RENEWABLE ENERGY

COORDINATING A NORTHWEST GRID

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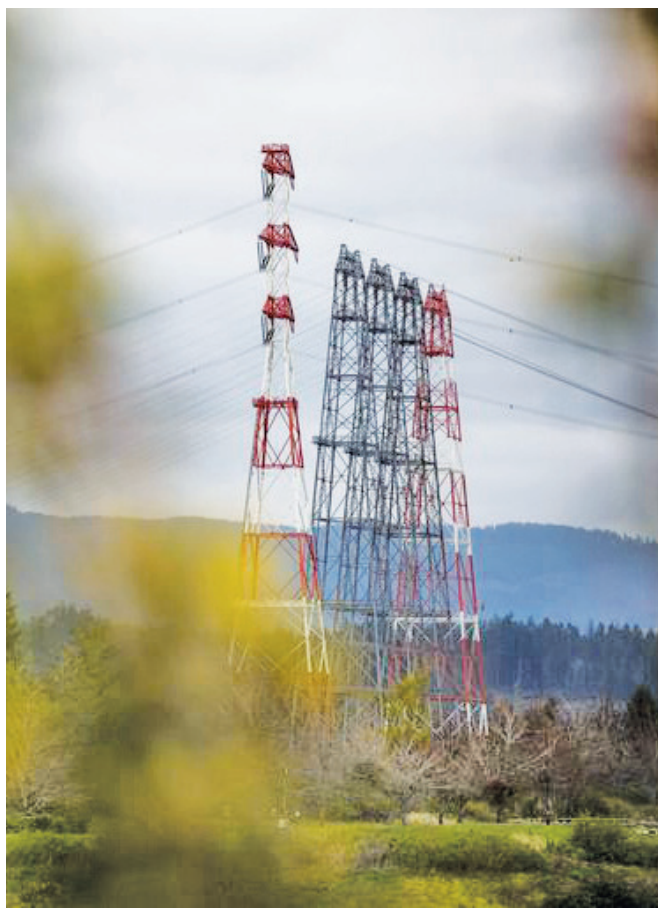
The Colstrip coal plant in Montana, which supplies electricity to customers in the Northwest and elsewhere.



Bradley W. Parks/Oregon Public Broadcasting

Power lines are seen at Bonneville Dam.

March of 2019 opened with a deep chill across Cascadia. Arctic air poured south, jacking up energy consumption and straining energy supplies in Oregon, Washington state and British Columbia. It conjured a perfect storm for the region's electricity grid.

As temperatures plummeted, Cascadia's hydropower reservoirs sat at record lows following weak fall rains and an exceptionally cold winter. Mechanical trouble had halved output from the Centralia, Washington, coal-fired power plant — the largest generator between Seattle and Portland. A low-pressure weather system was hampering Cascadia's wind farms. And maintenance work on lines in Los Angeles limited the amount of power that could flow north.

Utilities appealed to citizens to conserve energy. Industries cut back as power prices spiked. And the grid held.

Utility officials call it a near miss and a sign of a new normal. "We really had a very close call," says Scott Bolton, senior vice president for transmission development at Portland-based PacifiCorp.

"Future events could have direct impacts to the reliability of the bulk power system," concluded an assessment by Western Electricity Coordinating Council, the utility consortium that oversees reliability for the interconnected transmission network west of the Rockies.

Sharing renewable electricity across long distances is among the most cost-effective strategies for slashing carbon emissions, as InvestigateWest reported in April. Longer power lines with centralized control centers increase grid flexibility to carry high levels of wind and solar power.

A robust network would allow utilities to tap diverse sources. If inconvenient weather zaps Cascadia's power supply, for example, utilities can import electricity — maybe solar power from the Southwest or wind power from Montana and Wyoming. And if the tables turn, Cascadia can export solar, wind and water power.

A bigger grid isn't the sole solution. Giant battery arrays on the high-voltage grid or smaller packs charged from rooftop solar panels could keep things running for several hours. Hydrogen gas produced from clean electricity and stored locally could back up the grid.

Even diehard advocates for an expanded grid agree local energy upgrades will be crucial. Still, they say, grid expansion requires immediate action. Yet grid projects often are delayed for a decade or more by community opposition to new power lines and interstate disputes over who should pay for new lines.

