



December 11th, 2013 NIGEL JAQUISS | Cover Story

## Costly To The Core

How the nuclear plant no one knows about is wasting your money.



IMAGE: Energy Northwest

At lunch, you can often find Robert McCullough in the Heathman Hotel dining room. From the moment he sits down, waiters know to ferry him one latte after another as McCullough, one of the nation's top utility consultants, works his laptop and takes client calls.

His \$400-an-hour fee buys a lot of coffee.

With his snowy beard, rosy cheeks and round middle, McCullough could moonlight as a Nordstrom Santa. But the gifts he bears can be tough to accept. He's a blunt, if loquacious, truth-teller.

McCullough was one of the first to figure out Enron Corp. was behind the power shortages and blackouts that darkened California in 2000 and 2001. In congressional testimony in 2002, McCullough revealed exactly how the Texas energy giant crippled the economies of Western states by manipulating electricity markets. His work led to billion-dollar settlements and criminal convictions.

“He’s incredibly smart—and a little bit arrogant,” says Jim Lazar, an Olympia, Wash., utility economist who’s known McCullough for 30 years. “There’s no question he’s one of the most knowledgeable people about the Northwest power system.”

Over the past 35 years, McCullough has often worked on complex disputes out of public view.

But on Dec. 11, he’s releasing the results of an investigation that affects anyone in the Pacific Northwest who pays a utility bill.

He’s spent the past nine months examining the economics of the region’s only nuclear power plant, the **Columbia Generating Station**, which sits on the Hanford Nuclear Reservation in southeastern Washington.

Many people in the Pacific Northwest don’t even know the plant exists.

After policymakers review McCullough’s report, the plant’s owners and operators may wish the Columbia Generating Station had remained in obscurity.

McCullough is hardly anti-nuke—as a **Portland General Electric** executive 25 years ago, he fought to keep PGE’s now-closed Trojan Nuclear Power Plant open.

But his report on the Columbia Generating Station leads to an unmistakable conclusion: It should be shut down.

Not for safety reasons, but because it has become the most expensive nuclear plant of its kind in the United States to run, and is a waste of money that costs ratepayers as much as an extra \$50 per year.

McCullough says we could replace the plant with cheaper power and save ratepayers \$1.7 billion over the next two decades.

“The people who are paying for this plant,” he says, “should want it closed.”





**TRUTH-TELLER: Robert McCullough, in the Heathman Hotel dining room, told Physicians For Social Responsibility he'd maintain complete editorial control of his report on the Columbia Generating Station.**

IMAGE: Natalie Behring

All the rain that falls in the Pacific Northwest yields one glorious benefit: cheap hydropower. For nearly 80 years, the federally owned dams on the Columbia and Snake rivers have made our electricity rates the envy of the rest of the U.S.

Northwest power planners realized in the late 1950s, though, that population growth would require finding other forms of electricity generation. By the late 1960s, private and public utilities, as well as the federal government, backed plans to build 10 nuclear plants in Oregon and Washington.

Only two were ever completed. The first was Trojan, which PGE operated outside Rainier, Ore., for 17 years before shutting it in 1993. The second was the Columbia Generating Station, which is owned by a consortium of publicly owned utilities across Washington and Oregon.

The Columbia Generating Station was supposed to be among five plants owned by the Washington Public Power Supply System, whose acronym WPPSS was pronounced “whoops” long before its grand nuclear dreams turned into epic failure.

WPPSS launched construction on all five plants. Between 1975 and 1981, the costs ballooned from \$5 billion to \$24 billion. Work ceased on four plants by the mid-1980s. The result left parts of Washington state looking like a post-apocalyptic movie set: two completed but

never-used 500-foot cooling towers, for instance, loom over dairy cattle in Grays Harbor County, about 30 miles west of Olympia.

The consortium had borrowed the money to build the plants, assuming they would pay for themselves. WPPSS defaulted on the bonds for two unfinished plants, leaving investors out \$2.25 billion—then the largest municipal default in American history.

WPPSS also left the region with what today is nearly \$6 billion in debts for the remaining two stillborn plants and the Columbia Generating Station. The **Bonneville Power Administration**, which brokers energy from the Columbia River system dams, had agreed to buy power from the WPPSS plants and, in turn, got stuck with the debt.

As McCullough notes, 30 years later the costs of the WPPSS fiasco “are still being paid for by Northwest ratepayers.”

