 30 minutes. But sometimes they had to take aggressive actions to reroute federal generation and, in some cases, curtail transmission schedules to move power through other parts of the system. Some of these steps forced those relying on the power to make rapid changes to maintain service to customers.

The worst of the congestion was in the Puget Sound area. Transmission in Puget Sound was also a conduit for the Canadian Entitlement, a share of power generated by water stored behind British Columbia dams constructed under the 1964 Columbia River Treaty between the United States and Canada.

Several times through 2000, British Columbia didn't receive its full entitlement. Under



the Treaty, BPA cannot curtail the entitlement if it does not also curtail other transmission schedules into the Puget Sound area. But BPA did not have a reliable way to balance the curtailments. The agency developed a manual curtailment procedure, but it was clumsy and complex. It required operators to use spreadsheets to make calculations, and then make telephone calls to utilities.

A curtailment calculator BPA developed in 2007 automated the curtailments so they were equitable. But the calculator was still not an ideal

solution, since it didn't avoid congestion, but merely addressed congestion when it happened.

New transmission lines weren't ideal either. They're expensive, and don't always pencil out as a way to relieve congestion, which is occasional and often only involves lower-priced power sales in the surplus market.

Instead, BPA developed a voluntary redispatch program. The goal was to reduce congestion without curtailing schedules by directing specific generators, based on voluntary bids, to adjust their output. BPA also created a





contingency measure in the event power flows exceeded or were close to exceeding operating transfer capability. New software allowed BPA to refuse all new transmission schedules over constrained areas until the dispatcher was sure the system was stable.

Nationally, the reliability of the electric grid hinged on voluntary standards for utilities squeezed by the competitive pressures of deregulation. Few disagreed with the standards, but how closely could utilities afford to follow them without compromising their finances? BPA had faced similar stresses itself. Cost-cutting in the 1990s left its transmission system more vulnerable to problems like the one that triggered the 1996 West Coast power outage.

“There is a trade-off between maintaining reliability and incurring costs,” Administrator Steve Wright wrote in an Oregonian opinion column following the massive 2003 blackout that affected 50 million people across the Northeast states and Canada. “The pressure to skate on the edge or even not comply has increased dramatically.”

Wright urged Congress to quickly pass legislation that made the reliability standards mandatory and imposed financial consequences for noncompliance. About two years later, in 2005, Congress did so, authorizing a self-regulating “electric reliability



organization” to propose mandatory and enforceable reliability standards for FERC approval. The North American Electric Reliability Corp. — NERC — became that organization, filing its first set of standards in 2006. The standards became mandatory and enforceable in 2007 after FERC approval. The result was greater FERC authority over BPA, which agency leaders saw as reasonable because the standards so necessary to protect reliability should apply to all utilities, BPA included.

The standards cover areas from cyber security to vegetation management to communication between transmission grid operators. They require regular compliance audits, imposing major additional workload and expense on BPA and other utilities. However, the mandatory nature of the standards and potential for financial penalties has also made clear that system reliability must remain a priority for all users, owners and operators of the interconnected grid.

As BPA adapted to the stepped-up reliability standards and resolved the worst of its congestion, another issue crept up. The system was facing more and more pressure to move power from new generation. Developers planning to build new power plants had to get in line — a queue — for access to BPA’s transmission system.



*A rigging crew packages capacitors containing PCBs for disposal. The BPA crew, in blue hard hats, includes (from left) Walt Finney, Tom Wellman and (in the cab) Tom Thomas.*

## Going above and beyond to eliminate PCBs

An important example of BPA’s environmental stewardship in the past 20 years is the agency’s dramatic reduction of PCBs (polychlorinated biphenyls) at its substations across the region.

The cleanup of PCBs, which pose serious risks to human health and the environment, is mandated by the Toxic Substances Control Act of 1976. But BPA went much further than standards require and committed to replace equipment containing the toxic substance. Since 1991, the agency has eliminated all the large capacitors known to contain PCBs across its service area, replacing or retiring 101,000 high-voltage capacitors in 69 substations.

“BPA took the initiative to voluntarily embark on this sustained replacement effort to protect the regional environment,” said Lorri Bodi, BPA vice president for Environment, Fish and Wildlife. “Achieving a 100 percent reduction in the largest category of PCB-containing equipment

over such a vast network represents a major accomplishment and source of pride.”

PCBs are oily compounds used to insulate capacitors, which store electrical charges, and other electrical equipment. When released or spilled, they last many years, accumulating in the bodies of animals — especially those at the top of the food chain. After being labeled a suspected carcinogen by the Environmental Protection Agency, they were banned from manufacture and use in new equipment in 1979.

EPA officials recognized BPA’s two-decade achievement when they visited the Ross Complex in 2008 to present the agency with a special letter of recognition. BPA’s program makes new strides every year, and the agency’s goal is to have no equipment containing regulated levels of PCBs in use in its 262 substations by 2025.





*The direct-current transmission lines that begin the Pacific Northwest-Pacific Southwest Intertie stretch south from BPA's Celilo Converter Station in The Dalles.*

## The queue explodes

In 2007, BPA had a list of approximately 200 requests for transmission service for new generators that totaled about 12,000 megawatts of capacity. Many requests would cross one or more congested areas of the grid.

BPA followed a standard process to evaluate each request on a first-come, first-served basis, which matched FERC's rules to ensure that all transmission requests were treated in a nondiscriminatory fashion. To allocate the requested transmission capacity, BPA had to first study each request individually, in the order received, to determine whether any new or modified transmission equipment was needed.

The trouble was that the queue contained many speculative requests. Some generators had likely staked claims on capacity they might not need for years, if ever. Other developers requested far more capacity than they would probably ever need, just to keep their options open. This meant that an early request for service that may never be used would block studies of requests from generators who were ready to take service.

It took BPA far too long to conduct the individual studies to be practical. Requests low in the queue could linger for years awaiting study. And when the studies were complete, they did not identify the potential interactions between requests.

"Evaluating each transmission request sequentially doesn't work for several reasons," said Brian Silverstein, BPA senior vice president for Transmission Services. "First, it's unlikely a [single] developer will have a request that alone is sufficient to call for developing a transmission line. There's really an economy of scale, and you want to evaluate them together.

"Second, the model assumes that if you want to move power from point A to point B, you just need to build a line in between. It's really much more complicated than that. You may need to make reinforcements in other places. Third, with many requests, you need to look at



the electrical flows of all the projects together. You can't just look at each one in isolation."

BPA proposed a way to break the queue gridlock, calling the new approach Network Open Season. Once a year, the agency would offer customers a chance to sign commitments to purchase set amounts of capacity beginning at a specific date.

The open season was designed to weed out speculative requests. Only those with clear needs would commit to purchase BPA's service. Once BPA had commitments, it would cluster the requests and consider them all at once, which was more efficient and helped engineers identify and understand potential interactions between the power flowing from different sources.

The approach would also resolve financing issues. For years, BPA's transmission organization focused its limited borrowing authority on reliability projects. Requests for new service were handled under FERC's financing model, which required developers to pay for the entire project up front and receive the investment back through transmission credits over time.

"Dear customer, this project will cost \$250 million. Please send us a check and we will be happy to begin construction," was the gist of it, Silverstein explained. It was not a popular approach. Customers were generally unwilling to put up tens or hundreds of millions of



dollars years before they would receive service.

Under its new policy, BPA would make financial arrangements using its borrowing authority or by arranging third-party financing. Customers who participated in an open season would commit to paying for enough

service to produce a revenue stream that would cover the cost of the commercial project. Customers also would be required to put down a deposit equal to one year of transmission service. BPA saw this as a fair balance of risks.





## Trees and power lines teach a hard lesson

Trees growing into power lines is the nightmare of every transmission operator. In 2008, BPA faced a massive challenge, and the way the agency tackled it improved practices and reliability across its transmission system.

On July 3, 2008, just weeks after a tree hit a BPA line for the second time in less than a year, the Western Electricity Coordinating Council ordered BPA to inspect all 8,500 miles of its transmission rights-of-way, covering 15,000 circuit miles, within 90 days. Crews had to cut any encroaching vegetation, no questions asked.

“We are stunned, embarrassed and shaken by the event,” Administrator Steve Wright and Vickie VanZandt, BPA Senior Vice President of Transmission Services, wrote to the region on July 1.

BPA responded with all hands on deck. Transmission line maintenance crews and many others across the agency canceled leave and missed vacations to help get the enormous job done immediately.

A week into the 2008 effort, VanZandt said, “Our people have responded to a very challenging situation. They are dealing with extended work schedules, high temperatures, rugged terrain

and concerned landowners, and they are doing it very well against a very tight deadline.”

Crews walked or drove the lines while aircraft inspected from above. Several million dollars and 56 days later, BPA finished the job. It was a hard and expensive lesson, but the results underscored BPA’s fundamental commitment to be frank about problems and use root cause analysis to assure problems are clearly defined and addressed.

BPA has since adopted a high-tech laser tool to more quickly and accurately identify encroaching vegetation. Light Detection and Ranging (LiDAR) technology bounces lasers from low-flying aircraft off tree branches, transmission lines and other objects to create color-coded 3-D computer images that pinpoint any vegetation getting too close to lines.

“We can calculate where the line will be at its lowest sag, and we can see every tree branch,” says Robin Furrer, VP of Field Services.

The use of LiDAR has been a game-changer in the crucial job of managing vegetation growth across a system that spans four states. The proof? No vegetation-related incidents have occurred since.

## The queue is clear

Network Open Season worked. The combination of up-front commitments from transmission customers and the change in financing drastically shortened the size of the queue and the time it took to build the projects.

BPA conducted Network Open Seasons in 2008, 2009 and 2010. In three years, BPA processed 263 requests for new transmission service, totaling more than 11,000 megawatts. The agency offered nearly 7,000 megawatts of new service.

BPA found that it could serve more than 2,500 megawatts of additional energy with existing transmission capacity. This was because some customers high in the transmission queue declined to make the new commitments. But the agency determined it needed more lines to accommodate the remaining requests. BPA proposed to build four new transmission lines, and later found that each of the projects would also help serve subsequent transmission requests the agency received in 2009 and 2010.

BPA got to work right away on one of the projects — the McNary-John Day line. It was complete in 2012. The agency started construction of two other lines in 2011, and conducted environmental studies on the fourth. Together, the lines could deliver



about 3,700 megawatts of energy throughout the region.

Network Open Season became a model for transmission operators nationwide.

## An open door to wind developers

When BPA unclogged its transmission queue and offered transmission capacity, more than half of the recipients were wind energy developers.

Wind developers were responding to a call for more clean energy in the Northwest. Oregon, Washington and Montana had each adopted renewable portfolio standards, requiring utilities to meet a certain share of their demand with renewable generation. California adopted a renewable portfolio standard, too, creating demand for large amounts of Northwest wind energy to help meet its goals.

The region's biggest utilities were also looking toward more diverse sources of generation in anticipation of possible future carbon regulation. And federal and state tax incentives further encouraged wind development.

