

# Journal

May 2015

## McNary Dam hits rewind

To the untrained eye, it's a box of copper planks. But these wands, called stator bars, are where the magic happens in hydroelectric generation.

Kathy Spillane says stators are the hidden key to transforming the muscle of the Columbia River into the low-cost, carbon-free electricity used across the Pacific Northwest. And Spillane — who has successfully led an \$86 million federal project to replace 1,044 of the copper bars at McNary Dam — would certainly know.

“The stator windings are the invisible piece of the hydro plant, part of the mystery people don't understand,” says Spillane, a project manager with the U.S. Army Corps of Engineers. “But they're really the heart of the generator.”

McNary's original stator windings had been producing electricity virtually 24/7 since the dam went into full service in 1957 near Umatilla, Ore. Its powerhouse produces 980 megawatts at full capacity — enough to support about 686,000 homes. That's more than the households in the cities of Seattle and Portland combined.

But by the early 2000s, the old insulation wrapping the metal bars had deteriorated, raising the risk of high-voltage faults that jeopardized safe and reliable operations. Several of the generating units had to be indefinitely de-rated, meaning they could only be safely operated at partial capacity, something akin to always having to drive 20 mph below the speed limit.

That's why BPA ratepayers are investing \$86 million at McNary to install new stator windings on 10 generators, helping secure its dependable value for the next half century.

The Corps, McNary Dam's owner, and its partners are now in the home stretch of the project to replace the original Eisenhower-era windings with state-of-the-art components. Besides BPA, the project partners are contractor Andritz Hydro and the Corps' own Hydroelectric Design Center in Portland, Ore.

The labor-intensive project is expected to wrap up this fall. During the painstaking installation process, the 1,044 bars must be bonded by hand in a high-temperature process called brazing, using a torch at more than 1,000 degrees.



*After half a century of service, 1,044 stators at McNary Dam are being replaced so that the generating units can safely operate at full capacity.*

To have a revolving roster of two generators disassembled and out of service over the course of five years would pose a challenge at any FCRPS dam, but managing McNary's array of vital and often competing objectives can be even more difficult. Beyond its main job of producing a certain amount of electricity to serve the Northwest's demand hour to hour, the dam provides the voltage support to keep the regional transmission grid stable in the era of variable wind power. It also maintains calibrated water flows to support endangered fish. At times of peak demand, when every available generator is needed for such operational flexibility, subtracting units compounds an already difficult juggling act.

The project is part of a sequence of capital investments in the FCRPS, which provides nearly a third of the electricity consumed in the Pacific Northwest. As part of their broader asset strategy, BPA and the Corps decided it would be cost-effective to invest in better stators, which will have the capacity to produce 18 percent more power from the same amount of water.

This improvement was possible with next-generation insulation, which provides more protection in a thinner epoxy material. Streamlined insulation makes more room for larger, more powerful copper stator bars nested in the same space.



The current work sets the stage for the next major project: the likely replacement of the dam's 14 aging hydroelectric turbines with more efficient models in the coming decade. The new stators contain about 35 percent more copper, which will lift the capacity of each generator to 100 megawatts from its historic 84.7 MW after turbine upgrades.

"This shows foresight for the future," says Tim Roberts, the dam's chief of maintenance. "McNary is a really robust plant. They built it to last. With this project, you've reset the asset, as far as windings, for another 50 years and you've also provided the potential for increased capacity. That's a win-win."

## Line crew puts work plan into aerial action

There's nothing like working 125 feet above the ground on a busted goat peak to demonstrate BPA's brand of safety, innovation, reliability and stewardship.

What's a goat peak? That's a transmission term for a fiber bracket, a 4-by-10-foot triangular structure that sits like a steel hat atop some BPA towers.

While electricity is carried on the lines below, the goat peak supports a separate arterial, the fiber-optic cable that moves digital communications across the region for BPA and third parties. The bundle of glass fibers delivers the broadband signals that enable BPA to remotely evaluate and control elements of its vast transmission system.

