

# CONNECTIONS



Spring 2009  
Vol. 3 | No. 2

WASHINGTON PUBLIC UTILITY DISTRICTS ASSOCIATION  
**WPUDA**  
YOUR connection

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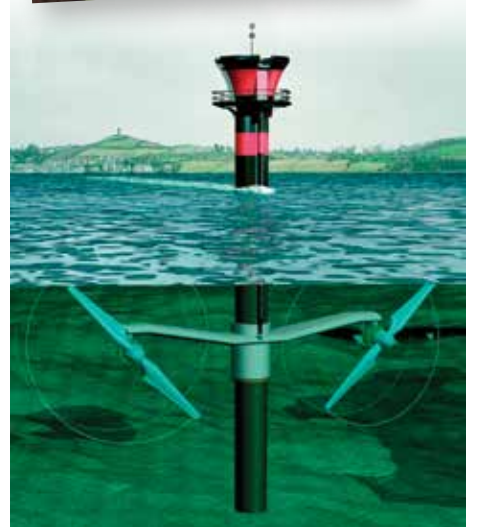
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**On the cover:** A farmer in Eastern Washington harvests wheat in the shadow of the Nine Canyon Wind Project, owned and operated by Energy Northwest. Located near Kennewick, Nine Canyon is one of the largest public power wind projects in the nation. It consists of 63 turbines that begin generating electricity when wind speed reaches 8 mph. Generation increases as the wind speed increases, with full power achieved at about 35 mph. Once the rotors begin to blades, they turn

at a constant speed. If the wind exceeds a sustained speed of 55 mph, the turbines shut themselves down automatically. The turbines are placed in four rows along the windiest ridges on the site. Although the project lease covers 5,120 acres of land, only 47 acres are actually taken up by turbines, access roads, and a maintenance building. The project lease guarantees the landowners an annual income for the life of the project.

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## Transmission: The vital link for renewable energy

By Steve Johnson, Executive Director

**A**mid all the discussion of renewable energy, we can't forget about transmission – literally the critical link between electrical generation and the utilities that provide power to the consumers.

The U.S. electrical grid needs to be expanded and enhanced to ensure reliability, facilitate wholesale power sales to reduce costs to consumers, make the so-called smart grid a reality, and to bring renewable resources from remote locations to load.

In this issue of Connections, Elliott Manzier, executive vice president of Corporate Strategy for the Bonneville Power Administration, writes about BPA's efforts to build transmission and integrate wind power onto the grid.

This is critical if Washington utilities are to meet state mandates for renewable energy. BPA not only markets the clean, renewable hydropower generated by the Federal Columbia River Power System, it also operates more than 15,000 circuit-miles of transmission lines that crisscross the Northwest from Montana to California.

As Manzier notes, BPA has already connected more than 2,000 megawatts of wind capacity to the Northwest grid and expects to add another 6,000 megawatts by 2013.

That's why it was especially gratifying that Congress recently authorized BPA to borrow an additional \$3.25 billion to "assist in building critical infrastructure to facilitate renewable and energy efficiency projects."

Notice that I said "borrow" the money.

That's because BPA is not funded by taxpayer dollars.

While BPA is an agency of the Department of Energy, it is self-funded. It covers its costs by selling power and transmission services to Northwest utilities, and it makes yearly loan payments – with interest – to the U.S. Treasury.

It's important, periodically, to remind folks that BPA's costs are paid for by rate-payers, not taxpayers. About a third of all the electricity used in the Northwest comes from BPA, and collectively, Washington Public Utility Districts are BPA's largest customer.

While we're on the subject of transmission, when WPUDA was in Washington, D.C., earlier this year for the annual American Public Power Association legislative rally, we discussed two other key issues with members of the Washington congressional delegation.



It's clear that two primary barriers to the construction of new transmission lines are siting and how those costs are allocated.

Understandably, there is always some local opposition to new power lines, and some in Congress want to give the Federal Energy Regulatory Commission (FERC) the authority

to make those decisions. We disagree.

In 2005, Congress adopted the National Interest Electric Transmission Corridor program, which directed the Department of Energy to designate transmission corridors in congested areas where new transmission facilities are needed. FERC is authorized to site transmission lines in those corridors when states lack authority to site multi-state transmission lines or when a state has delayed action on an application for more than a year.


To date, that "backstop" authority has not been tested.

Before FERC is given full siting authority, which some parties have called for, we believe Congress should give the existing federal "backstop" authority a chance to work. If necessary, the limited existing authority can be changed to make it a more workable tool.

Congress should also respect existing regional planning processes. Here in the Washington, we are well-served by ColumbiaGrid, a nonprofit organization that includes BPA and both investor-owned and public power utilities working together to improve the operational efficiency, reliability and planned expansion of the Northwest power grid.

We also believe that Congress should direct FERC to establish principles, through rulemaking, to allocate the costs of new transmission among the various entities that will benefit over the life of the project.

Lastly, Congress should not give preference to the transmission of renewable resources over the transmission of baseload or other generation. Preference for renewable resources would run counter to existing federal transmission policy that favors open, non-discriminatory access to transmission and could create serious reliability and security issues.

Transmission is not the most exciting issue, although the prospects for a smart grid can be tantalizing. It's more fun to write about wind farms, solar power and hydroelectric dams. But transmission is literally what ties it all together, and the future of reliable, affordable, renewable energy depends on a sound federal transmission policy. 



The Chehalis River inundates the Lewis County community of Boistfort in December 2007.

Photos: Centralia Chronicle

# Chehalis RIVER

*PUD pursues small dams to reduce flooding, generate power*

By Dean Boyer

**L**ewis County PUD is exploring whether two earthen dams in the upper reaches of the Chehalis River watershed could reduce the threat of flooding that has caused hundreds of millions of dollars in damage in recent years, while also providing a source of clean, renewable hydroelectric power.

A preliminary study by EES Consulting, released in February, found that a dam on the Chehalis River above Pe Ell and another on the South Fork of the Chehalis River above Boistfort would have prevented much of the \$500 million in property damage caused by record flooding in December 2007.