Many wind developers flocked to areas near the east end of the Columbia River Gorge. It was attractive for its wind and its welcoming counties,



landowners and many (but not all) citizens. Also attractive was its proximity to the heart of BPA's transmission system. While other regions of the country had to develop major new transmission additions to handle wind generation, BPA's far-reaching system made it relatively easy for rural wind projects to deliver power to customers. And, the location of the transmission at the head of southern interties made it an accessible source of renewable energy for California.

When existing transmission capacity wasn't enough, BPA's transmission policies paved the way for new lines to handle the wind power. Of the 11,722 megawatts of transmission requests BPA processed in three Network Open Seasons, 7,105 megawatts were associated with wind energy. The agency's first Network Open Season transmission project — McNary-John Day — supported 495 megawatts of additional wind energy.





## Adapting the grid – again

BPA engineers had led the industry through many transmission challenges over the decades. Its system operators had just transformed the way they managed the grid to respond to deregulation. At the time, it was the biggest change in the agency's history. But BPA soon had new opportunities to demonstrate its ingenuity and resilience.

Engineers found themselves adapting the transmission system to an energy source that the grid's original designers probably could not have imagined. They had designed the system to handle fairly predictable amounts

of power generation that followed demand — not generation that changed from moment to moment, as wind power often does.

The challenge is this: The amount of power entering the transmission system must equal the amount being consumed every instant.

BPA largely meets that challenge with help from the Columbia River hydroelectric system. The river acts as a giant storage battery — increasing or decreasing generation to balance unexpected changes from other power sources. BPA has always held some hydroelectric capacity in reserve, ready at a moment's notice to ramp up or down to meet changes in demand.

The rapid growth of wind energy brought a unique opportunity to team up two renewable resources. BPA recognized as early as the 1980s



that federal hydroelectric reserves could help absorb changes in wind generation. The agency began offering a balancing service to wind energy producers in the 2000s. But wind generation also dramatically increased the variability of power traveling through the transmission system, creating new technical and operational issues. For instance, what happens when the balancing reserves are exhausted? The hydro system's ability to balance the variability was not limitless.

Adding to that challenge, most of the wind energy generated on BPA's system is exported, often long distances. Wind development on BPA's system is unique in this way — in most regions, wind energy is consumed in the same balancing area where it is produced. This created issues for the agency that others had yet to face. For instance, many of the resources that could be used for balancing are located in other balancing areas, far from the wind projects.

BPA was under pressure to resolve the issues sooner rather than later. But the agency could not do it alone. So BPA took on another important role it has sometimes played in the Northwest: convening interests from across the region to discuss and develop strategies on emerging issues.

In this case, BPA joined the Northwest Power and Conservation Council in 2006 to create the Northwest Wind Integration Forum,

which brought together major Northwest utilities, stakeholders and experts. About 500 megawatts of wind generation was connected to BPA's transmission system at the time, with the Power Council's Fifth Power Plan citing the possibility of up to 6,000 megawatts of wind in the region. The group, originally intended as a short-term effort, discussed what it would take to prepare for so much wind in the Northwest grid.

Speaking to the forum's first meeting, BPA Administrator Steve Wright, co-chair of the group, raised three issues for discussion: how the intermittent nature of wind affects short-term reliability, how it contributes to meeting peak loads, and how to meet transmission needs for wind when it generates energy only about a third of the time.

In 2007, the group released the Northwest Wind Integration Action Plan, which found no fundamental technical barriers to operating up to 6,000 megawatts of wind in the Northwest, but noted, "it's a question of cost." It suggested BPA could see up to 3,000 megawatts of wind by 2020. The plan cautioned that the region would still need other resources to meet peak demands and would need new transmission to handle the growing flow of wind power. It also included 16 recommendations covering issues from transmission to overcoming market barriers for wind integration services.



## An innovative transmission service

BPA provided a new service to help wind projects come on line before the agency was able to build new transmission lines to serve them. It's called "conditional firm" service — transmission with the potential for a small amount of interruption if the system becomes congested. Since 2009, this product has helped BPA serve 1,200 megawatts of new service requests. While part of FERC's pro forma tariff, it had rarely been used previously. BPA and its customers are leading the nation in use of the service.



By 2010 — only three years later and a decade earlier than the plan suggested — BPA exceeded the 3,000-megawatt threshold. To do it, the agency had to rethink the way it operated a transmission system born nearly 75 years earlier.

“Figuring out how to connect and balance wind energy has been one of the great engineering challenges of the 21<sup>st</sup> century,” Silverstein said. Silverstein oversaw the expansion of BPA’s high-voltage transmission system and other operational solutions to support the rapid development of wind energy.

For example, generators historically scheduled their relatively stable energy production once an hour, and transmission systems and marketing processes were designed around it. Following pilot testing, BPA in 2011 began allowing generators and utilities to increase or decrease their transmission schedules every 30 minutes to better match fluctuations in wind output.

BPA also invested in wind forecasting. “When you forecast wind, the best near-term forecast we have is what it’s doing now,” Silverstein explained. “If wind is now generating 200 megawatts, in the next minute, it will probably generate close to 200 megawatts. But as you get 10, 20 or 60 minutes away, the jaws of uncertainty widen fast.”



BPA’s Power Services staff developed a state-of-the-art wind speed and wind generation forecasting system that looks at wind generation up to three days in advance, as opposed to the previous system that provided information only an hour ahead. By 2012, BPA had developed the systems to support more than 4,700 megawatts of wind energy — more than half of the entire Northwest’s wind generation. Still, the agency had more work to do.

“As the variable energy resources become

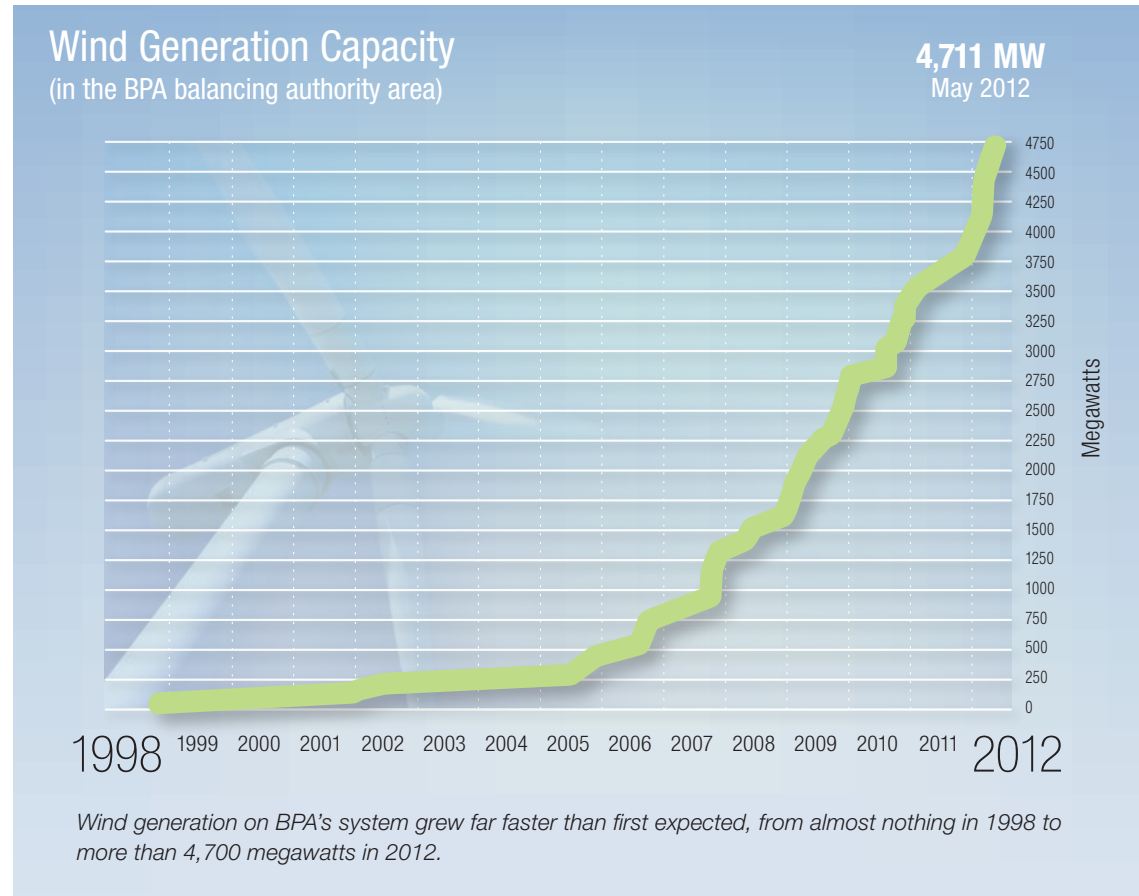
a bigger and bigger component of the West Coast supply, you have three basic problems,” Administrator Steve Wright explained, “a balancing problem, an undersupply problem and an oversupply problem. They all stem from the fact that wind ramps up and down fairly unpredictably — not necessarily when you want it to — and you need other resources to fill in the gaps,” he said. “Otherwise, you can end up with more or less power on the system than needed.”



By 2012, the capacity of the Columbia River hydroelectric system to balance wind's variability was running out. The agency began discussions about new mechanisms and strategies to meet the need for more balancing capacity. BPA also joined other utilities in discussing whether it was time for more regional collaboration — an idea on the table for more than a decade. In the 1990s, discussions centered on better planning for transmission expansion, more efficient operations and keeping costs down. But the discussion changed with the growth of variable energy.

## Efforts to unite the Northwest grid

In the Northwest, BPA is one of about 20 balancing authorities — power system operators responsible for maintaining a constant balance of generation and load within a designated area. Maintaining that balance became more challenging for operators as variable energy resources came on line. BPA interconnected new wind projects faster than any other region of its size in the country. If BPA's balancing authority — roughly the geographic size of Idaho — were a state, its more than 4,700 megawatts of wind



generation in 2012 would exceed that of any state but Texas.

“That’s probably as much wind in such a small geographic footprint as exists anywhere in the world,” Silverstein explained. Dense concentrations of wind generation, all affected by the same weather patterns, can produce wide swings in output that require balancing. That can rapidly exhaust the balancing reserves available in a single balancing authority. But pooling wind variability and

balancing resources among the region’s numerous balancing authorities might be a better way. For example, the wind resources in different balancing authorities could, to some extent, offset each other’s variability and reduce the need for balancing.

The push for more regional coordination followed deregulation, when FERC called on the nation’s utilities to pool their transmission assets in separately managed “regional transmission organizations” or “independent





system operators.” While transmission operators in other parts of the country pulled together and created these united grids, the Northwest did not arrive at a similar solution.

In an early attempt, utilities in eight western states proposed an independent grid operator

called IndeGO in 1998. It was put on hold later that year because of concerns about costs and complex congestion clearing processes.

“We have a very effective and efficient power system in the Northwest that has served us well for decades,” Silverstein said. “BPA

has operated much more as an open access carrier than most. While there were benefits identified from moving to some sort of RTO, we didn’t have a burning platform.”

Still, BPA wondered whether cooperative operation of regional transmission lines could help make needed physical improvements on a more timely basis, improve reliability, and in the long term, hold down costs. In 2000, eight western utilities and BPA tried again. They filed a proposal with FERC to create RTO West. It would not control all high-voltage transmission in the West, but it would serve eight western states and control nearly 52,000 miles of transmission.