But ice and snow can be downright unkind to a goat peak — especially in the sub-alpine setting between the icy chute of the Columbia Gorge and 11,250-foot Mount Hood.

BPA pilot Peter Renggli and patrol observer Ron Totorica were flying on a routine helicopter patrol near the northeast flank of the mountain in February when they noticed a mangled goat peak on the Big Eddy-Troutdale transmission line. To protect reliability, BPA crews continuously survey its 15,000 circuit miles of lines by land and air for maintenance problems.

"It needed to be fixed urgently to prevent further damage," Totorica said. The collapsed bracket lay along the Ross-Malin fiber-optic line, which carries data between Vancouver, Wash., and Klamath County, Ore.

But the damaged tower was down the steep slope of a canyon, imperfectly served by a rough right-of-way.

Totorica alerted Foreman III Scott Williams of BPA's transmission line maintenance crew in The Dalles, Ore. Williams immediately conferred with Aircraft Services to devise an innovative method of making the repair using a helicopter to hoist tools and steel parts to linemen on the tower without having to de-energize the 230-kilovolt dual-circuit power lines.

In recent years, BPA linemen have taken yearly "long-line" training in Pasco, Wash., to become proficient at rescue



*A BPA line maintenance crew makes an urgent repair with helicopter support in a rugged setting near Mount Hood.*

techniques using a helicopter. Those safety, communication and physical skills are now being put into practice to do select field projects more efficiently.

Without the helicopter, the project would have taken much longer, Williams explained. The crew would have transported in a track bulldozer to repair the access road and landings to allow TLM equipment to reach the rugged site. Then they would have spent hours manually moving heavy steel parts and tools up and down the tower by rope. "We would have piecemealed it using hand lines and ground holds," Erickson said.

"By using the helicopter, the exposure to known safety hazards for the linemen was decreased because of how quickly we can get them the equipment," Renggli said. "The traditional method would have taken most of the day."

Another advantage: The decision to use the helicopter also reduced the environmental concerns associated with projects in the Mt. Hood National Forest.

This time, the linemen assembled a new goat peak on the ground and the helicopter flew it to them.

The crew completed the actual peak replacement in an hour flat. All told, they were on and off the tower in 2½ hours.

"That's what we do," says Erickson.

## Demand response pilot launched

Energy Northwest and BPA have integrated an additional demand response resource into the Energy Northwest Aggregation Demonstration project that went live Feb. 9. The system, which is the first of its kind in the region, will help BPA test balancing loads on its Northwest transmission grid through industrial resource partners.

Over the long run, demand-side resources have the potential to defer or displace the need for new generation in the region and make the most efficient use of existing generation, resulting in overall cost savings for Northwest ratepayers. Since the launch of the pilot program in February, BPA has called for 11 tests lasting up to 90 minutes. Each test was successful.

“This is a testament to Energy Northwest’s mission to provide our public power members and regional ratepayers with safe, reliable, cost-effective, responsible power generation and energy solutions,” said Energy Northwest CEO Mark Reddemann.

In the past, BPA provided balancing services solely with capacity from the federal hydropower system.

“The hydro system provides many benefits to the Northwest, but it has been stretched to its limit,” said BPA Administrator Elliot Mainzer. “Moving forward we will need smart, sound measures, including demand response, to cost-effectively maintain hydro and transmission system flexibility and deliver value and reliable service to our customers and the region.”

Following the agreement to start a pilot program, Energy Northwest assembled the demand response resource from asset loads served by regional public utility partners and took the role of the resource aggregator. The contract currently provides up to 35 megawatts of reliable “fast reaction” demand response-capacity resource.

Conceptually, demand response builds on the idea that while individual electric loads are relatively minor compared to the scale of a regional transmission grid, many loads lowered and raised at once may serve as a cost-effective alternative to building or purchasing the output of additional electric generating sources.