The dams, according to the study, also

would provide significant environmental benefits – reducing downstream scouring of fish habitat during heavy winter flows and allowing for additional in-stream flows, lowering temperatures and improving water quality, during the dry summer months. And by installing small hydropower generators at each of the dams, the PUD would be able to generate nearly 24,000 megawatt-hours



continued on page 4

of electricity annually, or enough to power 1,600 households.

“We’re looking at this very seriously,” said Lewis PUD General Manager Dave Muller. “Groups have been trying to decide what to do about flooding in the Chehalis River basin since 1931. Our preliminary study shows dams for flood reduction are economically viable.”

In February, the PUD presented its preliminary study to the Chehalis River Basin Flood Control Authority, which was formed in April 2008, after the devastating December 2007 flood. The Legislature last year provided the flood control authority – comprised of 11 municipal, county and state governmental entities – with \$2.5 million to study the problem.

The flood control authority recently approved spending \$250,000 for a more detailed geologic study by EES Consulting to determine the best locations for the proposed dams, and to consider what effect the dams would have on fish runs and water flows.

The preliminary study estimates the two dams, hydropower facilities and measures to limit the upstream impact on fish would cost \$336 million. But, it also concludes that there would be nearly \$2.24 in benefits for every \$1 of cost. “Under all scenarios, the potential flood retention facilities offer more benefit than they cost to build and operate,” according to the study.

The Chehalis River originates in western Lewis County, flows east as far as Centralia, then loops back to the north and west until it empties into Grays Harbor. The Chehalis River basin is the second largest basin in Washington state, second only to the Columbia River, draining an area of nearly



Flood waters turn Chehalis Wal-Mart and Home Depot parking lots into islands. I-5 is in the upper left.

2,700 square miles.

Flooding is a frequent occurrence in the lowlands around Chehalis and Centralia, and downstream in Thurston and Grays Harbor counties.

The study documents accounts of flooding dating back to the 1930s, with major floods approximately every 10 years. More recently, significant flooding occurred in 1990, 1996, 2007, and again earlier this year, causing extensive damage to private property, public buildings, roads and bridges.

Although there have been numerous ideas floated to reduce the impact of flooding along the Chehalis, most of those have focused on protecting Interstate 5, which has been inundated at times by as much as 10 feet of water. A 20-mile stretch of the interstate was closed by flooding for three days this January, forcing vehicles trying to get between Seattle and Portland, Ore., on a 440-mile detour.

The dams proposed by the PUD would not entirely eliminate the threat to I-5, but the PUD’s Dave Muller said they would complement a system of levees the Army Corps of Engineers proposed in 2003 to protect the highway. The state Department of Transportation has also looked at raising stretches of I-5.

A preliminary study by EES Consulting, released in February, found that a dam on the Chehalis River above Pe Ell and another on the South Fork of the Chehalis River above Boistfort would have prevented much of the \$500 million in property damage caused by record flooding in December 2007.

The initial EES study found the two dams would have lowered flood waters at the Mellen Street Bridge in Centralia by nearly four feet – reducing the December 2007 flood stage from major to moderate.

The study looked at building a 220-foot dam on the Upper Chehalis, creating a 1,600-acre reservoir able to hold about 226,000 acre-feet of water. The reservoir would be maintained at a maximum of 140,000 acre-feet from November through March, leaving room to capture 80,000 acre-feet of water in a flood. Two small turbine generators would be added – one rated at 6.8 megawatts, the other at 1.2. Both generators would operate during high-water months; only the smaller generator would operate during the summer.

A smaller dam would be built on the South Fork of the Chehalis River, creating a 600-acre reservoir with a capacity of 40,000 acre-feet. Half of that would be held in

reserve for flood control during the winter months. Again, the study projects installing two small turbine generators, one rated at 1 MW and one at 200 kilowatts. Only the smaller generator would operate during the summer.

The combined annual output at the two facilities would be about 24,000 megawatt-hours of electricity. Lewis PUD believes the power should count toward Lewis PUD’s obligation to use renewable energy resources under the voter-approved Initiative 937. Lewis PUD also owns and operates the 70-megawatt Cowlitz Falls Hydroelectric Project that annually produces about 260,000 megawatt-hours of electricity.

Muller said Lewis PUD spent about \$80,000 to develop the preliminary study and has taken the project as far as it could by itself.

“We obviously have a whole lot of questions that still need to be answered,” Muller said. “We’re not asking anyone to commit to building flood retention facilities, only to give the idea further consideration. Our preliminary study shows the idea has merit, now we need to see how realistic it is.”

The PUD proposal is also being supported by One Voice, a grassroots group formed after the 2007 flooding.



Flood waters isolate the town of Galvin, four miles northwest of Centralia.

Dr. John Henricksen, a local dentist who is chairing the One Voice group, says the Corps of Engineers’ proposed levee project alone will not provide adequate relief from catastrophic flood damage. One Voice is promoting a combination of the water retention dams and levees as the most ideal

approach with the highest level of flood protection for the entire basin.

“If you control the flow of the river, you control the level of the flood,” Henricksen said at a public meeting on the PUD’s proposal. ☐



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# BIOPOWER

## Partnership developing wood-waste renewable energy for the Northwest

By Rochelle Olson

**W**hile the development of wind and solar power projects have been grabbing headlines across the country, the Department of Energy reports that biomass power – or “biopower” – has quietly become the nation’s second-most utilized form of renewable energy.

Biopower currently provides electricity for two million American homes, trailing only hydropower in the renewable energy arena.

Wood-based biopower is considered “carbon neutral” by environmental agencies and state and federal regulators because power plants that utilize organic material to generate electricity add no new carbon to the atmosphere. The carbon they release is considered part of the natural cycle – carbon absorbed by trees in the form of carbon dioxide as they grow.

In contrast, power produced from fossil fuels such as coal, oil and natural gas removes carbon from eons of geological storage, adding new carbon to the atmosphere, continually increasing carbon dioxide levels.