BPA expected RTO West would move electricity for a seller over the most efficient and economical transmission path, regardless of who owned that path. But public power customers were concerned about how they would fare. “People who have rights to the federal power system want to be sure that they will still have those rights, and it wasn’t clear that those were preserved if we went to an RTO,” Wright noted at the time.

“RTO West came pretty close to happening,” Silverstein said. “There were still remaining questions about federal assets and operating the federal power system, but we thought we saw a path forward. The bigger challenge was







whether costs and risks were appropriately balanced with benefits achieved, and we hadn't sufficiently vetted the idea with preference customers early enough in the process."

RTO West efforts stalled in 2001 during the power crisis. And in 2005, another attempt — called Grid West — also fell apart.

"I wish we could have found a way to

operate the region's transmission assets in a more coordinated fashion," Wright reflected later. "At the core of it for me was a more coordinated, collaborative approach to the operation of the transmission assets of the region. I think that got mixed up with market creation, FERC regulation and a variety of other things. There were many different visions at that time. As I think back, I wonder if we didn't miss an opportunity. I always ask myself what I could have done differently about that."

When Grid West stalled, BPA joined with several of the region's utilities to consider what might work. Their discussions evolved into a smaller, more limited approach to regional collaboration in transmission planning and management: ColumbiaGrid. ColumbiaGrid was formed in 2006 with seven founding members, including BPA. One of ColumbiaGrid's primary roles is creating a biennial transmission expansion plan that looks out over the next 10 years, considering the grid as if it were owned and operated by a single entity.

It was progress. But as variable energy expanded, many of the region's utilities wondered if they needed even more regional collaboration to meet the day's challenges.

"As you move to variable energy resources in particular, there is a greater need for sharing the underlying resources," Wright said. "Variable







energy resources aren't always producing when folks would like them to, and you need other sources of supply. And the bigger the footprint, the more opportunity for benefits there is. It's not entirely clear to me what will exist in 10 years. But I think you can't continue to add all these variable energy resources without having some changes in structure to be able to address the physical challenges that exist on the system. And so I think that's what's going to drive the discussion."

## A pause to regroup

To launch the discussion, in 2011 BPA and the Northwest Power and Conservation Council reconvened the Wind Integration Forum Policy Steering Committee, which had led the development of the 2007 Northwest Wind Integration Action Plan. The steering committee had not met for more than a year but reconnected to review progress so far

and decide how to best meet the region's renewable energy goals.

For BPA's part, Network Open Season had produced an overwhelming response. But the agency wasn't sure whether it should continue a full-speed-ahead transmission expansion policy. After completing three Network Open Seasons, the agency decided it would continue to collect new requests for transmission service, but it would not conduct an open season in 2011.

"It's a good point to pause and make sure we have it right," Silverstein said. By 2012, planners could see that Northwest wind development was leveling off. "People moved quickly to tie up the most attractive sites and were building ahead of need," he said. "Most Northwest utilities have met their renewable portfolio standard requirements at least through 2015."

BPA wanted to evaluate whether it was getting the right information from customers to make good investment decisions. For instance, BPA did not require customers to identify where the power from new generation would go. This provides flexibility for wind developers, but it was hard to study the full system impacts without knowing where the power would enter or leave the grid. BPA had also allowed customers to defer service up to five years,





and many took advantage of that. This led to a revenue shortfall that will push up transmission rates. In 2012, some customers — unsure about future demand for their product — even wanted out of their transmission service agreements completely.

The agency's decision to forgo a 2011 Network Open Season surprised and disappointed some of its stakeholders.

"Everyone realizes that Bonneville is facing serious engineering challenges," said Robert Kahn, executive director of the Northwest and Intermountain Power Producers Coalition in a 2012 report. "But it didn't have to be this way. Together we all need to hurry up and address this problem."

Others were concerned about the uncertainty of when they would be able to secure access to new transmission service. BPA understood the concerns, but didn't believe it could risk rushing into another Network Open Season. Echoing the position of former Administrator Peter T. Johnson some three decades earlier, Steve Wright was determined to complete a thorough assessment before deciding how to act.

The transmission system, after all, is a public resource, he noted. And the decisions BPA makes have far-reaching impacts.

The future of renewable energy including wind and hydroelectric power — and BPA itself — depends on maintaining the integrity of

the grid even as the region and nation demand more of it. It's a job BPA engineers are ready for.

"We have a track record — we have never failed to complete a project," Silverstein said. "Colstrip is a great example. People wondered if we would find a route. But we had committed to it — people depended on it. Hundreds of millions of dollars had already been invested. Today, many wind projects depend on transmission projects, and we'll find the right thing to do."

"Engineers are a different species," added Hardev Juj, BPA's chief engineer and vice president of Transmission Planning and Asset Management. "We want the challenge, and we'll make it work. What you'll see us do in the



“Engineers are a different species. We want the challenge, and we’ll make it work. What you’ll see us do in the future is no different than what you have seen us do in the last 75 years.”

Hardev Juj



future is no different than what you have seen us do in the last 75 years.”

There may be one difference. This generation of transmission planners has 75 years of experience to guide it.

Silverstein, preparing for retirement after 33 years at Bonneville, has drawn some important lessons from his career. “One is the benefit of one-utility planning,” Silverstein said. He recalled BPA’s plan to build a new 500-kilovolt line between Grand Coulee and Spokane, Wash. It turned out a local utility,

Avista, had its own plan to build two 230-kV lines to the south of BPA’s proposed line.

“We concluded that the best project was really a mix of both of our plans. Together, it was a much stronger project. It addressed their local needs and the needs of the bulk system. Bonneville has always been an advocate of coordinated, one-utility planning — that goes back to the interties in the 1960s. But it will become even more of a factor.”

Another bit of advice from Silverstein: “Planning is everything, the plan is nothing. You have to recognize that there are external pressures. Your view of the future could very well turn out to be wrong. So focus on projects that are valuable under a variety of futures.”



# 8 Building Resilience for a World of Change

**THE NORTHWEST CHARTS BPA'S FUTURE ROLE**





Only two years after the 1962 World's Fair in Seattle that included construction of the Space Needle, BPA Administrator Charles Luce peered into the future with a 1964 speech to the Northwest Public Power Association called "The Year 2000." A visionary who championed the promise of a direct-current intertie to California and the Columbia River Treaty, Luce foresaw a future of satellite-monitored and computer-controlled transmission. It was bold thinking for a time shortly after the first-ever satellite, when the smartest computers filled entire rooms.

But it was, to a large extent, a future that succeeding generations of BPA's staff would deliver, and often transcend.

By 2010 BPA had gone so far as to put the renewable energy heartbeat of the Northwest on line for all to see, displaying the moment-by-moment generation of the Columbia River system on the Internet. Viewers from around the world could watch the peaks and valleys of hydroelectric generation and the wind and thermal energy coursing through the regional transmission system on what became BPA's most-visited web page.

It was the ultimate transparency for the nation's ultimate renewable energy system,



*The rapid growth of wind power in BPA's largely rural section of the grid has led the agency to pioneer new ways to integrate the intermittent output of wind generation. (Rod Aho/BPA)*

one that, when the wind is blowing and the river surging, puts the Northwest as close as any region of the country to running entirely on renewable power.

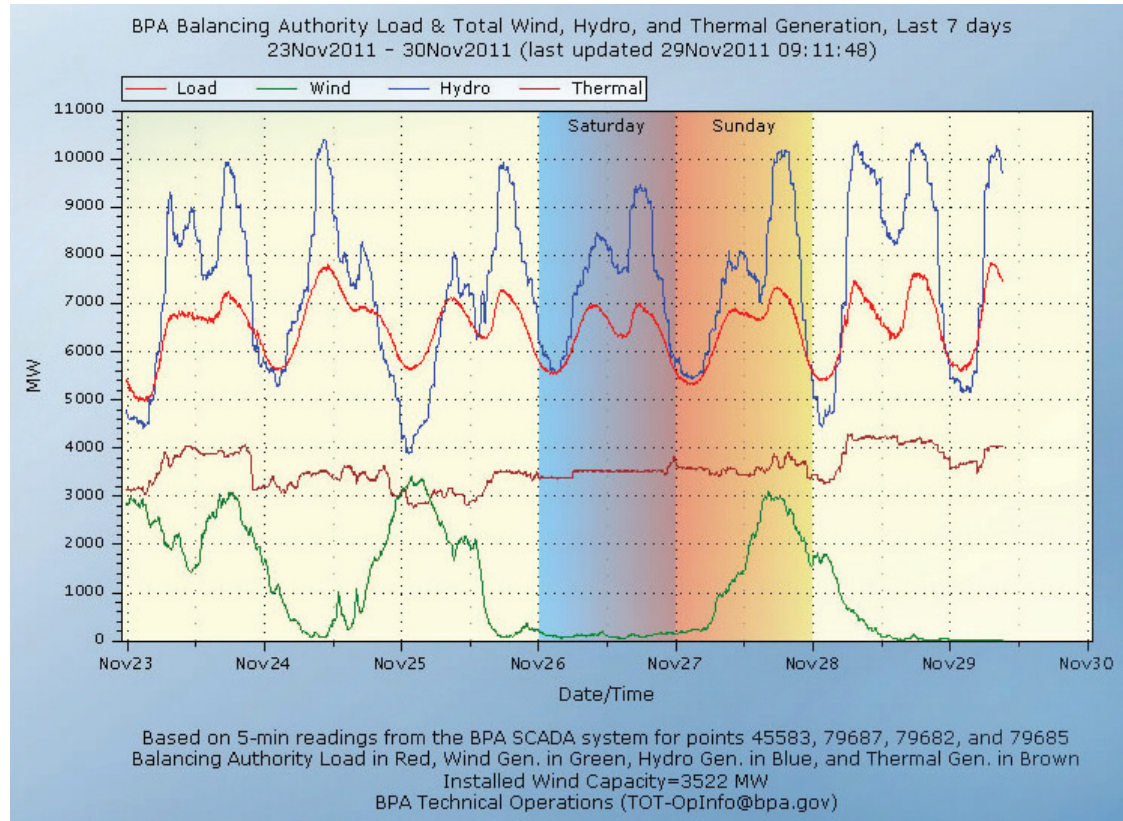
In that website is a glimpse of a renewable energy future, a power system working at an ever-increasing pace to deliver clean energy concentrations that might have impressed Luce. But the survival and success of the Northwest's prized energy system has been possible only because the Northwest and BPA have proved themselves both bold and adaptable, with vision as grand as Luce's and

the flexibility and humility to adjust that vision to radically changing circumstances and values.

In the previous three decades, BPA had weathered more crises than most cared to count: a collapse of nuclear ambitions in the 1980s, the 1990s trials of deregulation, the West Coast power crisis, a regional blackout traced to its own faults and a transmission system stretched to its limit. As much as the Northwest Power Act had sought to chart a stable course for BPA and the region's energy future, it could not dodge the game-changing volatility of shifting energy demand, markets and environmental



# POWER OF THE RIVER



A real-time graph on BPA's website displays the moment-by-moment output of wind, hydroelectric and thermal generation, as well as energy demand, in BPA's balancing authority.

conditions, as well as human values and expectations for the Columbia River.