Energy Northwest developed its Demand Response Aggregation Control System, a comprehensive data-gathering, monitoring, control and communications infrastructure system, for the project. Communication devices are installed by each participating utility to report to and receive direction from the system via secure cloud-based data paths. The system is hosted within Pacific Northwest National Laboratory’s Electricity Infrastructure Operations Center, a U.S. Department of Energy-funded incubator facility built and operated for such roles.

When system conditions require BPA to activate reserve system balancing resources — including demand response — BPA operations staff generates a signal calling on demand response assets. Energy Northwest’s Demand Response Aggregated Control System picks up BPA’s signal, acknowledges its receipt, and forwards the signal to multiple demand response assets. Upon receipt of the forwarded signal, each asset begins to automatically reduce its loads. The load changes must be complete within 10 minutes and sustained through the event, which can be up to 90 minutes.

During events, the system collects detailed metering information from each of the assets and reports total capacity response delivered to BPA. Once an event ends, it sends terminating signals to the assets, which can then resume normal operations.

Energy Northwest and its public utility partners continue to look for diverse electric loads from customers willing and able to reduce their electric demand on short notice.

## BPA offers education grants

BPA is offering grants in science and energy education to nonprofit organizations, schools and others in support of work to educate students in grades K through 12 about the energy systems of the Pacific Northwest.

The goal of the program is to advance students’ understanding, awareness and interest in the issues and science involved in energy generation and transmission in the region.

Funded projects could focus on hydroelectricity, wind and other sources of electric power, methods of conserving electricity, studies of energy and environment, programs on engineering and technology skills relating to energy, and others.

BPA anticipates making four to 10 grants ranging from \$500 to \$5,000. Funding can be awarded to school districts, government agencies and nonprofit 501(c)(3) organizations. The recipients must be from, and the funding must be used in, BPA’s service territory in Washington, Idaho, Oregon and parts of Montana, Nevada and Wyoming.

Applications for project funding are due May 8 and funding will be awarded in June for projects taking place over the 2015-2016 school year. For complete terms and instructions on completing an education grant proposal, go to [www.bpa.gov/goto/EducationGrants](http://www.bpa.gov/goto/EducationGrants).

# Public Involvement [updates & Notices]

## BPA PROJECTS

### Quarterly Business Review [Regionwide]

BPA's next QBR will be held May 5. The draft agenda is available at [www.bpa.gov/Finance/FinancialInformation/FinancialOverview/Pages/fy2015.aspx](http://www.bpa.gov/Finance/FinancialInformation/FinancialOverview/Pages/fy2015.aspx).

### Integrated Program Review 2 [Regionwide]

BPA has completed its Integrated Program Review 2 and decided to proceed with moving the Energy Efficiency capital program to expense. A closeout letter and final IPR2 report will be available at [www.bpa.gov/Finance/FinancialPublicProcesses/IPR/Pages/IPR-2014.aspx](http://www.bpa.gov/Finance/FinancialPublicProcesses/IPR/Pages/IPR-2014.aspx).

### BP-16 Rate Case [Regionwide]

BPA is conducting a consolidated power and transmission rate proceeding, BP-16, to set rates for the fiscal year 2016–2017 rate period. BPA is proposing a 6.7 percent average wholesale power rate increase and a 5.6 percent transmission rate increase. The formal rate-setting process will culminate in the filing of a final rate proposal and the administrator's record of decision with the Federal Energy Regulatory Commission in late July 2015. BPA will request approval for the rates to be effective Oct. 1, 2015. For information, go to [www.bpa.gov/goto/BP16](http://www.bpa.gov/goto/BP16).

## Transmission

### I-5 Corridor Reinforcement Project

[Cowlitz, Clark counties, Wash.; Multnomah County, Ore.]