Biopower is a natural fit for the Northwest where the importance of renewable timber harvest and responsible use of byproducts like wood biomass is well understood. In addition, there is an abundance of unused and secondary sources of biopower

fuels, such as wood wastes, that suggest a strong potential for renewable biopower operations.

Like hydropower, wood waste biopower does not depend on the wind blowing or the sun shining, an important distinction between “baseload” and intermittent renewable resources. Wind power generation, for example, can spike or decline suddenly with wind conditions – a serious reliability issue for the nation’s power grids. Biopower is immune to such unpredictable fluctuations since the fuel is used to produce heat to make steam, which

drives a traditional turbine generator. The predictable “baseload” nature of biopower allows for operations up to 90 percent of the time, critical to help maintain grid stability.

Energy Northwest recently signed an agreement with ADAGE, a joint venture between AREVA and Duke Energy, to explore the potential for biopower in the Northwest.

The AREVA-Duke Energy partnership will develop privately funded wood waste biomass power plants in Washington, Idaho, Montana and Oregon.

AREVA, which has designed and built more than 100 biopower plants in Europe, Asia and South America – with a combined capacity of 2,500 megawatts – will construct the plants. Duke Energy, a major power provider in the Midwest, will operate the

facilities. Energy Northwest will market the power, giving priority to its 24 public power member utilities throughout Washington. Energy Northwest will also work with the Bonneville Power Administration on transmission interconnection.

Each of the plants would generate 50 megawatts of electricity, enough to power around 40,000 homes. The partnership’s goal is to select the first location in the second half of this year and have the first plant operating by late 2012.

“Reliable, sustainable, clean wood biopower makes sense given strong public

interest in renewable energy, as well as our regulatory framework that encourages technologies that will help us achieve the state’s climate goals,” said Vic Parrish, CEO Energy Northwest. “The use of wood waste biomass as fuel for power generation utilizes abundant renewable domestic resources and reduces our dependence on imported and fossil fuels.”

Parrish said the key to successful development of the biopower projects will be securing affordable, reliable, long-term wood waste fuel contracts, ensuring generation sustainability throughout the life of the plants. The partners will initially work with large private forest landowners to secure contracts and consider tribal, state and federal lands in the future.

Support from state governments where these projects will be located is also crucial, according to the project partners. Washington state legislators this year considered a bill to create tax credits for responsible gathering of wood waste from forests. While the bill didn’t make it out of committee this session, there remains encouragement and support from many legislators.

Biopower plants are expected to provide hundreds of green-collar jobs, boosting local economies. Estimates are each plant will provide about 400 jobs during construction and nearly 100 permanent jobs to operate the facilities and to gather and process the wood waste. Total local economic impact per plant is estimated at \$20 million per year.

Responsible fuel gathering strategies for biopower plants will help promote healthier forests. Removing wood waste from forest lands reduces the potential for devastating bark beetle infestation and other insects; optimizes carbon sequestration; increases the ability to protect and restore critical wildlife habitat; improves the heartiness and density of forest trees; lowers disease outbreaks; and decreases severe and uncontrollable forest fires.

Like all natural resources, forests must be maintained to achieve their maximum benefits. Over the last decade, Washington’s forests have seen increasing outbreaks of the

aggressive Mountain Pine beetle. This same insect has infested forests in British Columbia where the Ministry of Forests and Range estimates that 80 percent of the merchantable pine in the province’s central and southern interior could be killed by 2013.

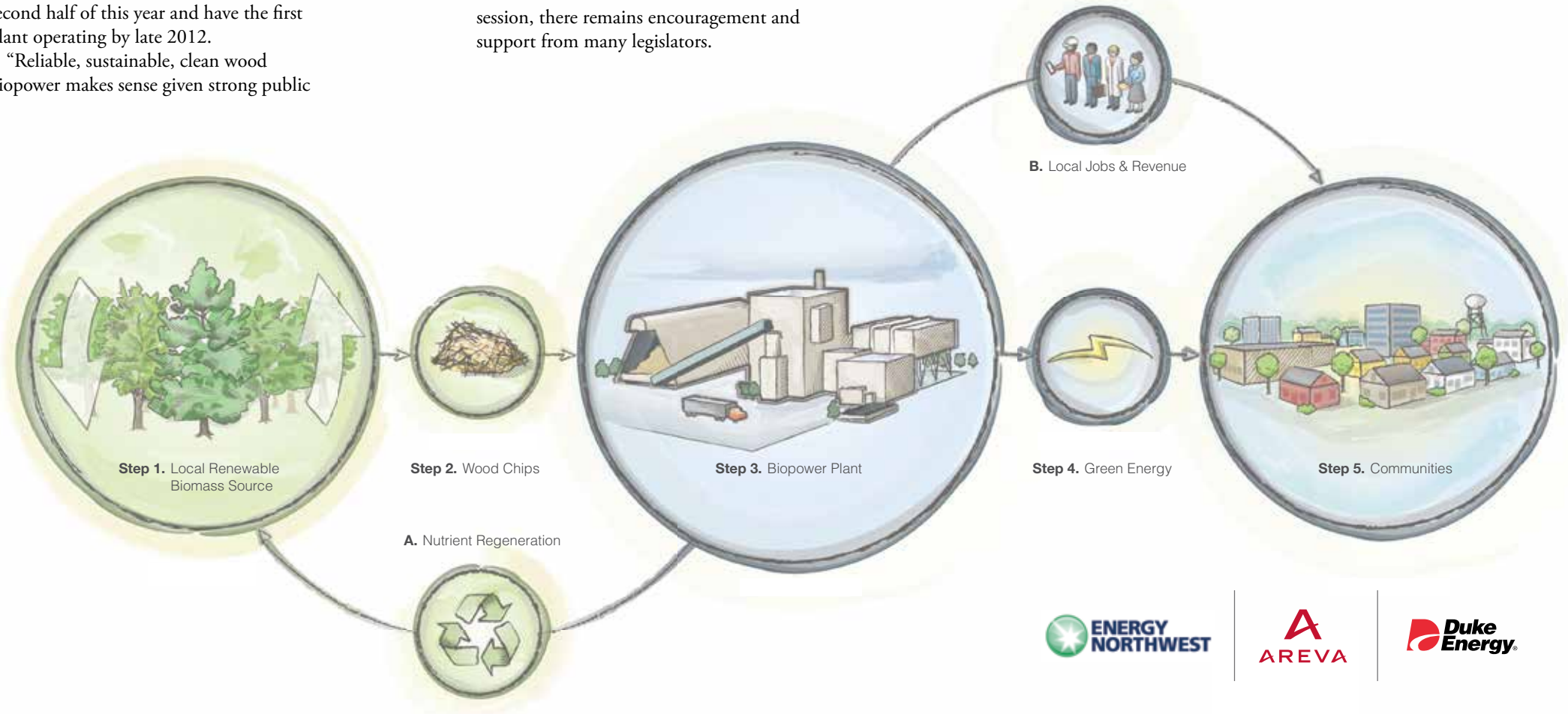
As states look to produce more of their electricity from renewable sources, biopower is expected to play an increasingly significant role. The Department of Energy estimates that biomass-based power currently provides 6,000 megawatts of installed generation, producing nearly 45 billion kilowatt-hours of electricity each year. Biomass energy supplies are expected to double over the next decade; potentially reaching 14 percent of the nation’s power needs.