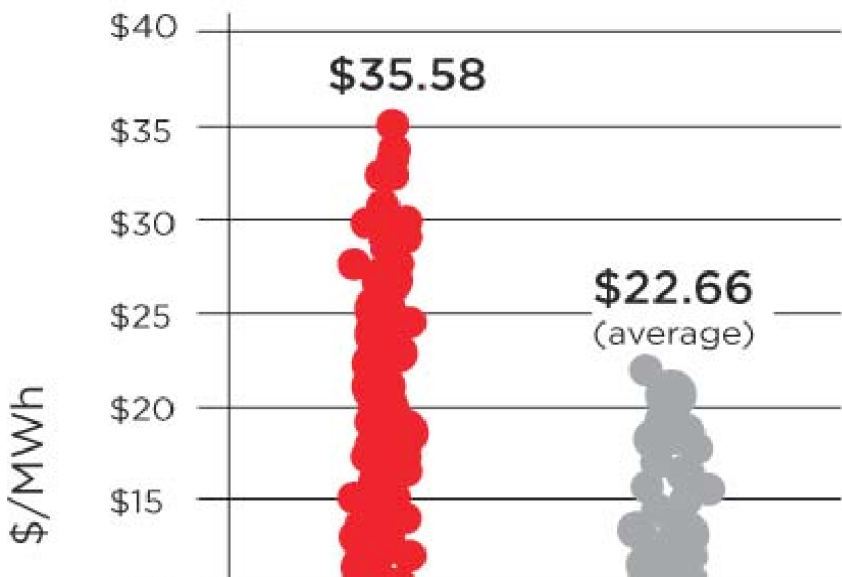
Meanwhile, the Columbia Generating Station has been operating since 1984, after being completed seven years late and \$2 billion over budget.

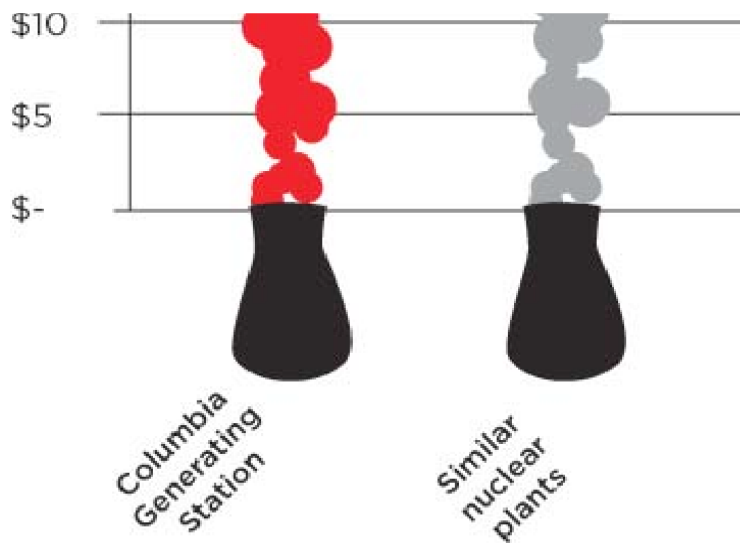
When running full-tilt, the plant today is capable of producing 1,170 megawatts of power, enough to serve 1 million homes. That’s 10 percent of the electricity in the entire Bonneville system.

The low-slung Columbia Generating Station lacks the iconic cooling towers of other nuclear plants. It was built largely below the surface of the sand and sagebrush on the Hanford reservation, a half-hour north of Richland, Wash., and 240 miles east of Portland.

It’s as if the plant doesn’t want to be seen—and in many ways, it’s been overlooked for decades.

McCullough Research’s investigation of the Columbia Generating Station found the nuclear plant’s costs of producing a megawatt hour of electricity are well above the average costs of the 27 comparable plants now operating in the U.S.





SOURCES: McCullough Research; Federal Energy Regulatory Commission.

McCullough, a cocky Irish kid from Chicago, landed in Portland at the tail end of the 1960s to attend Reed College.

“There were many distractions,” McCullough says, “and I got involved with them all.”

His undergraduate thesis on “Eurodollar Credit Creation,” launched him into a master’s in economics at Portland State University and a Ph.D. program at [Cornell University](#) in Ithaca, N.Y., where he had too much fun and too little money to complete his thesis at the Ivy League school.