The Northwest would spend the first decade of the new millennium seeking a lasting way for the Northwest Power Act to fulfill its promise of regional equity, stewardship and efficiency in a time of unpredictable change. All while positioning the region to remain flexible and resilient for the further change sure to come.

"The question of Bonneville's role in the region will constantly come up because our

role is defined by how you best serve the public interest," Administrator Steve Wright said. "And we manage, with the U.S. Army Corps of Engineers and the U.S. Bureau of Reclamation, this incredibly valuable resource in the Columbia. It's a public waterway to be used for the public good. Because of that there are constant challenges with respect to how the public interest is changing and being reshaped and whether we should be reshaping ourselves to respond to that.



"The question of Bonneville's role in the region will constantly come up because our role is defined by how you best serve the public interest."

Steve Wright



“There will be another challenge down the road. I’m not sure I’m prescient enough to be able to forecast what that will be, but there will always be challenges with respect to what our role is in the region.”

## Hitting the limits

If the nuclear debacle and deregulation tested BPA’s own resolve to make hard choices about its role, the West Coast power crisis had a different effect. By convincing factories and homeowners, public utilities and private, to cut their power use, it proved as starkly as ever that the federal power system, which had seemed so flush for so long, had hit its limits. For perhaps the first time since the Northwest Power Act, the crisis tested the region’s resolve to make hard choices about BPA’s role in the Northwest.

It also demonstrated that the region’s many competing interests could accomplish far more together than apart.

The Northwest Power and Conservation Council warned in 2002 that the region could no longer view BPA and the power system as a matter of convenience, worthy of attention only when a capricious market made low hydroelectric power prices attractive. The uncertainty of whether customer utilities would call on BPA’s



*Wind turbines near the east end of the Columbia River Gorge feed an increasing volume of renewable energy into BPA’s grid. (Rod Aho/BPA)*

obligation to serve them or seek better deals on their own whipsawed BPA from one financial peril to the next. That in turn threatened the financial security of the hydroelectric system at the heart of the region’s economy. The Council’s findings echoed many points identified earlier in the Comprehensive Review completed for the Northwest governors in 1996.

“Customers will want to take load off of Bonneville when market prices are low and Bonneville’s fixed prices make it difficult for it to compete,” the Council concluded in a report on the future role of BPA. “Conversely, customers

will want to place additional loads on Bonneville when market prices are high, forcing Bonneville into a high-cost market. This translates into risk that Bonneville will not be able to make full and timely payment of its Treasury debt. With much of the rest of the country envious of the Northwest’s access to federal power at cost, failure to make Treasury payments increases the risk that the region may not be able to preserve the benefits of the system.”

By 2003, that risk was real. Its financial reserves depleted, “BPA’s ability to make the fiscal-year-end Treasury payment is far from



POWER OF THE RIVER





certain,” an internal report to the administrator said. BPA’s costs over the five-year rate period from 2002 to 2006 spiked \$5.3 billion above the previous period, the equivalent of more than \$400 for every person in the Northwest. Rates shot up, and BPA offered an unflinching assessment as to why.

In the urgency of serving preference customers that rushed back to security of low-cost federal electricity ahead of the power crisis, BPA had departed from the limited role envisioned by the 1996 Comprehensive Review and abandoned spending limits outlined by the Cost Review that followed. The agency’s contracts with public and investor-owned utilities and direct-service industries that took effect in 2000 promised to supply more power than it had at below-market rates, relying on rosy estimates from before the power crisis of the costs BPA faced. Costs rose, revenue fell and the results, the report said, “have transformed BPA from an agency with relatively low power rates and large financial reserves to one with much higher rates and smaller reserves.”

The Council added: “It could be argued that if responsibility for meeting load growth had been more clear in the late 1990s, additional resources might have been added to the system and the power crisis of 2000/2001 might not have been as severe.”



*Electrician foreman Johnnie Hall examines a transmission line insulator.*

The higher rates added insult to a recession-injured region with some of the highest unemployment rates in the nation. Low-income families were losing electric service because they could not pay their bills and BPA was not far behind. The agency, Administrator Steve Wright wrote to the region in 2003, “has gone from an agency that was financially healthy to one that is clearly in trouble.”

## Consensus on the future

No blue-ribbon panels or high-profile summits convened. Washington, D.C., did not step in. Instead, frank discussions known as the Regional Dialogue picked up where BPA’s own lessons-learned reports left off. Investor-owned





Long and often complicated Regional Dialogue discussions tested the region's determination to forge a clear role for BPA in the region's energy future. (Rod Aho/BPA)



Geoff Carr of Northwest Requirements Utilities discusses potential approaches to long-term rates as part of Regional Dialogue discussions. (PNUCC)

utilities and BPA's preference customer utilities took the lead with a proposal to restructure the region's energy future and BPA's place in it. They agreed that BPA's central strengths were operating the transmission system and marketing power from the hydroelectric system and, especially in a deregulated market, BPA did not have an inherent advantage over its customers in acquiring new resources. Indeed, BPA's attempts to go further and acquire new resources had all too often led, in unexpected ways, to high rates and financial crisis.

The utility proposal echoed earlier recommendations of the 1996 Comprehensive Review and dovetailed with recommendations

from the Council following the power crisis: BPA should limit itself to distributing power from the federal system and avoid the role of a regional power broker. Individual utilities would receive a share of the federal output but would then absorb the cost of additional power they might need to meet growing demand, whether buying it from BPA or on their own. The proposal would, in effect, rework the Northwest Power Act's approach to keep pace with changes that Congress could not have envisioned in 1980, while still delivering on the Act's central goals:

- Sharing the value of low-cost power from the federal hydroelectric system.

- Creating financial incentives to stretch that value as far as possible.
- Assuring the benefits of the system would remain in the Northwest.
- Providing financial stability to take care of the system for the long term.

The proposals and recommendations were especially striking because the region — divided for so long over how the Northwest Power Act should work — appeared to be united behind an answer. "This fact alone deserves careful consideration," the Council noted. Supporters included most public and investor-owned utilities — large and small,



urban and rural — brought together, the Council said, by recognition “of a mismatch between how Bonneville is called upon to operate and the realities of the evolving electricity system.”

The agreement opened a rare window of opportunity. “Now is the time to resolve those issues,” Council Chair Judi Danielson wrote to Wright in 2004. “They will not become easier to address with time.”

The central element of the new approach was clear recognition of the unusual value of the Columbia River and the power it provides. As central as the value was to the region, it had long been shrouded in BPA rates that blended the cost of federal power with the higher costs of whatever extra electricity customers needed. BPA’s historical practice of melding the two also hid the true costs of acquiring power — either from the market or new resources — reducing the financial incentive for utilities to pursue energy efficiency or other local energy resources that might well have been more cost-effective.

The new long-term solution would limit BPA’s preference customers to purchasing approximately as much firm power at BPA’s lowest rates as the existing federal system could provide. BPA could provide additional firm power beyond the federal system’s



*Lake Roosevelt stands mirror smooth behind Grand Coulee Dam, the largest source of power generation in the Columbia River hydroelectric system. (Geri Campbell/BPA)*

capability at a higher, tiered rate that reflected the extra cost of power purchased or acquired to meet those additional loads. By breaking out the cost of federal power, tiered rates highlight the value of power from the system and encourage BPA customers to make the most

of it before tapping higher-cost power from other sources.

Utilities that need extra power then shoulder the financial responsibility — and the risk — of obtaining it, but have the freedom to choose the best option for them.





## Breakthrough on tiered rates

“The old model has served us well, but I don’t think the model that we all come together and build one big resource makes sense anymore,” says Steve Klein, general manager of Snohomish County Public Utility District, BPA’s largest power customer. “The federal system we have today is a foundation on which we can build renewables located all over the place, in many cases, in small increments.”

Tiered rates had emerged before, but never gained consistent support in part because of how the costs shook out, recalls Scott Wilson, who helped lead the Regional Dialogue process for BPA. Utilities with growing demand, for instance, might see an advantage in BPA spreading the cost of additional power across other customers. But the nightmare of the power crisis woke the region to the reality that leaving BPA to assume the risk of

uncertain costs and demand could leave the whole region a loser. “People saw a tough example of what happened when it wasn’t clear who was responsible for covering that load when we needed it,” Wilson says.

Public utilities also settled on an approach for apportioning the benefits of the limited federal system among themselves, a breakthrough that was critical to the adoption of tiered rates but which had eluded them as far back as the 1970s.

In February 2005, BPA agreed to limit the amount of power it sells at its lowest cost-based rates to about 7,000 average megawatts, the output of the existing system. With notice BPA could provide additional power at a higher tiered rate, or utilities could obtain it themselves from whatever source best fit their needs.

Tiered rates would give customers a clear incentive to stretch the low-cost federal power as far as they could, providing ever-more powerful motivation to fulfill the conservation

mandates of the Northwest Power Act. Tiered rates could deliver on former Administrator Peter T. Johnson’s mandate to pursue costly new resources “only when we have wrung every cost-effective watt of waste out of our existing uses.”

Years of painstaking discussion and negotiations fed the Regional Dialogue, which led to long-term contracts signed in 2008 that would begin deliveries Oct. 1, 2011, and run through 2028. Simultaneously BPA developed tiered priority firm rates that made a clear distinction between the cost of power from the existing federal system, known as the Tier 1 rate, and the cost of additional resources recovered through a separate Tier 2 rate. The long-term contracts and tiered rates provided certainty and stability for BPA and its customers while also buttressing the region against political moves to tap the regional benefits of the Columbia River system.

But the contracts also involved extraordinarily complex legal and technical issues that had never been addressed before, recalls Paul Norman, former senior vice president of Power Services, making for tough negotiations. Many smaller utilities that purchased most or all of their power from BPA feared the agency would shift its focus to the federal system so much that it would lose its





*Sen. Maria Cantwell of Washington speaks at a Senate hearing on energy legislation. Cantwell frequently weighs in on BPA issues. (Associated Press/Harry Hamburg)*

edge in acquiring low-cost Tier 2 power if they needed it. But BPA pledged to keep pursuing the best possible acquisitions on their behalf. Ultimately the contract negotiations succeeded only through exceptional creativity and collaboration on the part of BPA and its customers that, given the discord of many public

policy debates, made for “a great example of how things can work,” Norman recalls.

“An additional benefit of a long-term contract is that it will provide contractual protection against extra-regional efforts to take away or dilute the benefits of the Columbia River system for the Northwest,”

the Council wrote at the time. The contracts “also demonstrate the willingness of the region to back the federal system and accept its risks as well as its benefits over the long term.”

As if the region needed a reminder of how valuable those benefits were, the Bush administration issued a series of budget proposals in the 2000s calling for BPA to charge market rates or direct secondary power sales revenues above a certain threshold to pay down BPA’s bond debt. The Northwest congressional delegation again pushed back hard with Sen. Maria Cantwell of Washington describing one of the early proposals as an untimely rate hike and promising Secretary of Energy Samuel Bodman, “We’ll bring to a screeching halt any piece of legislation that contains this proposal.”

The proposals faded, but not before serving as a timely reminder that others saw the value of the system too.