From a Northwest perspective that growth begins today, with the Energy Northwest – ADAGE efforts to bring biopower projects and green-collar jobs to our region within the next three to five years. ☐

*Rochelle Olson is Public Information Officer for Energy Northwest, a Joint Operating Agency comprised of 24 public power utilities, including 20 public utility districts.*

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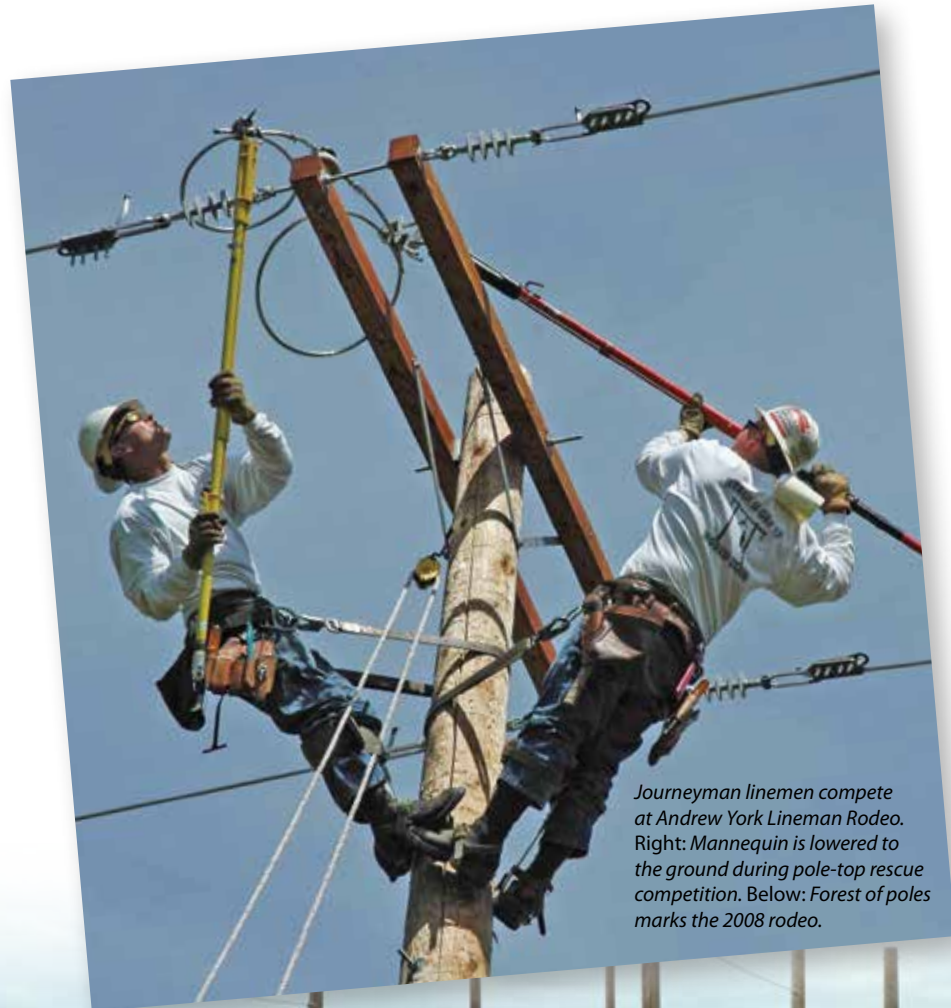
Biopower currently provides electricity for two million American homes, trailing only hydropower in the renewable energy arena.



# ANDREW YORK LINEMAN RODEO

*Strap on the spikes and give pole-climbing a try*

By Kimberlee Craig



Journeyman linemen compete at Andrew York Lineman Rodeo. Right: Mannequin is lowered to the ground during pole-top rescue competition. Below: Forest of poles marks the 2008 rodeo.

**A**ndrew York was everyone's idea of a utility lineman. He was tall, strong and devoted to his family, his work at Chelan County PUD and his union brothers and sisters.

The circumstances of York's death in July 2000 while on the job made the loss even harder. He was struck by a drunk driver and died a few days later.

Almost immediately co-workers began talking about how to honor York and what they could do to help prevent other families from facing the grief of a death caused by drunken driving.

In August 2000, PUD commissioners named the district's newest switchyard for York. Community safety events were organized in 2003 and 2004 in his memory to raise scholarship funds for local high school graduates active in anti-drug and alcohol efforts.