After Portland General Electric recruited him in 1979, McCullough rose through the executive ranks in finance and rate-setting, ending up as director of special projects and assistant to PGE’s chairman.

McCullough chafed at the utility’s culture. “At PGE, there was a suggestion that you have your sense of humor surgically removed,” he says. In 1991, he left the utility and opened his consulting business, McCullough Research.

McCullough may not be a household name, but in energy circles, he’s a big deal. He’s been a consultant for Texas utilities and Canadian Indian tribes, and is often called as an expert witness. He assembled millions of Enron-related documents and testified for state and federal prosecutors. McCullough helped unravel Enron’s schemes for the Snohomish (Wash.) [Public Utility District](#), which won a \$1.6 billion judgment against the company.

Snohomish’s former assistant general counsel, Eric Christensen, often visited McCullough’s office in Southeast Portland.



“It’s what you’d imagine a CIA safe house to be,” Christensen says. “On the outside, it’s a nondescript tract home. On in the inside, there are these big banks of computers and analysts scattered all through the house.”

Even those who’ve been adversaries of McCullough admire his work.

“When he was working for PGE, not all of the information the utility put out was great, but I’ve never found anything wrong with his work,” says Portland public interest lawyer Dan Meek, who battled PGE and McCullough for years over closing Trojan. “He’s a highly expert and very careful economist.”





**BY THE NUMBERS:** The energy industry doesn't always like the conclusions McCullough reaches in his work. Says former Snohomish PUD assistant general counsel Eric Christensen, "If he's says he's done the research, then he's done the research."

IMAGE: Natalie Behring

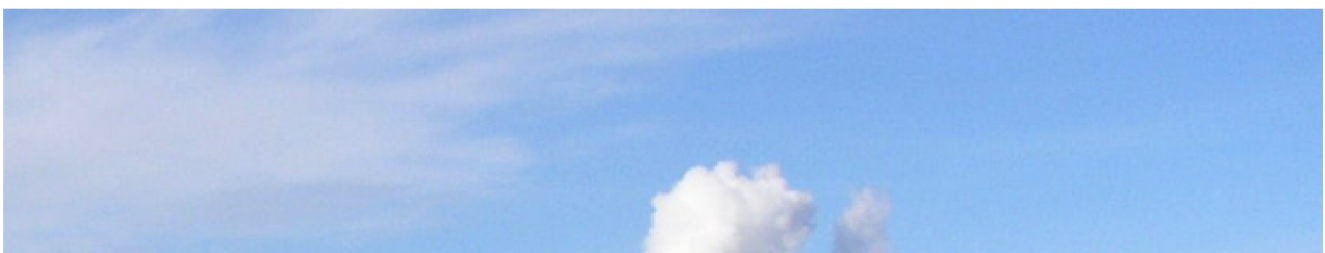
It's McCullough's reputation for independence that appealed to [Physicians for Social Responsibility](#), a national group that campaigns against global warming, as well as nuclear weapons and energy.

The organization's Oregon and Washington chapters wanted to draw attention to potential problems with the Columbia Generating Station after the 2011 earthquake and tsunami in Japan, where three nuclear reactors at Fukushima melted down and another exploded. Last month, the group released reports saying the Columbia Generating Station is seismically unsafe—something the plant's operators deny.

The physicians group turned to McCullough last spring to see if he would consider evaluating the plant's economics. He initially said no. "A lot of nuclear advocacy is emotional," he says. "That doesn't mean it's wrong, but it's not data-driven."

McCullough knew the plant had experienced problems controlling its costs. But a cursory glance at the plant's recent annual reports piqued his curiosity—especially the Columbia Generating Station's cost of producing power.

"I'm not anti-nuke," McCullough says. "[But] I was surprised to see the differential was so high."





**SKY-HIGH COSTS:** The Columbia Generating Station dominates the mid-Columbia plateau, but steep operating costs imperil the nuclear plant's future.

IMAGE: Uptanum / PD

To hear the owners and operators of the Columbia Generating Station tell it, the region's only nuclear plant is essential.

Mike Paoli, a spokesman for [Energy Northwest](#), the consortium that operates the plant, says the Columbia Generating Station provides a reliable, predictably priced source of power that backs up the Columbia River dam system.

"You could go to the market today and easily beat Columbia [Generating Station's] cost of power using natural gas—true," Paoli says. "But regardless of short-term performance, we looked 30 years out, and in terms of long-term cost savings, there's no question that Columbia comes out ahead for the ratepayer."