## Influence over costs

Some customers worried about signing on with BPA for so long if BPA could unilaterally rack up high costs. To address the concerns, the Regional Dialogue contracts give customers insight into BPA’s planned costs and opportunities to influence





*Red and white paint on transmission towers near airports or flight paths makes them more visible to pilots. The Federal Aviation Administration switched its requirements to lights on tall towers, but BPA maintains paint on towers marked under the older protocol. (Mitchell Brown/BPA)*

them. That promise built a new degree of public involvement into BPA's business practices.

"Customers were making a commitment to pay our costs for the next 17 years, so it was fair for us to make a commitment to them," recalls Norman who helped drive the Regional Dialogue discussions. "They knew our rates would be cost-based and they looked to us to manage our costs. But they also wanted some

insight into the costs, with an ability to opine on those costs and an expectation that BPA would listen and take their input seriously. We thought that made sense, and the contracts include that commitment."

The Regional Dialogue contracts also provided customer utilities the flexibility to find new solutions on their own scale for the time when the hydroelectric system could no longer

do it all. That allowed BPA to focus on the federal power system. Despite uneven water years, the agency gradually regained its financial footing and rebuilt its reserves. Payments to the U.S. Treasury continued uninterrupted. BPA's priority firm power rates declined by close to \$10 per megawatt-hour from a post-power-crisis high of more than \$30 per megawatt hour in 2004 before resuming a slow climb.

As much as the Regional Dialogue brought regional interests together, it did not immediately resolve two lingering issues: the Residential Exchange Program and service to the few surviving direct-service industries. That was a problem because the stability of the Regional Dialogue contracts hinged, in particular, on resolving the core question that had long bedeviled the Residential Exchange Program: how the benefits of the Columbia River system would be shared with the residential and small-farm customers of investor-owned utilities.

The question had been mired in regional infighting and litigation since the passage of the Northwest Power Act, with numerous cases reaching the Ninth U.S. Circuit Court of Appeals. In 2007, the court issued a set of rulings that threw out a 2000 settlement between BPA and investor-owned utilities, concluding that BPA had overpaid investor-owned utilities and overcharged its public customers for the previous six years.



With billions of dollars at stake, BPA responded to the ruling by undertaking its most complicated and contentious rate case ever. It concluded with a 709-page record of decision and a complicated means of collecting overpayments and issuing refunds. The result was nothing new: “Everyone was dissatisfied,” BPA recounted in a later court summary. By 2010, a decade after the earlier settlements, neither public nor investor-owned utilities knew whether rates they had paid, Residential Exchange benefits they had distributed to customers or refunds they had received were valid. Administrator Steve Wright in turn urged utilities to resolve the seemingly never-ending cycle of litigation.

“The one undeniable fact that almost everyone could agree on was we were looking at years and years and years and years of litigation on top of the years of litigation everyone had already gone through,” said Charles Forman, project manager for BPA’s responses to the court’s ruling. “It was at least as daunting looking forward as looking back.”

Following mediation by a former federal judge, a settlement finally attracted support from public and investor-owned utilities representing roughly 94 percent of the region’s electricity load, which was unprecedented



## Taking excellence to new heights

Accountability. Continuous improvement. Commitment to quality. These are key ingredients of “operational excellence” at BPA — a recipe for anticipating and adapting to change and delivering quality products and services. It’s easy to throw ingredients into a bowl. But BPA employees are known for blending them into masterpieces.

Transmission towers rarely merit a second glance from most people. But in the spirit of continuous improvement, BPA’s structural engineers asked: Can we build a better one?

The answer was yes. They designed new towers that are stronger, but use less steel; sturdier, but cheaper; easier to assemble, but more resistant to winds and storms.

“The most challenging part in tower design is the infinite number of configurations. You can move a piece of steel in one place and end up with problems in another,” explains Structural Design supervisor David O’Claire. “It’s design fundamentals and trial and error.”

Engineers on their own might spend weeks or months evaluating a single tower configuration. So BPA’s David Hesse — a structural engineer and self-taught software designer — developed a computer program to accelerate the process.

“In one day, we can look at a variety of different configurations,” says Hesse of his Advanced Tower Analysis and Design System.

The program analyzes whether a tower design can hold up to worst-case scenarios such as 100-mph winds and heavy ice, or failure of the next tower along the power line. It also predicts the cost of the tower, helping engineers find a design as economical as it is strong.

On BPA’s McNary-John Day line, energized in 2012, the designs saved BPA as much as \$300,000 per tower and a total of more than \$11 million — easily exceeding the \$80,000 cost to design them. The savings will grow as BPA upgrades other transmission lines because the new tower designs can be used again and again, demonstrating an operational excellence tenet of adopting efficient, standardized business practices. The savings will flow to BPA’s customers and from there to homeowners and businesses throughout the Northwest.

“This is why we invest in a talented workforce,” says Chief Operating Officer Anita Decker. “It’s often employee innovations that inspire products to meet our needs and provide value to the region.”

Hesse’s groundbreaking work secured BPA a spot at the 2011 Platts Global Energy Awards — the Academy Awards of the energy industry. BPA was one of 12 finalists for the commercial technology of the year award.

With many utilities looking at expanding their transmission grids, BPA is sharing its tower design software and concepts free of charge.



support by historical standards. “To their credit, they picked up the ball and got together,” Wright said. “We supported all the parties with analysis and encouragement, but it was really the publics and the IOUs getting together and working this thing out that got us to where we are.” Further litigation continued testing the settlement, but the unusually broad backing gives it strength.

## Settling service to DSIs

Less settled was service to the remaining direct-service industries, which in the wake of the power crisis had shrunk to a shadow of their one-time selves. They included Alcoa’s Intalco plant in Ferndale, Wash.; Port Townsend Paper Co. on the Olympic Peninsula; and, until its 2009 closure, Columbia Falls Aluminum Co. in Montana. The DSIs pressed for continued low-cost power. The Northwest Power Act required service to the DSIs only through 2001. Utility customers argued they should not have to underwrite power for DSIs that BPA was no longer obligated to provide. BPA looked for ways to support the regional economic benefits of DSIs in a way that was fair to other customers.



*Port Townsend Paper Co. on Washington’s Olympic Peninsula is one of the few remaining industrial customers BPA serves directly. (Michael Grodesky)*

“We are a public service organization,” Wright said. “We seek to do what best serves the public interest. Our service to the DSIs has been based on analyses we’ve done that show the results are more likely than not to be a net increase in jobs. The public interest standard is what has been in the forefront of my mind.”

In 2006 BPA signed contracts with the remaining DSIs to provide power service at the

low industrial rate from 2007 to 2011. The contracts with the aluminum plants called for them to purchase power from the market, with BPA paying the difference between the industrial rate and market price. BPA’s payments were capped to limit the agency’s financial exposure. The point was to protect BPA from having to buy high-priced power in a volatile market, as happened during the power crisis. But in the



ensuing lawsuits, the Ninth Circuit settled the question of how far BPA could go for the regional economy. The court ruled that while BPA has the statutory authority to serve the DSIs, the agency cannot provide payments instead of power. Instead, BPA must sell them power in a way that makes sound business sense, the court said. BPA continued service to Intalco and Port Townsend Paper under a new cost test designed to meet the court mandate.

While DSIs once consumed about 3,000 average megawatts, by 2009 their load had dwindled to less than 500. The much reduced DSI power sales nonetheless provided a consistent revenue stream that helped hedge the risk of poor market conditions.

## ‘A new normal’

In defining BPA’s role and obligations, the Regional Dialogue contracts also defined the limits of the federal power system that had done so much for so long.

The system had kept Seattle powered during the 1989 arctic blast and supplied revenue to fund ground-breaking energy efficiency work and one of the world’s largest ecosystem recovery efforts. It had powered construction of an aircraft carrier a week during World War II. It had also generated low-cost electricity when



energy crisis prices went stratospheric and provided a flexible foundation for some of the fastest growth of wind energy in the nation. But from an age of plenty decades earlier, with visions of electricity too cheap to meter and the Columbia River as an unending resource, the Northwest had entered an age of limits and scarcity, of making more of what’s available.

In pushing for energy efficiency over 25 years earlier, former Administrator Peter T. Johnson had said, “Somehow, in the abundance of our resources, we devalued it in the energy business.” The new contracts between BPA and its customers reasserted the value of the region’s central energy resource — the Columbia River — while fostering its most efficient use over the long term.

“The long-term contracts reflect the just incredible value of the Columbia River system,” Norman said. “Capturing the value of the system for the Northwest was a primary goal.”

“The Regional Dialogue contracts for us represent a new era, a new normal if you will, where utilities will have more responsibility for their own load growth,” reflected Dwight Langer, general manager of Northern Wasco County People’s Utility District in The Dalles, Ore. “It’s the first time in history that the resources are maxed out, that the load of the preference customers is basically equal to what the output of the federal-based system is. And it represents a change — a positive change, I think — a new challenge that I think public power, in cooperation with Bonneville, is up for.”





Representatives of customer utilities, interest groups and others pack a room at BPA headquarters during Regional Dialogue discussions aimed at resolving key questions about how best to share the value of federal hydroelectric power. (PNUCC)

“The Regional Dialogue contracts for us represent a new era, a new normal if you will, where utilities will have more responsibility for their own load growth.”

Dwight Langer,  
Northern Wasco County  
People’s Utility District

The Dalles reflects continuing change in Northwest energy demands. While the city lost its aluminum smelter to low world prices for the metal and higher electricity prices following the power crisis, it gained an industry of the Internet age — a Google data center. It is one of a growing network of Northwest data centers that warehouse social media posts and speed Internet searches, fueling a digital economy supported in part by low-cost, renewable power and the regional fiber optic network BPA helped develop. In 2012, BPA accelerated transmission improvements in central Oregon to help supply electricity to data centers developed by Facebook and Apple.

The Northwest Power and Conservation Council projected that the power demand from data centers could rise 7 percent a year, by 2030 rivaling historical electricity consumption by the region’s aluminum industry. However, the Council said a new generation of energy efficiency practices such as shifting workloads among data centers and more efficient cooling could cut that in half. A major difference between aluminum smelters and data farms, besides what they produce, is that data centers purchase power from local utilities, not BPA. Utilities decide how best to meet the demand, whether through efficiency, new generation or calling on BPA for further resources.

“The price signal is working,” Wright said.



“The ownership within the public power community of service to their load growth is a remarkable change that will be good for the region. A lot of folks are considering and identifying options we might not have been able to identify. We see more small resources that are coming into play than would have occurred, I think, if everything were run through here.”

The success of tiered rates reflects the strength of Northwest partnerships and a renewed lesson that, as much as BPA might struggle on its own, it gains strength when it works in concert with the region. Successes such as the Columbia Basin Fish Accords and Network Open Season came through partnerships and collaboration. While the Northwest Power Act’s concept of BPA as the central source of power fell flat, a reshaped model of the Columbia River power system as the renewable backbone of the region’s environment and economy stood firm.