While meaningful, those events didn't reflect York's zeal for line work. He was hired as a Chelan County PUD apprentice in 1996 after working in construction and was a journeyman lineman when he died at the age of 33.

Chelan PUD linemen and supervisors who were involved in pole-top rescue competition

had seen other lineman rodeos and wanted to bring the excitement and the safety message of that kind of event to North Central Washington.

As planning started in 2005 for a memorial event to raise scholarship money, organizers and PUD linemen came together, and the Andrew York Memorial Lineman Rodeo was launched.

"There were people involved in doing a fundraiser. Andy was a lineman and it seemed like a natural fit," said Steve Hendrickson, IBEW Local 77 business agent. A former Chelan PUD foreman, Hendrickson was on the job with York the day of the accident.

The rodeo "has been an incredible relationship builder, and it's an awesome way to attract new workers," he said. "It's a great way for us to put our titles down and work together for a good cause."

The combination of competition and camaraderie has drawn employees together from across the district and from other PUDs.

"I worked with Andy his first day on the job," said Daryn Klinginsmith, a former lineman, now a system operator for Chelan PUD. "I knew him his whole career at the PUD and know he loved the line work trade.

"I've always loved lineman competitions, and being able to be an instrumental part in building the York Lineman Rodeo for both those reasons was just a real simple choice," added Klinginsmith. "Seeing its success building each year is what keeps it fun and compels all of us to come up with a better and better event each year."

What's a lineman rodeo?

Debbie Gallaher, another early organizer and manager of the Rocky Reach Visitor Center, said that was the question on everyone's mind the first year.

Like a cowboy rodeo, it's non-stop action. Dozens of power poles are installed for competition by journeymen and apprentice line workers in events that include pole-top (hurt-man) rescue, speed climbs and pole-climbing relays. Apprentices also take

written tests of electrical knowledge.

Competitors are judged on safety; work practices; neatness and ability; how equipment is handled; and how fast they finish.

"Safety is always a priority, but the death of an employee on the job like that makes awareness of the consequences of driving while under the influence even more critical," said Kirk Hudson, head of Chelan PUD's utility operations. "The lineman rodeo, held to honor Andy York and with its focus on safety and skills, is a terrific event."

It's fun, too.

Spectators can strap on spikes and give pole-climbing a try, in between rooting for a favorite competitor. Each year more activities for children are added to keep them entertained between events.

The grounds at Rocky Reach Dam provided a spectacular backdrop for the inaugural event, which attracted competitors from nine utilities around the Northwest and raised more than \$8,000 for the memorial scholarship fund through entry fees, an auction and donations.

Interest has continued to grow, and last year the rodeo moved to one of Chelan County PUD's riverfront parks in Wenatchee. "We wanted to get more involved in the community," Gallaher said. "It's great, free, fun family entertainment and the safety message is so important."

Eleven teams and 47 apprentices took part in the 2008 lineman rodeo, held at Walla Walla Point Park in Wenatchee.

As the event grows, so does support from other utilities and groups. Employees from Douglas and Okanogan PUDs have gotten involved, as well as IBEW Local 77. The Washington State Patrol and other local safety groups also attend the lineman rodeo, emphasizing the dangers of driving under the influence and the need to wear seat belts. There are vendors displaying the latest gear and, of course, food booths.

Thanks to the Internet, the event has gone global. Last year a live video stream allowed out-of-town family and friends to watch loved ones compete. Organizers hope to do it again this year with links available from



Chelan PUD Commissioner Ann Congdon gives pole climbing a try.

[www.chelanpud.org](http://www.chelanpud.org) and [www.ibew77.com](http://www.ibew77.com).

Along with the emphasis on safety, the scholarships are an enduring tribute to York. The lineman rodeo is a registered non-profit corporation with 501(c)(3) status. Ten graduating seniors have received \$12,000 in scholarships since 2005, administered through the Community Foundation of North Central Washington.

Staying in touch with York's family is another benefit of the lineman rodeo held in his name.

"I am so grateful for each and every one of you, that you take the time to put out so much effort to organize an event, like the lineman rodeo," Genelle Graves-York, Andy's wife, wrote to organizers after last year's rodeo. "...no words can express our gratitude, so from all of us, to all of you we would like to say a BIG THANK YOU!"

Kimberlee Craig is Public Information Officer for the Chelan PUD.



## Join the fun!

**What:** 5th annual Andrew York Memorial Lineman Rodeo.

**When:** 8 a.m. opening ceremonies, 8:30 a.m. competition on Saturday, June 20, 2009.

**Where:** Walla Walla Point Park, Wenatchee.

**Who:** Everyone is invited to watch for free; linemen and apprentices from around the Northwest are encouraged to register and compete.

**Why:** Raise scholarship money for high school seniors involved in preventing drug and alcohol use and raise awareness of the dangers of impaired driving.

**Details:** Visit [www.chelanpud.org](http://www.chelanpud.org) and click the link on the left side of the home page.

# BALANCING ACT

## *BPA focuses on integrating wind energy onto Northwest power grid*

By Elliot Mainzer

**W**hile the Bonneville Power Administration is involved in research and demonstration projects on several renewable fronts from solar to wave power, our focus is on wind power.

Wind is undergoing unprecedented growth in the Northwest, much of it in the heart of BPA's system. We now have over 2,000 megawatts of wind connected in our balancing authority and expect more than 6,000 megawatts by 2013.

BPA is working intensively with the region on three aspects of the challenge of integrating large amounts of wind power into the transmission grid:

- Building transmission to physically interconnect remote renewable resources to metropolitan areas.
- Revamping system operations to allow the grid to work reliably with large amounts of variable generation.
- Creating new wind power-friendly busi-

ness practices and institutional arrangements with other utilities.

We have interconnected 19 wind projects into our grid and built five substations and six tap lines, with more in the works. We have devised new ways to transmit more wind power and other resources over existing transmission capacity and are begin-

ning to build new transmission lines primarily to serve still more wind projects.