Paoli says Energy Northwest has not been given the opportunity to review McCullough's report in detail, but it has been presented with its major findings.

Paoli questions the report's objectivity. Physicians for Social Responsibility, he says, started from the premise of wanting to close the nuclear plant, so any research the group paid for would further that goal.

"They had their conclusion, and they set about proving it," he says.

McCullough disagrees. He says he had complete freedom to report what he found, not what Physicians for Social Responsibility wanted him to say.



What's more, his report draws on voluminous Energy Northwest, nuclear industry and Bonneville documents to build its case.

He found there is regularly so much electricity available in the Bonneville Power Administration network that it can't sell it all.

In fact, McCullough found, in the past two years, the market has been so oversupplied that Bonneville regularly paid customers to take electricity off its hands.

There are a few reasons why energy prices have fallen so low. Two consecutive rainy years have put plenty of water behind the dams. Energy companies continue rapid development of wind farms, which have become more competitive in the cost of power.

And there's fracking—the process of extracting oil and gas using pressurized water and sand—which has caused natural gas supplies to soar. It has turned North Dakota into a small slice of Saudi Arabia, goosed U.S. oil and gas production and cratered the price of natural gas. That's why there's been a scramble to send Wyoming coal through proposed Oregon and Washington export terminals.

Power companies often use natural gas to fire electricity-generating plants, and the cheap cost of gas has helped undercut the Columbia Generating Station's high-cost output.

The Columbia Generating Station might still be a plus for the region if its cost of making electricity were also low. But McCullough found the plant's cost of producing a megawatt hour over the past six years is about \$36, roughly 1.5 times what more efficient nuclear plants spend.

McCullough also found that it appears to be the most costly nuclear plant of its kind to run in the U.S. He and his team of six analysts crunched all of the Federal Energy Regulatory Commission filings for 2006 through 2012 for 27 operating nuclear plants built and designed on the same basis as the Columbia Generating Station.

"From what we can see, it's the most expensive," McCullough says.

As a result, he found ratepayers last year spent \$418 million for power from the Columbia Generating Station. They could have purchased the same power elsewhere for \$218 million.

Energy Northwest spokesman Paoli acknowledges the nuclear plant has recently been more expensive than market power and other nuclear plants, but he says that is changing.

"We continue to trend down toward lower cost," Paoli says.





**SAFETY FIRST:** Workers at the Columbia Generating Station perform maintenance on the nuclear plant's control rod drives. The plant has been running for nearly 30 years.

IMAGE: Ryan C. Deuschle

Why is the Columbia Generating Station so expensive to run?

One reason is location. Some of the most economical nuclear power operations exist where reactors are clustered together; where they are parts of companies such as Exelon, the Illinois utility that operates 17 reactors at 10 different plants; or where they are close to major population centers.

Another is overhead costs. For example, McCullough found the plant employs 1,100 people—about one-and-a-half times as many people per unit of energy produced as other nuclear plants.

“At \$80,000 a head, the high employment level is a continuing challenge to the plant’s economics,” McCullough says.

Paoli says comparisons to other nuclear plants’ costs are a “red herring.”

“As the only nuclear facility in the Northwest,” Paoli says, “our industry status doesn’t change our economic position as the best non-hydro—and clean—value for the Northwest.”

And the plant is aging. The Columbia Generating Station is 29 years old, and McCullough says it’s no longer viable.

“It’s like a computer-chip fabricator that makes large wafer chips,” McCullough says. “That plant gets replaced because the technology is obsolete and the market has moved on.”

Aging nuclear plants require lots of repairs, expensive parts and frequent shutdowns. McCullough found that Columbia Generating Station’s history has been plagued by above-average downtime and a failure to meet its targets for generating electricity.

Even Bonneville, in a 2009 report, recognized this problem. “Although the plant’s safety record is solid,” the report read, “[Columbia Generating Station] now ranks very close to the bottom of all nuclear plants.”

Paoli says the plant has made operational improvements, including securing a long-term, low-cost fuel supply.

“We’re on our way to being one of the top-performing nuclear facilities in the nation by end of 2014,” he says. “Not there yet—but the trends have us climbing fast.”

McCullough notes the plant’s budget for the next decade calls for nearly \$500 million in spending for new equipment, which will make it even less economical.

But the biggest reason the nuclear plant has been such a money sinkhole is the way it has been

managed.