## Reshaping expectations

Former BPA Administrator Charles Luce in his 1964 speech described a future of big getting bigger, of Northwest loads growing nearly eight-fold from 12.5 gigawatts in 1965 to



*The efficient design of Facebook’s data center in Prineville, Ore., reduces energy consumption. BPA’s transmission system helps supply the data center with electricity. (Facebook)*

96.4 gigawatts by the year 2000. Such load growth would require transmission lines with many times more capacity than the 500-kilovolt lines Luce’s engineers were then planning across the Cascades. The Northwest Power Act originally underscored that booming future with its vision for BPA-supported development of additional energy supplies.

But the Act also brought a sense of how the region could use energy efficiency to fuel

an even more ambitious course, one that went beyond Luce’s vision by seeking to do more with less. Former BPA Administrator Peter T. Johnson further advocated efficiency as a cost-effective alternative to development of new generation. The Northwest led a seismic generational and philosophical shift in the energy world.

“Energy efficiency is the third largest resource in the region,” Wright said. “So



we have accomplished a lot there and relatively quietly.”

The Council’s Sixth Power Plan, released in 2010, set out the most ambitious efficiency goals yet, calling for meeting 85 percent of the region’s load growth through energy efficiency. While the population has grown as Luce projected, the power plan estimates the region’s power consumption by 2030 will remain less than half of what Luce predicted the population would need. Energy efficiency is a big reason why: Since 1980, the region has saved more than 4.6 average gigawatts in cumulative energy, enough to power four cities the size of Seattle.

While Luce foresaw “exotic generators” converting chemicals or heat into energy, he said wind and solar power “do not appear to offer power in sufficient quantities.” He clearly saw the environmental value of hydroelectric power, “Bonneville people regarded themselves as true conservationists,” he recalled of his time at BPA, which would be only one highlight of his career. He would go on to head the giant New York utility Consolidated Edison. “With hydroelectric projects we were harnessing solar power in the form of falling water the sun had evaporated from the Pacific Ocean — clean, safe and perpetually renewable.”



*Charles Luce, right, BPA administrator from 1961 to 1966, looks over a model of BPA’s Celilo Converter Station with Chief Engineer Ken Klein in 1966. The station at the head of the direct-current intertie outside The Dalles, Ore., converts electricity between alternating current and direct current.*

But as the Northwest began to see the limits of the hydroelectric system and the nation saw the limits of its dependence on fossil fuels, the world’s first wind farm grew within BPA’s system. Luce was right at first:

That experiment with turbine blades as long as football fields did not deliver lasting energy. But decades later its technological lessons gave rise within the BPA grid to one of the highest concentrations of wind power in the nation, a









success story possible in large part because of the rapid ability of the Northwest hydroelectric system to balance the ups and downs of wind generation.

That responsiveness, though, is running out. BPA is again reshaping expectations while looking beyond itself for solutions.

“We don’t have enough capacity in the engine room any longer to meet the growing demand for system flexibility driven by the growth of wind energy,” says Elliot Mainzer, BPA’s executive vice president of Corporate Strategy. “In the same way that we can no

longer rely on the federal hydroelectric system to meet future load growth, we will also need access to additional sources of flexibility on both the supply and demand side to keep the lights on. In many ways, flexibility is the commodity of the future.”

Mainzer got hooked on energy issues during a college semester in India when the country was rushing to develop hydroelectric power and its electric grid for a rapidly growing population and economy. He later joined Enron after graduate school when the company was looking to transform the U.S. electric power

industry. Seeing the growth of wind and solar energy, he set up a Renewable Power Desk at Enron just before the company imploded amid the same power crisis that engulfed BPA.

He was drawn to BPA’s public service mission, figuring on staying a few years. After a decade in the power and transmission sides of the business, he came to lead the BPA staff charged with planning for a future that BPA’s recent history suggests no one can fully foresee. He and his staff attempt to aim BPA’s headlights the right way into the future, evaluating technologies and policies and supporting business decisions that deliver on the agency’s mission. Climate change, renewable energy development, power system coordination and federal energy policy all stand high on his agenda.

## Anticipating change

The Strategic Direction Mainzer’s staff developed to guide BPA for the five years beginning in 2012 hinges on the core values of maintaining trustworthy stewardship of the Columbia River power and transmission system, building collaborative relationships and searching out





*Elliot Mainzer, executive vice president, Corporate Strategy*

**“In many ways,  
flexibility is the  
commodity of  
the future.”**

Elliot Mainzer

more effective solutions through operational excellence. It attempts to craft a course that will remain resilient amid different futures, by addressing the factors most central to BPA’s business. Although the emission-free power from the hydroelectric dams and nuclear plant that make up the federal system has given the Northwest great advantage in a time of concern over climate change, a changing climate could

also influence the supply and timing of the water that drives hydroelectric generation.

“The overarching issue in the utility industry is climate change,” Wright says. “It changes everything. It changes the resources utilities acquire. It changes the way transmission operates because resources are different. It just goes on and on. Climate change impacts the business, so you have to start from there, trying to think through, ‘How will the response to climate change impact the operation of the business?’”

The Strategic Direction built on earlier initiatives that sought to strengthen BPA from the inside out. Learning from the painful fallout of rushed decisions amid the power crisis, Deputy Administrator Steve Hickok had led development of a plan for better considering strategic risk. It included creation of a chief risk officer position dedicated to spotting business risks before they hit. “BPA is conducting its affairs in an extremely difficult environment that confronts us with risks of unprecedented magnitude — commercial, physical, legal/political, financial, you name it,” he wrote to the staff. BPA had long examined financial risk. But BPA’s Enterprise Risk Management program broadened the examination, using a standard process to look across the landscape for changes or pitfalls that could put the agency’s objectives at risk.





**“BPA is conducting its affairs in an extremely difficult environment that confronts us with risks of unprecedented magnitude – commercial, physical, legal/political, financial, you name it.”**

Steve Hickok

That dovetailed with a more rigorous asset management strategy to guide spending. The agency stretched its borrowing authority through a Debt Optimization Program that retired Treasury debt early, making room for further borrowing, while extending the life of BPA-backed bonds that originated with the 1980s nuclear debts. Wright also instituted a new Agency Decision Framework that requires staff to think through the implications of policy decisions on the agency, public, economy and the environment. The Agency Decision

Framework incorporates risk assessment and risk management on many fronts.

“As a large business with significant cost consequences for the region, we have to be really thoughtful, deliberate and rigorous about decision making,” Wright said. “There were times when people thought they could walk into the administrator’s office and get a decision on a \$10 million action. I was always uncomfortable with that. Everything is connected to everything around here in ways that are not always visible. You have to understand how power will flow, consequences for accounting or finance, or any decision that reverberates in the public affairs arena in a way that makes other apparently unrelated things more difficult.”

Underpinning the Strategic Direction were core values developed in 2007 at the urging of then Chief Operating Officer Ruth Bennett, who pressed for BPA to define the basic tenets of its business culture. Bennett and other executives did not want buzzwords for posters; rather, they wanted meaningful measures to guide BPA in a demanding business environment with high ethical standards. Bennett led deliberate discussions among executives that required them to define how they personally weighed the values and

discussed them with their staffs. They settled on the three core values — trustworthy stewardship, collaborative relationships and operational excellence — that employees often see, hear and embody.

“If it’s not consistently reinforced in some way, it will become shelf art,” says BPA’s Karl Hunrick, who helped guide the process. “The key was that this went top-down. All the executives, especially Steve Hickok and Ruth Bennett, were behind it. They were the drivers. That made the difference.”

At the heart of BPA’s business is an aging but stalwart power and transmission system likely to grow in value even as it faces increasing and often competing demands. A central priority of the Strategic Direction is preserving and enhancing that value through judicious investments. For instance, BPA is directly funding the Corps of Engineers’ replacement of turbine runners at Chief Joseph Dam with new models that will generate 2 to 3 percent more energy from the same amount of water. A decade-long overhaul of Grand Coulee Dam’s largest turbines, each producing nearly as much power as a nuclear plant, will continue the Bureau of Reclamation dam’s role as the largest single source of renewable power in the country.





*(David Pruitt/BPA)*





*Libby Dam in northwest Montana was the fourth and final dam built under the Columbia River Treaty, and is the only treaty dam in the United States.*

## Extending the Strategic Direction

Other priorities of BPA's Strategic Direction include fulfilling the agency's endangered species responsibilities in large part through partnerships with states and tribes, further advancing energy efficiency and review of the 1964 Columbia River Treaty. Like the Northwest Power Act, the original provisions of the Treaty, drafted in Luce's time have been overtaken by change. Protection of salmon, steelhead and other fish was not an issue when the Treaty was signed, for instance, but has since come to dominate operation of the hydroelectric system. In 2012, the Corps of Engineers and

BPA, together known as the U.S. Entity, began a series of studies to inform a recommendation to the U.S. Department of State on whether the Treaty should continue.

Like Luce nearly a half century before,

BPA's Strategic Direction foresees a power system working faster and smarter to keep up with the fluctuations of the next generation of renewable resources. While BPA has developed sophisticated models to forecast and manage the seasonal and even daily variation of hydroelectric generation, the minute-by-minute changes of wind and solar energy demand something more.

Even markets have accelerated to keep pace. In 2011, BPA introduced intra-hour scheduling of energy through its transmission system, encouraging wind producers to adjust their scheduled power deliveries every 30 minutes instead of every hour to better reflect the ups and downs of wind generation. The more closely the schedules match the output of wind, the less pressure the hydroelectric system faces to make up the difference.

Intra-hour scheduling and other business practices and operating procedures that leveraged new technology and control systems helped BPA integrate more than 4,700 megawatts of wind energy into the federal transmission grid in scarcely a decade.

Luce predicted the faster pace. "The heart of this system will be a high-speed digital computer. The computer will optimize the use



*Elliot Mainzer, BPA's executive vice president of Corporate Strategy, describes BPA's handling of wind energy in a talk at the inaugural TEDxPortland event in April 2011.*



of resources and minimize line losses,” he said. “It will report on operations. It will warn when line limits are approached. It will respond to emergency conditions with the best operational schemes.”

The Remedial Action Schemes and Wide Area Measurement Systems developed by BPA transmission engineers gave early shape to that computerized heart. BPA has helped take the technology even further by helping install a network of more than 300 phasor measurement units, devices that track the waves that make up electric currents passing through the grid, as part of the Western Interconnection Synchrophasor Program, sponsored by the U.S. Department of Energy. Simultaneous readings by the units are called synchrophasors, which has also become the more common name for the units themselves. They track and reveal fine-scale conditions in the grid the way electrocardiograms display heartbeats, spotting vulnerabilities before they turn into trouble. It is a step toward a smarter and more responsive grid.

“Over the coming years,” Mainzer says, “we are likely to see greater coordination and visibility between the region’s multiple system operators and the deployment of a range of new technologies to help support a more variable and sophisticated power system.”



*BPA's Chief Technology Innovation Officer Terry Oliver, far right, speaks at a 2012 forum on large scale energy storage and how it may affect the utility industry. (Nat Seymour, Be Technical Graphics)*

## Reviving technology innovation

One of the champions of synchrophasors at BPA is Terry Oliver, the agency’s chief Technology Innovation officer, who joined BPA just as the Northwest Power Act created a new dawn for energy efficiency. He helped lead the Hood River Conservation Project, demonstrating the very real returns of energy efficiency measures, and a weatherization

program that became one of the world’s largest residential conservation projects. Then in 1992 he headed to Thailand to lead the regional office of the International Institute for Energy Conservation and demonstrate, as BPA had helped do in the Northwest, that energy efficiency represented a true energy resource.