We expect to break ground this year on a 500-kilovolt transmission line from McNary Dam to John Day Dam. The line will allow BPA to provide transmission service to more than 870 megawatts of energy, 700 megawatts of which are new wind energy.

### GETTING WIND TO MARKET

BPA has developed three new mechanisms to increase available transmission capacity, so that more wind projects can get their wind power to market. These include:

#### 1. Service without new construction

Last year we conducted a Network Open Season to sort out a complicated queue of service requests from customers seeking

access to our transmission system. The open season financial commitments and signed service agreements allowed us to conduct studies to determine what service could be provided from the existing transmission system, as well as what service required new infrastructure.

We found we could provide service for 1,780 megawatts of new service without major construction, simply by withdrawing from the queue those not ready to commit to taking service. Of the more than 6,000 megawatts of new power projects that requested service, more than 4,700 megawatts are wind power projects.

#### 2. Greater use of existing capacity

In March, we began offering Conditional Firm transmission service to another 1,200 megawatts of new service requests. This service provides transmission with the potential for a small amount of interruption if transmission becomes congested. We expect to make additional offers of Conditional Firm on an interim basis in the future.

#### 3. New transmission construction

With the assurance of additional Treasury borrowing authority approved by Congress, we are now confident we can move forward

with several projects. We are planning four new transmission lines and one system upgrade for 3,700 megawatts, almost 2,800 of which will come from renewable, non-carbon-emitting generation. Three of these projects are about to undergo environmental analyses, but the McNary-John Day line is shovel-ready because environmental review was completed in 2002.

### INTEGRATING WIND WITH TRADITIONAL RESOURCES

BPA views wind primarily as a source of energy, rather than a source of power capacity to meet peak power loads. The primary value of wind is its ability to displace fossil fuels, reduce carbon emissions and limit exposure to volatile natural gas prices. We are working to match up the different operating characteristics of variable wind energy with those of traditional resources.

The natural variability and uncertainty of wind increases the demand for balancing reserves. This requires changes in system operations, with corresponding integration costs and consequences for balancing resource availability. While much has been accomplished, a great deal of work remains, and we are moving quickly to do it.

In 2007, BPA and the Northwest Power and Conservation Council completed an Action Plan that confirmed that adding 6,000 megawatts of wind generation in the Northwest by 2020 is technically feasible. The unexpected speed of wind's actual development put a priority on resolving the technical issues needed to realize this goal.

In 2008, under a transmission rate agreement with our customers, we launched a Wind Integration Team to tackle the grid operation, business practice and institutional arrangements needed to make the most of the wind resource.

The team is working closely with our customers and the wind community to

establish new operating procedures within BPA's control area. Work already completed will allow the wind fleet to continue its rapid growth while long-term technical improvements are realized.

In February, we established a new work plan to complete the remaining wind integration team tasks. The challenge is to develop more sophisticated tools to manage large amounts of wind power effectively in the transmission grid. Because the wind resource is growing so rapidly, these technical improvements are needed quickly, and we have moved budgets from other areas to increase staffing for this effort.

The Wind Integration Team is focused on five critical areas.

#### 1. New operating procedures

New operating protocols go into effect this October to assure grid reliability while the wind fleet in BPA's balancing authority area continues its fast growth. We are installing the necessary operating and control equipment for these procedures.

#### 2. Tools for transmission dispatchers

Dispatchers traditionally schedule generation by the hour. Now, with fast changes in wind power output in the mix, we are working with the Pacific Northwest National Laboratory to give dispatchers better tools so they can change generation schedules within each hour.

#### 3. Within-hour scheduling

We are developing within-hour transmission scheduling as part of a joint initiative with other utilities and utility organizations so that variations in wind can be matched to within-hour changes in operation of other resources and, perhaps, to changes in loads.

Wind is undergoing unprecedented growth in the Northwest, much of it in the heart of BPA's system. We now have over 2,000 megawatts of wind connected in our balancing authority and expect more than 6,000 megawatts by 2013.

#### 4. Dynamic scheduling

BPA and other utilities are developing new power dispatch protocols and scheduling systems and tools so that wind farms physically located in BPA's transmission balancing authority can be electronically controlled and supported by other utilities' balancing authorities, using remote sensors and


controls similar to those of emerging Smart Grid technologies.

#### 5. Third-party supply

Last year BPA issued a Request for Information about third-party supplies of within-hour services to support variable wind power. The results were encouraging, and we expect to launch a pilot project in 2010.

### THE FUTURE'S BLOWING IN FAST

In the last decade, wind power has grown from commercial infancy to a significant energy source for the Pacific Northwest. In the next half-decade, it's expected to become a major energy source. This work will also help BPA and other utilities manage solar, wave and other renewable power sources whose output is controlled by Mother Nature, as those resources come on line in large quantities.

To follow the work of BPA's Wind Integration Team or participate in its efforts, go to [www.bpa.gov/corporate/About\\_BPA/wind/index.cfm](http://www.bpa.gov/corporate/About_BPA/wind/index.cfm). 

*Elliot Mainzer is Executive Vice President-Corporate Strategy for the Bonneville Power Administration. Headquartered in Portland, BPA is a federal agency that operates an extensive electricity transmission system for the Northwest and markets wholesale electrical power from the Columbia River Hydroelectric System, the Columbia Station nuclear power plant, and other nonfederal hydroelectric and wind energy generation facilities.*

# River Riders

## Grant PUD monitors mid-Columbia River hydro operations

By Kathy Kiefer



**A**s the Columbia River flows through Washington it encounters 11 federal and privately owned hydro-electric dams, generating close to 20,000 megawatts of power for the Northwest. With another three dams in British Columbia and many more on various tributaries, it is the largest power-producing river in North America.

Operations at one dam can have a significant impact on others downstream. Maximizing the river's potential, along with protecting and enhancing non-power uses of the river, is a major challenge that can affect the power grid throughout the Northwest.

For one stretch of the river, between Grand Coulee Dam and Priest Rapids, this is accomplished through a unique agreement known as the Mid-Columbia Hourly Coordination Agreement.