In most of the United States and parts of Canada, utilities give neutral grid operators and regional markets control over power plants. Such optimized systems provide electricity at lower costs, identifying where new lines are needed and spreading costs among the utilities and states that benefit.

West of the Rockies, the power sector remains dominated by vertically integrated monopolies. An independent grid operator manages most of California's electricity, but everywhere else control rests with 37 public and private utilities, including 14 within British Columbia, Washington and Oregon alone.

A coordinated Western grid is needed to accelerate wind and solar installations and to expand access to imported renewable energy, says Spencer Gray, who runs the Portland-based Northwest & Intermountain Power Producers Coalition. The group's members include most of the Northwest's renewable energy developers.

"It's crazy to go into a decarbonized future still treating each state or each utility as a little island unto itself," Gray said.

Although attempts to shift the dynamic in the West failed in recent decades, the U.S. Senate recently approved an infrastructure bill with provisions to encourage centralized operations and to facilitate line approval and financing.

And Western utilities have now gained experience with open power markets via an exchange launched in 2014 by PacifiCorp and the agency that operates California's grid. Although the Western Energy Imbalance Market trades only last-minute surpluses — mostly renewable energy that would go to waste —as of last month, it had saved consumers a cool $1.4 billion.

To assess prospects for a coordinated regional grid, InvestigateWest sought the views of an industry representative, a renewable energy advocate and a former British Columbia power trader who now teaches energy economics.

Managing energy politics

Scott Bolton says he's the lone liberal arts major in a utility's transmission department — usually the domain of electrical engineers. But it's no accident. Modernizing the grid is more than a technical challenge for PacifiCorp. "We have a six-state system, and we have three of the bluest of the 'blue' states and three of the reddest of the 'red' states," Bolton said.

As negotiators work in several forums to unify the power sector, weather and politics associated with climate change stoke tensions across the West. Grid development in states as politically diverse as Oregon, Washington and Wyoming requires a political science major's experience.

State politicians "think local." For example, pressure to avoid a repeat of 2020's rolling blackouts prompted California's grid operator to adopt a California-first policy that could block urgent power flows to other jurisdictions. This engendered distrust in other states and impeded California system's effort to spearhead a Western power market.

Closer to home for PacifiCorp, tensions between pro-coal Montana and Wyoming and anti-coal Oregon and Washington threaten to delay development of reliable wind energy.

Federal politicians are working to accelerate grid expansion. Gray worked with U.S. Sen. Maria Cantwell, a Washington Democrat, on a proposal to help transmission developers get private financing. The plan would empower the Department of Energy to sign up for rights to a proposed or expanded line, thereby encouraging utilities to join in. And a $2.5 billion "transmission facilitation fund" is part of the Senate's $550 billion infrastructure bill, which still must pass the House.

Meanwhile, Bolton said a proposal by U.S. Sen. Ron Wyden, an Oregon Democrat, to extend tax breaks to transmission projects could have even greater impact. That measure could pass as part of a $3.5-billion, Democrat-driven package.

But not everyone in Cascadia welcomes Bolton's pitch. Communities and conservationists are fighting a link between Eastern Oregon and Idaho, for example. They accuse Idaho Power, PacifiCorp's project partner, of trying to siphon off Cascadia's renewable energy and degrading views along the Oregon Trail.

Critics in coal-rich states, meanwhile, are riled by Oregon and Washington mandates to phase out imports of coal-generated power.

The way to transcend these divisions, Bolton said, is to deliver cheaper power to everyone. He notes the "happy coincidence" that adding renewable energy and cutting the use of fossil fuels now also reduces costs.

On utilities and the greater good

Nicole Hughes' biggest challenge is disjointed thinking by some utilities and their states' regulators.

Hughes runs Renewable Northwest, a coalition pushing for renewable energy deployment in Oregon, Washington, Idaho and Montana. To her, blackouts that crippled Texas in February dramatized the importance of sharing power among regions.

Texas operates its own grid and has only weak connections to adjoining western, eastern and Mexican grids. The result, she said, was that Texas couldn't tap outside help when extreme cold shut down dozens of gas, coal, wind and nuclear power plants in February. Hundreds of people died when heaters turned off.