Nearly all of the nation's 100 nuclear power plants belong to investor-owned utilities. The discipline of having to answer to investors and a customer base that can identify more easily where its power is coming from provides a level of accountability missing at the Columbia Generating Station.

The plant, as McCullough's report found, is owned by 92 public utilities and managed by 27 of them. But the owners have little incentive to change. They don't have to pay the costs of running the plant, nor are they responsible for unloading its expensive power on the market.

That falls to Bonneville, a massive, sophisticated energy agency with more than 3,000 employees, \$3 billion-plus in annual revenues and a service area that covers 300,000 square miles and nearly 13 million people.

When it comes to oversight of the nuclear plant, McCullough found, Bonneville has been an absentee landlord that has failed to address chronic problems.

"It's a bizarre set of political circumstances," he says. "You've got ownership without accountability."

And the relationship between Bonneville and Energy Northwest has been difficult.

"The history of this arrangement is rife with miscommunication and conflict between the two parties," McCullough wrote in his report.

McCullough's report found that in one instance Bonneville officials refused for years to allow the Columbia Generating Station to replace its condensers, a crucial piece of the operation, contributing to the plant's inefficiency.

The report also found Bonneville has failed to enforce agreements that could have reined in costs or even brought an end to the plant's operations years ago.

In 1998, the congressional delegations from Washington and Oregon, along with the governors of both states, conducted a "market test" to assess the nuclear plant's viability. The plan was to do such a test every two years, but for reasons that are unclear, Bonneville has not done so.

"There was a suggestion that continue," Bonneville spokesman Doug Johnson says of the plant's proposed cost reviews. "We did not adopt that recommendation."

At the time, Sen. Ron Wyden (D-Ore.) pushed for cost controls on the nuclear plant. Wyden is chairman of the [Senate Committee on Energy and Natural Resources](#). Spokesman Keith Chu says committee staff have not yet seen McCullough's report but are looking into the issues it



raises.

“Ultimately the decision about whether to run this power plant has to be based on what’s best for ratepayers,” Chu said in an email. “Keeping BPA rates affordable is always a priority, and that involves keeping a close eye on all BPA costs, including the Columbia Generating Station.”



**COOL TO THE IDEA OF A SHUTDOWN:** Bonneville Power Administration officials say they have not read McCullough’s report but see no reason to close the Columbia Generating Station any time soon.

Image courtesy of Energy Northwest

In states with greater accountability over nuclear plants, some aging plants are being shut down. In the past few years, at least four nuclear plants—two in California and one each in Wisconsin and Florida—have been closed for economic reasons. Vermont’s only nuclear plant will close next year.

McCullough doesn’t want to shut down the Columbia Generating Station without an alternative. And he has one.

He says with the glut of electricity sources, Bonneville could replace the nuclear plant's power by 2015 with long-term contracts from companies that generate electricity from wind, natural gas or other sources.

"Let's simply ask the market if there's a better deal out there," he says. "If there's not, then keep the plant operating."

There's urgency to tackle the issue: rapidly escalating shutdown costs. McCullough found the cost of complying with federal shutdown procedures is growing at 8 to 9 percent a year, far faster than inflation.

The longer Energy Northwest and Bonneville wait to shut down the plant, he says, the more it will cost ratepayers.

"Those costs have to be paid in any case," he says. "Better to do it now, when the price will be lower."

But there's enormous political support for the status quo. That's because the Columbia Generating Station employs 1,100 high-wage workers.

The plant's officials say closing now would actually increase costs to ratepayers. "We're the best regional value only so long as we're operating through our full life cycle," Paoli says. "Early closure equals higher rates."

Bonneville officials say they have not yet seen McCullough's report but seem to have already decided what to do about the plant.

"The plant's license was recently extended through 2043," says Johnson, the Bonneville spokesman. "At this time, there are no current plans to consider shutting down [the Columbia Generating Station] early."

Lazar, the Olympia utility economist, wrote his master's thesis on WPPSS 30 years ago and has continued to study the Washington power system.

He has reviewed McCullough's 208-page report. He says Washington's and Oregon's governors and congressional delegations should convene an expert panel to decide the plant's fate.

"The report's about 150 pages longer than it needs to be," Lazar says. "But it's highly credible and, if anything, conservative in its conclusions. The operating costs of the plant far exceed the market value of the power it produces. A private owner would not keep it open."