Signed in 1972, and renewed for 20 years in 1997, the MCHCA covers seven dams and nearly 13,000 MW of generation.

It defines how Chelan, Douglas and Grant PUDs, which own major dams on the Columbia, will coordinate operations with the Bonneville Power Administration to maximize power generation while reducing fluctuations in the flow of the river. A

number of other utilities that buy power from the PUDs have also signed onto the agreement.

Aided by a computerized system that updates information every four seconds, dispatchers balance the systemwide demand for electricity with a growing number of constraints on the system, including operations at the dams, spill for fish, recreation, water flow through the Hanford Reach, and other environmental requirements.

This coordinated system "reshapes" water in the river, releasing it as needed through the seven dams, beginning with Grand Coulee and the 5.2 million acre-feet of water stored in Lake Roosevelt.

This activity is carefully orchestrated to ensure that each of the dams has sufficient water to meet generation needs – Grand Coulee and Chief Joseph, the two federal dams, along with Wells (Douglas PUD), Rocky Reach and Rock Island (Chelan PUD), and Wanapum and Priest Rapids (Grant PUD).

There's a host of nuanced details required

to accomplish this, most relating to the science of hydraulics. But in the simplest terms, it means that the water elevation above each dam (forebay) must be at a certain height relative to the downstream elevation to derive maximum benefit from the turbines.

Each dam in the system has an ideal forebay elevation for the most efficient operation

and the dams each have a minimum forebay elevation required by their Federal Energy Regulatory Commission (FERC) license, or authorizing legislation in the case of Grand Coulee and Chief Joseph.

The agreement allows for intermittent trade-offs of maximum benefits at individual dams to spread benefits throughout the system. At times, one of the dams may actually be producing power to meet another dam operator's load. This situation can alternate as constraints and demands fluctuate each hour.

The system is one big balancing act.

Energy is constantly being produced and consumed across a wide geographic area. Every turbine at each of the dams is

electronically linked, controlled through a central operations center at Grant PUD where requests for power are made every four seconds by parties to the agreement. As needs change, the system responds almost instantaneously, while keeping frequency across the system at the 60 Hz cycles of each hydro turbine.

If, for example, a turbine at a coal-fired plant in Montana, owned by one of the other 14 parties to the agreement goes down, the system responds to the frequency change by instructing the hydro turbines to increase capacity.

There are few power generation sources as flexible or responsive as hydropower. This is made possible by two basic facts, hydro turbines can react quickly to frequency changes or disturbances in the system, and the use of water as fuel makes for efficient conversion to electricity.

This also makes hydropower a perfect match in the coordination and dispatch of intermittent wind resources onto the grid.

**Dam operators on the Columbia do not work in a vacuum. The entire river system is tied together to meet environmental, recreational, and power generation requirements.**

Jeff Jarrell, a senior systems operator at Grant PUD, is one of the "river riders" that monitors the hourly coordination system.

An early task every morning is to review BPA's estimate of how much water will be discharged that day from Chief Joseph Dam, first in line after Grand Coulee. This is the fuel that Jarrell and other operators along the river will manage during the next 24 hours.

Chief Joseph Dam, like the others downstream, is run-of-the-river, with very little storage capacity. The discharge from Grand Coulee ultimately determines how much water reaches the dam, which in turn determines what will be available downstream.

For the rest of his shift, Jarrell will watch the draft and fill of each dam within the system. With the computer calculating how much energy is needed, when and by whom, there are other details to attend to, such as downriver predicted fill times, a power plant with a turbine out, or a spill requirement that causes the water to draft at

a higher rate. Monitoring these constantly changing parameters is recognized as one of the highest stress positions in the utility industry.

At the end of the day, the Mid-Columbia hourly coordination system, as administered through the MCHCA, is essential to the Pacific Northwest.

Restrictions at each project, demands upon the system, the tremendous requirement to produce a never-ending supply of power, and the availability of the most essential component of the system, water, make for extraordinary challenges for Pacific Northwest hydropower operators.

There is no other agreement quite like the MCHCA anywhere in the country, due in part to the fact that there are no other river systems like the Columbia with such diversity of ownership and contractual rights.

Dam operators on the Columbia do not work in a vacuum. The entire river system is tied together to meet environmental, recreational, and power generation requirements. This work is done 24 hours a day, every day of the year.

*Kathy Kiefer is public affairs officer for Grant PUD.*

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Both approved by the voters in 1934, Mason PUD No. 1 took over operations of the Hood Canal Mutual Co. while Mason PUD No. 3 began by serving customers closer to Shelton.

# Why are there two PUDs in Mason County?

**M**ason County is unique among Washington counties in having two public utility districts. In addition to Mason County PUD No. 1, the oldest operating PUD in the state, the county is served by Mason County PUD No. 3.

Mason PUD No. 1 provides electricity to about 5,000 customers in an area along Highway 101 stretching from the Skokomish Valley to Walker Mountain in Jefferson County. It also provides water and sewer services to about 2,000 customers throughout the eastern part of the county.

Meanwhile, Mason PUD No. 3 provides electricity to about 32,000 customers in southeast Mason County, including the county seat of Shelton, along with small

areas of Grays Harbor, Kitsap and Pierce counties. Mason PUD No. 3 also provides wholesale access to broadband telecommunications in its service territory.

So why are there two PUDs in Mason County, and what happened to Mason PUD No. 2?

Backers of PUD No. 1 petitioned the Mason County Commission to place formation of the PUD on the ballot in 1932, two years after the law allowing voters to establish public utility districts went into effect. But the vote never took place because of a legal challenge over whether the county had properly advertised the commission hearing to approve the PUD petition.

So why are there two PUDs in Mason County, and what happened to Mason PUD No. 2?

The county commission rectified its error later that year, but by then it was too late for the general election. Because the law allows voters to create PUDs only in even-numbered years, the vote was delayed to 1934.