BPA published a project update with new information about the projected need for the line, as well as non-wires measures that could be used to relieve some of the congestion that the line is being designed to address. BPA continues to conduct surveys and studies to determine the potential impacts of the project. We expect to release a final environmental impact statement in late 2015, followed by a record of decision in 2016. If BPA decides to build the project, we would then focus on negotiating acquisition of the required easements from property owners and obtaining permits. For more information, go to [www.bpa.gov/goto/i5](http://www.bpa.gov/goto/i5).

## Environment, Fish and Wildlife

### Upper Columbia Spring Chinook and Steelhead Acclimation Project [Chelan and Okanogan counties, Wash.]

BPA will accept scoping comments through May 4 for the draft environmental assessment on funding the Confederated Tribes and Bands of the Yakama Nation's proposed project. The project would improve acclimation and release of existing hatchery-bred juvenile steelhead and chinook in a manner that more accurately mimics natural systems. For more information, go to <http://www.bpa.gov/goto/ChinookSteelheadAcclimation>.

### Kootenai River restoration at Bonners Ferry [Boundary County, Idaho]

BPA will issue a finding of no significant impact in May, along with the final environmental assessment and response to comments on the proposal to fund this project by the Kootenai Tribe of Idaho. The project would restore and enhance portions of the Kootenai River near Bonners Ferry. For information, go to [http://efw.bpa.gov/environmental\\_services/Document\\_Library/BonnersFerry/](http://efw.bpa.gov/environmental_services/Document_Library/BonnersFerry/).

### Crooked River Valley Rehabilitation Project [Idaho County, Idaho]

BPA, along with the USDA Forest Service, Nez Perce Tribe, and U.S. Army Corps of Engineers, completed the final environmental impact statement for the Crooked River Valley Rehabilitation project. The project proposes to rehabilitate two miles of Crooked River damaged by mining on Forest Service lands. The Forest Service is evaluating objections to its draft record of decision. BPA is a cooperating agency and expects to decide whether to fund this project in June. For information, go to [http://data.ecosystem-management.org/nepaweb/nepa\\_project\\_exp.php?project=40648](http://data.ecosystem-management.org/nepaweb/nepa_project_exp.php?project=40648).

## CLOSE OF COMMENT

- **May 4**, Upper Columbia Spring Chinook and Steelhead Acclimation Project

## CALENDAR OF EVENTS

For current meeting information, go to [www.bpa.gov/PublicInvolvement/Cal](http://www.bpa.gov/PublicInvolvement/Cal).

### Quarterly Business Review

- **May 5**, 10 a.m. to 2 p.m., BPA Rates Hearing Room, Suite 200, 1201 Lloyd Blvd., Portland, Ore.

## FOR MORE INFORMATION

Information on other projects under environmental review is available at [www.bpa.gov/goto/NEPA](http://www.bpa.gov/goto/NEPA).

For information about the National Environmental Policy Act in general, go to [www.bpa.gov/goto/environmentalplanning](http://www.bpa.gov/goto/environmentalplanning).

The Journal is a monthly publication of the Bonneville Power Administration. If you have questions or comments, or you want to be added to the mailing list for any project, call toll free 800-622-4519.

To order copies of documents, call: 800-622-4520 or 503-230-7334. Written comments may be sent to: BPA, P.O. Box 14428, Portland, OR 97293-4428. Email address: [comment@bpa.gov](mailto:comment@bpa.gov). BPA home page: [www.bpa.gov](http://www.bpa.gov). For details on BPA environmental reviews listed above, including site maps and documents issued to date, see [www.efw.bpa.gov/environmental\\_services/nepadocs.aspx](http://www.efw.bpa.gov/environmental_services/nepadocs.aspx). Process Abbreviations: EA-Environmental Assessment, EIS-Environmental Impact Statement, ESA-Endangered Species Act, FONSI-Finding of No Significant Impact, NOI-Notice of Intent, ROD-Record of Decision.