He went from middle manager at BPA to dealing with national leaders in Thailand and the Philippines, discovering that leaders often saw the value of innovation more clearly than others down the ladder. He recalls pitching the chairman of the board of the Manila





## Handling generation on nature's schedule

Just as a power system that depends on nature for fuel may run short of energy, it may also find itself with too much.

BPA drew national attention in spring 2011 when one of the heaviest runoffs in decades combined with thousands of megawatts of wind power BPA had connected to its grid. The hydroelectric and wind generation intermittently exceeded the demand for energy, mainly in night-time and weekend hours when electricity use was low.

BPA pursued a series of steps to handle the oversupply, including maximizing exports of energy to other regions, power trades with other dam operators to help manage spill levels and reducing thermal generation in BPA's balancing authority. But the most controversial was an interim 2011 directive to wind producers to occasionally displace their output with hydroelectric power, without compensation, when the supply of energy exceeded demand.

The step helped avoid spilling so much water past dams that the plunging water caused dissolved gas levels high enough to harm fish.

The situation demonstrated that generation of variable renewable energy may not always match human schedules and will require new tools and mechanisms. BPA expects that the

high concentration of hydroelectric and wind generation in its grid will continue to create an occasional risk of oversupply, although probably not every year.

BPA long managed high hydroelectric generation in the spring by offering low-cost or free federal hydroelectric power to replace the output of coal, natural gas and other thermal power plants, which often shut down in exchange. However, some wind producers are reluctant to shut down because they would lose production tax credits and renewable energy credits tied to their output.

The Federal Energy Regulatory Commission ruled in late 2011 that BPA's curtailment of wind energy without compensation was discriminatory and directed BPA to develop a different approach. In 2012 BPA introduced a new temporary Oversupply Management Protocol to reduce generation, including wind energy if necessary, in order of least cost.

Affected generators would be compensated for lost revenues. BPA said it would initially cover the costs of compensation with transmission reserve funds but would propose in a new rate case an equitable way to allocate the costs. The agency continues to pursue long-term alternatives to displacing wind energy, such as new marketing tools to maximize power sales and energy storage.

Electric Co. on a publicity campaign and the chairman snatching up the phone and calling other companies to get them on board. The lesson proved useful when he returned to BPA in 2000 and in the next few years found Deputy Administrator Steve Hickok pushing to resurrect a research and development program that had virtually disappeared during the cuts of the 1990s and the crunch of the power crisis.

Utilities in general are stingy when it comes to research, dedicating barely a half-percent of revenues to exploring new technology compared to an average among all industries of about 3.5 percent. But it wasn't about merely spending money: Hickok and Oliver drew up a research agenda tied squarely to BPA's business challenges and objectives. Then they developed technology road maps focused on energy efficiency, demand response and other fields that defined the research progress necessary to advance BPA's objectives.

"It was a matter of getting the right people to buy in," Oliver recalls. "If all we'd done had been set up Technology Innovation as a bureaucratic enterprise with no policy involvement, it would have been easy for people to say, 'Well, there's something you can cut.' But we have worked hard to make this a shared program that works for BPA and the region."



Oliver doesn't mind failure. In fact, he expects it from cutting-edge projects pursuing new technologies. A sign on the wall in his department quotes legendary coach John Wooden: "Failure is not the worst thing in the world. The very worst thing is not to try." "This is the piece of BPA's investment that has the highest level of uncertainty," Oliver says. The trick is not to avoid failure, but to catch it quickly. Projects focus first on key technology hurdles central to their success. "If this algorithm requires the world's fastest computer to work, we need to know if we can get that," Oliver says. Project managers closely track each project through numerous check points. "We build in a kill switch so optimism doesn't overtake our ability to actually achieve results."

A panel of experts, often including BPA customers, annually sifts through BPA's research portfolio, keeping it fresh by paring some projects and adding new ones. The projects — some home-grown inside BPA — have included research into improved wind forecasting and splice shunts that have saved BPA and its customers millions by strengthening transmission lines without taking them out of service to install costly replacements. Other projects continue BPA's track record of testing the new energy efficiency technologies. Do the technologies



*Far above the Columbia River, linemen install splice shunts on BPA's 230-kilovolt Midway-Vantage line. The shunts strengthen lines without taking them out of service, saving ratepayers millions of dollars. (Barry Peckham/BPA)*

deliver the promised energy savings? Will consumers use the technologies once installed in their homes?

For ductless heat pumps, the focus of several Technology Innovation projects, the answer was a resounding yes. The findings provided the foundation for a regional campaign explaining that ductless heat pumps can cut home heating costs nearly in half compared to electric baseboard heat. Since 2008 public utilities in the Northwest have installed more than 12,000 ductless heat pumps, saving

nearly five average megawatts, in one of the region's most rapid adoptions of new energy efficiency technology.

## The grid of tomorrow

BPA is also looking to advancements in synchrophasor technology to sharpen insight into the condition of the grid, similar to the way high-definition television improved on standard





*BPA's Technology Innovation program helped fund studies of ductless heat pumps to demonstrate their energy saving potential in the Northwest. (Joel Scruggs/BPA)*



*Clallam Public Utility District customer Al Charles Sr., member of the Lower Elwha Klallam Tribe, explains how his ductless heat pump has reduced his power bill. (Joel Scruggs/BPA)*

definition. Grid operators have long relied on “snapshots” of the grid’s status every two seconds, but synchrophasors provide it in real time. The devices have already revealed that potentially dangerous oscillations once blamed on unavoidable resistance between machinery actually resulted from inefficient operations or problems as small as a loose cable.

Synchrophasors also allow BPA to more easily calibrate models that simulate how power plants or other system components respond to disturbances in the grid. For instance, BPA used synchrophasors to calibrate a model that

simulates the dynamic behavior of Columbia Generating Station without taking the 1,100-megawatt nuclear plant off line, as was previously necessary. BPA saved somewhere between \$100,000 and \$700,000, depending on power prices, that the agency would have otherwise had to spend on replacement power if CGS had shut down during the tests.

Oliver likens the improvement to drivers steering their cars with their eyes open as opposed to opening their eyes every few seconds. “Your awareness of everything happening around you is far greater,” he says.

Innovation is not new to the hydroelectric system. Creative thinking long coaxed more flexibility and power from the dams and reservoirs that serve as enormous liquid batteries, storing energy in the form of water. In the 1960s, the Bureau of Reclamation installed reversible pumps that could either move water uphill from Lake Roosevelt behind Grand Coulee Dam for irrigation, or generate energy from water flowing downhill — a system called pumped storage. Called the John W. Keys III Pump-Generating Plant, the facilities help absorb extra energy when it’s available



and release it when needed. The Columbia River Treaty increased water storage through the development of Canadian reservoirs, leading to construction of the interties, the Third Powerhouse at Grand Coulee Dam in the 1970s and a second powerhouse at Bonneville Dam completed in the early 1980s.

But reservoirs can hold only about 30 percent of the Columbia River's average annual runoff and, between commitments to flows for fish and other demands, the existing storage is all spoken for. Other means of storing energy such as batteries, flywheels or compressed air remain research targets, especially as variable energy such as wind adds to fluctuations in supply.

BPA is helping fund joint research with utilities, universities and others into other promising energy storage options, including the possibility of storing wind energy by injecting it in the form of compressed air into underground cavities in the Columbia Basin's volcanic basalt. The same basalt is also under investigation as a storage space for carbon-dioxide emissions. Either possibility may be far off and seemingly far-fetched. But Luce's vision of high-speed computers running the grid might have also seemed far-fetched at a time when BPA crews staffed substations to throw switches manually.



*BPA line crews maintain transmission lines through rough and often scenic terrain.*

While utilities have long adjusted their generation of power according to demand, a smarter grid promises consumers greater opportunities to adjust their demand to the supply. That could in turn provide grid operators cost-effective tools in adjusting to

the variability of renewable energy such as wind. BPA's smart grid program began pilot tests of devices that adjust the temperatures of electric water heaters to help store energy as heat when additional electricity is available. Other pilots are investigating refrigeration



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units and ceramic blocks as alternate energy storage devices.

In an age of increased coordination among utilities, electronic insight into the grid and rising participation by consumers will demand security systems that protect critical electronic infrastructure without standing in their way. Cyber security, including both infrastructure protection and employee awareness, has become a central element of smart grid planning and an essential part of life for BPA employees.

BPA has also helped lead a national effort to assess the vulnerability of the grid to geomagnetic disturbances caused by solar storms, with BPA transmission engineer Don Watkins chairing a North American Electric Reliability Corp. task force on the issue. Studying a 1989 geomagnetic disturbance that blacked out 6 million people in Canada, the task force looked for ways to better protect and prepare the grid, such as more fully assessing the risk to transformers and other equipment.

With a foundation for financial sustainability, BPA also pursued environmental sustainability with an initiative launched in 2010. The effort dovetailed with operational efficiency, pursuing strategies to streamline operations and reduce waste of both dollars and resources. A team



*Water rushing through Bonneville Dam's spillways churns the Columbia into whitewater.*

of employees drafted a 27-point Sustainability Action Plan that called for a 30 percent reduction in energy use by 2015 and a 2 percent reduction in petroleum use per year. Among the initial results: cafeteria composting that cuts disposal costs by 55 percent compared to trash and a switch to electronic pay statements that saves more than \$1,000 a month in paper and printing costs. BPA has also adopted energy-saving green building standards for new buildings.

## 75 years down, more to go

BPA reached its 75<sup>th</sup> anniversary in 2012 as a reshaped institution compared to the BPA that had celebrated the agency's 50<sup>th</sup> anniversary. It had changed in ways large and small, pleasant and painful, with the values of the region. What did not change, though, was the value of the Columbia River system.





## Cheering on tomorrow's engineers

Every year since 1992 middle and high school students from across the Northwest have gathered with help from BPA employee volunteers to answer such questions as, "What is the decimal number 84 in binary?"

The annual event is the BPA Regional Science Bowl, which is held on successive — and intensive — Saturdays in Portland and has become the largest regional science bowl in the country. The quiz-based competition rewards education in math and science by raising the profiles of those subjects to match the prestige of school athletics, perhaps putting aspiring scientists and engineers on career trajectories to someday work at BPA, says Cheri Benson, BPA's longtime coordinator of the event.

More than 10,000 middle and high school students have participated in the fast-paced tournament since 1992, with more than 140 BPA employees and their families volunteering each

year to pose questions, judge and otherwise support the competition. Keynote speakers have included NASA astronauts and experts from the Oregon Museum of Science and Industry, with hands-on engineering activities provided by the Department of Energy's National Energy Technology Laboratory.

A highlight is the final competition, where the day's top teams face off for a trip to Washington, D.C., to compete in the National Science Bowl sponsored by the Department of Energy.

The regional science bowl has been a strong springboard to the national competition. After winning the BPA Regional Science Bowl in 2011, Vancouver's Shahala Middle School was runner-up in the National Science Bowl's middle school competition. Portland's Sunset High School placed third in the national high school competition the same year.