Her first focus for Cascadia's grid is repurposing and expanding existing high-voltage lines. One example is the line linking the Colstrip, Montana, coal power plant to the plant's four co-owners: PacifiCorp, Portland General Electric, Avista and Bellevue, Washington–based Puget Sound Energy. Those utilities all anticipate shutting down their Colstrip units between 2027 and 2030.

Renewable Northwest eagerly awaits retirement of the Colstrip plant so that its line to Washington can be repurposed for Montana wind power. But Puget Sound Energy put that future in doubt in early 2020 when it requested permission from Washington state regulators to sell its shares in Colstrip and the power line to NorthWestern Energy, a Montana utility with a weaker commitment to climate action.

Puget Sound Energy priced its transmission asset at $1.725 million — a bargain according to a transmission expert hired by Renewable Northwest and the Seattle-based NW Energy Coalition. The expert, Michael Goggin, testified to the Washington Utilities and Transportation Commission that Puget Sound Energy's asset was worth at least $342 million to Washington ratepayers. Ultimately, staff advised the commission to reject the sale.

Hughes, meanwhile, expects her struggle to continue: "We anticipate having this fight over and over again, every time a utility gets out of Colstrip."

Hughes says some new transmission lines are needed — and likely will be included in the projects planned by PacifiCorp. Still, she cautions against planning new lines until the West has a regional market that involves states and stakeholders beyond just utilities. She argues that such a market is needed to unlock the full potential of the existing grid.

"Instead of just buying something new, we need to figure out if there's something we can reuse. We're not very good at that in this country," Hughes said.

Sharing British Columbia's flexibility

Blake Shaffer spent seven years as an electricity trader for provincial utility BC Hydro. As an academic, he focuses on the role that power trading can play in decarbonizing economies. Power trading's moneymaking and climate action opportunities increasingly align, says the University of Calgary economics professor.

He points to Cascadia's hydropower and argues it has a lucrative role to play in helping utilities across the West slash reliance on coal- and gas-fired electricity.

Hydropower reservoirs are essentially giant batteries, and British Columbia has the West's biggest. The W.A.C. Bennett Dam on the Peace River impounds about 60 million acre-feet of water — roughly six times more than Grand Coulee Dam.

This gives the province unusual flexibility, Shaffer said. Hydropower reservoirs smooth out seasonal fluctuations in supply, making British Columbia less vulnerable to low-water years that stress Washington and California. In recent years, British Columbia also has earned extra revenue by tapping its flexible hydropower to smooth out the Western grid's electricity supply.

Here's how it works: BC Hydro ramps up its turbines and sends power south when the Western grid's power supplies are tight — often when wind and solar generation are in short supply. It then uses imported power to meet local demand when electricity is abundant — often when winds are strong and sunny days are activating millions of solar panels.

"B.C. doesn't have massive surplus of hydropower to export. In fact, they're often net importers. But they do have flexibility as to when they deploy their hydropower," Shaffer said. And British Columbia hydropower offers its neighbors an alternative to turning on fossil-fueled generators, which currently are their leading source of flexibility.

BC Hydro's import/export arm turns a tidy profit by trading electricity. Over five years, Powerex has earned an average of $260 million more annually on power sales than it paid for imports.

Shaffer said BC Hydro is boosting its capacity and flexibility. The utility is adding turbines at existing hydro dams and building a dam on the Peace River, although the structurally troubled Site C hydropower project remains controversial.

The West will need as much flexibility as it can get. As greenhouse gas targets tighten, it will be harder for utilities to use fossil-fired power plants. At the same time, peak electricity demand for home heating, cars and other equipment is expected to increase.

If the province wants to use its expanded hydropower to add flexibility to the Western grid, it will need more cross-border transmission capacity.

Shaffer said added cross-border transmission is likely to pay off for both sides. He points to work by Massachusetts Institute of Technology researchers who ran computer models to explore the value of comparable exchanges between Hydro-Québec's big reservoirs and the northeastern United States.

In the university's simulation, Quebec and New England traded increasing volumes of energy back and forth as researchers programmed in more transmission between the jurisdictions. As trading increased, carbon pollution and energy costs fell, and electrification of home heating and vehicles accelerated.

But conjuring this electrical symbiosis may take years. Proposed power lines from Quebec south are frequently hamstrung by opposition from local and state interests.

"Transmission doesn't get discussed enough," said a clearly frustrated Shaffer. "We're all kicking and screaming and saying this is a big part of the solution if we're going to decarbonize."