Oh, the answer to that question? It is: 1010100.

"Development of the federal-based hydro system was fantastic for the Northwest," said Steve Klein, manager of Snohomish PUD. "The legacy of Bonneville is the stewardship of a tremendous renewable resource that allows us to be ahead of any other part of the country in terms of a non-carbon-emitting resource that provides clean, renewable energy to the region. We as a utility get an energy source that is affordable. We get it in a way that is consistent under long-term contracts that give us the knowledge that that resource is going to be there."

As the baby-boom generation began hitting retirement, though, BPA's workforce faced rapid turnover and required a sustainability strategy of its own. In June 2012, Administrator Steve Wright announced that he would retire in January 2013.

As of 2012 about a third of BPA's staff had been at the agency fewer than five years and about 40 percent was expected to be eligible for retirement within three years. Facing increased competition for expertise in technical fields such as electrical, computer and mechanical engineering, BPA increasingly focused on maintaining a workforce that is both engaged and enthused about serving customers and the region. BPA's public service mission and value to the Northwest rest in their hands.

"Before I joined this industry, I never understood the dedication that it takes to provide the





*Dwight Langer, manager of Northern Wasco County People's Utility District in The Dalles, Ore., since 1993. Northern Wasco is one of BPA's nearly 150 power customers. (Tracy Paradis)*

service that we do," said Anita Decker, BPA's chief operating officer, who began her career as a building inspector, crawling under houses to look for conservation opportunities. "What we do is essential to people's quality of life. When the lights are out, it's time to go to work. The willingness of our people to put their lives on the line for others is something that I will always be proud to be associated with."

BPA's not-for-profit status and public service mission do not alter its business objective of seeking ways to provide ever-improving service to its customers and the Northwest, Decker said. In fact, it heightens BPA's responsibility to deliver value in all forms, from environmental stewardship to regional leadership.

"I sincerely believe that the Bonneville

Power Administration is an underappreciated organization," said Dwight Langer, general manager of Northern Wasco PUD. "It has fine people. Some have left. There is a new generation moving in or has moved in. And the leadership they have provided, working through all the political challenges to provide fairness and equity, and finding that balance between the different interests, I think Bonneville just does a tremendous job. We truly view Bonneville as a business partner.

"Do we always agree? No. It's probably not healthy that we always agree. But we feel that they're always willing to work with us and we look forward to working with them.

"Their contribution to not only the economy of the Pacific Northwest, but their contribution

to the war effort in World War II, extraordinary. I mean, just unbelievable. And now, the challenges go on. And I think they're unsung heroes and we need to give strength to each other. The customers need to give strength to Bonneville so that Bonneville can give that strength back."

## Celebrating a Northwest milestone

On Sept. 15, 2012, a motorcade of cars dating to the 1930s rolled up to the visitor center at Bonneville Dam as flag-waving crowds lined the route. Out stepped President Franklin D. Roosevelt (played by actor Gary Stamm), two members of Congress, tribal leaders, and executives from BPA, the Corps of Engineers, the Bureau of Reclamation and the Department of Interior. They gathered on a small stage while salmon baked and kids took on an obstacle course patterned after a salmon's migration to and from the sea.

"Truly, in the construction of this dam we have had our eyes on the future of the nation," Roosevelt proclaimed. "Its cost will be returned to the people of the United States many times over in the improvement of navigation and



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*Clockwise, from upper left: The Renegade Stringband of Portland performed a unique brand of Northwest bluegrass at the celebration of BPA's 75<sup>th</sup> anniversary at Bonneville Dam; Actor Gary Stamm portrayed President Franklin D. Roosevelt (Mike Berger); Fresh salmon cooking around a fire; Antone Minthorn of the Confederated Tribes of the Umatilla Indian Reservation represented the Columbia River Gorge Commission.*

*Antique automobiles carried dignitaries past flag-waving onlookers to the 75<sup>th</sup> anniversary celebration of the creation of BPA and completion of Bonneville Dam. (Kevin Wingert/BPA)*

transportation, the cheapening of electric power, and the distribution of this power to hundreds of small communities within a great radius."

Others underscored just how far the region had come in adapting Roosevelt's grand vision to respond to modern Northwest needs and values. And how BPA itself had adapted.

"This wonderful, non-polluting resource has contributed to the economic well-being of





*The 75<sup>th</sup>celebration event drew thousands. (Joel Scruggs/BPA)*

this entire region. But there was in fact a cost to culture and to environment and that took a long time to recognize,” said Roy Sampsel of the Institute for Tribal Government at Portland State University. “We didn’t begin to enter into what we talk about now, this collaborative

spirit, until probably the late 1970s, the early 1980s, and it’s been maturing ever since. I don’t share that with you to say, ‘Gee, that was really a terrible time.’ I share that with you to say, ‘Look at all the wonderful progress that we have made together.’ And we must continue to

be committed to make that happen. The future of this river, the future of this great resource and how it works and continues to work should be an inspiration to us and to the world.”







## The People Behind this Book



*Dulcy Mahar (1941-2011)*

This book began under the eloquent authorship of Dulcy Mahar, for many years BPA's sharpest writer, editor and storyteller, not to mention wit. She wove explanations of the most complex issues and events into irresistible tapestries. It is a great loss to all of us that she did not finish this one before she died in July 2011.

Those of us who carried on with the book did so in her honor.

Lynn Baker, for many years BPA's unofficial historian and encyclopedia, as well as an extraordinary researcher and writer, stepped up at a tough time.

Her knowledge and dedication built the foundation that made the rest of our work possible. Ed Mosey lent his deft writing and keen knowledge to tell key parts of this story in a way no one else could. Kristel Turner told BPA's transmission story and Pat Zimmer the conservation story like wonderful novels. Doug Johnson carried the narrative into the future. Sarah Smith chronicled Woody Guthrie's lost-and-found BPA songs and the partnership between BPA and Northwest tribes. Rod Aho dug up the tale of BPA's early wind power pilots.

The beauty of the book's design comes courtesy of BPA's superb and hard-working graphics staff, especially Lisa Colgrove, Karen Hauser and Pilar Reichlein.

The help of BPA's library staff, especially Tina Kay, Libby Burke, Mark Rogen and Everett Carter, was indispensable.

Many others have graciously helped in many ways, large and small. They include: Claudia Andrews, Crystal Ball, Sonya Baskerville, Cheri Benson, Bill Berry, Scott Bettin, Lorri Bodi, Katherine Cheney, Anita Decker, Greg Delwiche, Lou Driessen, Bill Drummond, Luanna Grow, Randy Hardy, Nancy Harris, Mike Hansen, Steve Hickok, Judi Johansen, Mike Johns, Peter T. Johnson, Tim Johnson, Jim Jura, Steve Kerns, Bill Kinsey, Gail Kuntz, Nic Lane, Steve Larson, Bob Lohn, Mark Maher, Doug Marker, Sarah McNary, Elliot Mainzer, Bill Mittelstadt, Bill Murlin, Paul Norman, Terry Oliver, Tom Osborn, Tracy Paradis, John Platt, Dave Potter, Randy Roach, Jack Robertson, Roy Sampsel, Roger Seifert, Brian Silverstein, Jason Sweet, Ian Templeton, Vicki VanZandt, Grant Vincent, Michelle Whalen, Jennifer Williamson, Don Wolfe and Steve Wright. Further help came from Tom Eckman, John Harrison and John Shurts at the Northwest Power and Conservation Council; Lynne Brougher at the U.S. Bureau of Reclamation; Clare Perry, Michael Coffey and Rock Peters at the U.S. Army Corps of Engineers; Kevin Getsinger at Idaho Falls Power; Mike Hoffman at Pacific Northwest National Labs; Larry Giardina with the City of Ashland; and Mary Jean Lord, formerly of Klickitat Public Utility District.

Finally, acknowledgment must be given to Michael Milstein, who provided outstanding leadership in organizing and managing the tremendously difficult matter of deciding what needed to be said and keeping the project on track.

We hope you are as proud of BPA's story as we are.

























# BEHIND THE PAGES

*Untold stories in the making of this book*

## A cartoon story

Believe it or not, the editorial cartoon on page 13 mocking the WPPSS nuclear plants did not start out that way. As originally drawn, it actually mocked a nuclear plant in California.

We discovered this with a call to the artist, Steve Kelley. Until 2012 he was the staff cartoonist at the New Orleans Times-Picayune. His name was on the WPPSS cartoon but he did not recall drawing a cartoon about the Washington nuclear episode. However, he recognized a description of the cartoon as one that he had drawn about the San Onofre nuclear plant in Southern California while he worked at the San Diego Union Tribune.

Apparently an imaginative editor in the Pacific Northwest “repurposed” the cartoon by writing “WPPSS” above the plant. Kelley kindly granted us permission to use the reworked cartoon, provided that we delete his name from it.

## The power of proofreading

Our proofreaders and fact-checkers caught many important details and mistakes, saving us from repeated embarrassment in the eyes of readers. (We do not claim this finished book is error-free but, boy, did we try.)

The best catch? Don Wolfe, whose careful eye recognized that the Pacific Northwest Power Preference Act was passed not in 1966 but in 1964. The significance of the act was that it allowed BPA to sell power outside the Northwest as long as there was not demand for it within the region. The significance of Don’s catching the mistake was a great sigh of relief from the writers and editors.

## Have you seen that photo?

Perhaps the greatest remaining mystery surrounding this book is, did someone take a photo as Peter T. Johnson was burned in effigy?

Many people at BPA have heard the story that Johnson, the administrator who made the difficult calls to terminate construction of the nuclear plants

backed by BPA, was burned in effigy during protests of his actions. The effigy burning apparently took place at Hanford. Some people swear they have seen a photo of it. However, we scoured the Northwest for such a photo and turned up exactly nothing.

We called on crack research librarians in the Tri-Cities, state archivists, colleagues at Energy Northwest, BPA’s own research staff and many others. We persuaded some people who had been present at the protests to check boxes of memorabilia in their basements and attics. Still nothing.

If you know of a photo, please contact BPA’s Public Affairs Office. It’s too late for this book, but we’ll get it in the next one!

## The water feature

Hopefully readers will notice that a continuing theme through the book is the incredible value of the Columbia River in the Pacific Northwest. We’ve tried our best to capture it in the text, photos and the spirit of the book.

This was not enough for Lisa Colgrove, our lead designer for the book. She also had an artist’s vision for a design element incorporating water, some kind of watery shape that would appear on the backgrounds of some pages. We all came to refer to it hopefully as, “Lisa’s water feature,” not to be confused with a splashing fountain in her cubicle. Her concepts took a variety of forms – light wave-like swirls washing across some pages, ripples of green, blue and aqua or undulating lines of brushed watercolors. But Lisa is particular and so is Karen Hauser, who oversaw the design and layout. Not even as we counted down the days to deadline could they find a water feature that worked just right.

In the final days, we took to laying odds on the possibility of a water feature in the finished book. The odds accelerated to a point that suggested one heckuva payoff if the right image finally emerged. Lisa kept tinkering as the hours ticked away, unwilling to give in.

Lisa, you can stop working on it now. The book is published.