Meanwhile, voters in other parts of the county were also beginning to organize PUD efforts. A group led by the Mason County Pomona Grange petitioned the county commission to approve a vote on a PUD to serve the Agate area east of Shelton. That would have been Mason PUD No. 2.

But when plans to create a countywide PUD took root, the backers of Mason PUD No. 2 withdrew their petition and joined

the efforts to form what would become Mason PUD No. 3. That effort also went to the voters in the fall of 1934.

With a two-year head start in getting organized, the newly elected commissioners for Mason PUD No. 1 were able to begin operations in February 1935, when it took over operation of the Hood Canal Mutual Co., which then served about 200 customers. The mutual's manager, C.M. Pixley, was retained as the PUD's first manager.

At the time, it cost \$100 to join the mutual – about \$1,500 in today's dollars – plus whatever it cost to install lines and poles to bring in electricity. Many rural residents couldn't afford the cost, even when the power lines went right by their property. Mason PUD No. 1 later purchased the mutual for about \$33,000.

Meanwhile, Mason PUD No. 3 did not become operational until 1939, when it began serving about 300 customers near Shelton. A year later, Mason PUD No. 3 purchased the Shelton-area assets of the West Coast Power Co., a holding company that owned several small electric systems in southwest Washington and coastal Oregon. The PUD then had about 2,200 customers.

Mason PUD No. 1 initially purchased power wholesale from the City of Tacoma,



In an undated photo, Mason PUD No. 3 customers learn how to use electrical appliances to make housework easier at a class held at Evergreen Elementary School in Shelton.

which built its original Cushman Dam hydroelectric generating plant in the Skokomish Valley in 1926. In 1959, Mason PUD No. 1 signed a wholesale power contract with the Bonneville Power Administration, which continues to provide electricity to the PUD today. Mason PUD No. 3 also purchased power from the Cushman Dam,

until signing a contract with BPA in 1947. In 1948, Mason PUD No. 3 purchased the Mason County assets of the former Puget Sound Power & Light Co., now Puget Sound Energy, expanding its service territory to Belfair and the north and south shores of Hood Canal. ☐

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# EBB & FLOW

## Coastal PUDs explore plugging into the power of the tides

By Liz Anderson

**T**he tides rise and fall with a predictability that coastal residents often take for granted. Unless you're fishing or maybe waiting for low ebb to go clam digging, the rhythmic nature of the tides can go mostly unnoticed. But that continual ebb and flow could provide a dependable source of renewable energy, turning underwater turbines without the vagaries of wind power.

Two public utility districts – Grays Harbor County and Pacific County PUDs – are already investing in development of the first large-scale wind project in Western Washington on Radar Ridge in Pacific County.

Now those utilities are also exploring the possibility of harnessing the tides as they flow in and out of coastal estuaries, including Grays Harbor, Willapa Bay, and the mouth of the Columbia River.

Grays Harbor PUD has been evaluating various options to meet state requirements for renewable energy resources under I-937, also known as the Energy Independence Act.

Pacific County PUD has fewer than 25,000 customers and isn't immediately affected by the mandate, but it has been looking to add renewable resources for voluntary retail sales of green power.

"This is another option in our own backyard that could be a valuable renewable resource," said Pacific PUD General Manager Doug Miller. "We see great benefits to developing tidal energy and look forward to taking the next steps toward putting a pilot project in the water."



*Companies are testing several different designs to capture the energy in the ebb and flow of the tides, as seen in these artist's conceptions. Grays Harbor and Pacific County PUDs are exploring the potential of tidal power in coastal estuaries, but haven't determined which design to pursue.*

The benefits of tidal energy include:

- Bringing predictable and reliable new energy generation to the grid to serve the increasing demands of a growing population.
- Reducing carbon-based energy generation by bringing new renewable energy loads to the grid.
- Generating economic development and "green jobs" connected to new energy generation.

How much tidal power may be available? Working with the consulting firm of Golder Associates, the PUDs have deter-

mined that a single transect of the Willapa Bay channel could produce as much as 2.9 megawatts of fluid power.

The actual amount of energy that could be produced would depend on the size and efficiency of the turbines or other power conversion technology that is employed. Most tidal power projects, like a pilot project in New York's East River, use horizontal axis turbines, similar to wind turbines, anchored to the bottom of the river. But a few use vertical axis turbines or even oscillating hydrofoils.

The next step is to complete the permitting, engineering, environmental studies and

feasibility designs to put a demonstration project in the water. The final phase of the project would include actual construction, operation, monitoring and evaluation of a pilot project. The total cost is estimated to be about \$7.1 million.



The PUD's are turning to the federal government to seek the funds necessary to complete phase two of the project, which includes determining what the value of the renewable energy might be and what it would take to bring a demonstration project online. The PUDs have submitted a request for \$1.5 million of the \$2 million needed to complete phase two of the project.

"Creating energy from tidal power requires a careful examination of the potential impacts on environmental activity, habitat, recreational boating and commercial fishing to be viable," said Rick Lovely, General Manager of Grays Harbor PUD.

"Our goal is to ensure that these impacts are known and understood with complete community input and involvement.

"We hope to be able to put a demonstration scale tidal energy project in the water, with all permitting, engineering, environmental studies and feasibility designs complete. It's not something that can be done overnight, but work now can produce great benefits in the future." □

*Liz Anderson is Community Relations Manager for the Grays Harbor PUD.*



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Rocky Reach Dam straddles the Columbia River seven miles north of Wenatchee. More than 7 million people throughout the Northwest benefit from clean, renewable energy produced by the Rocky Reach Hydroelectric Project.

# ROCKY REACH

## FERC renews Chelan PUD's license to operate hydro project

**T**he Federal Energy Regulatory Commission has issued a new 43-year license to the Chelan County PUD for continued operation of the 1,300-megawatt Rocky Reach Hydroelectric Project on the Columbia River 7 miles north of Wenatchee.

The new license provides a continued low-cost power supply for PUD customers, along with new environmental protections for the community.

"In this time of heightened awareness of clean energy resources, having a project like Rocky Reach secured for at least another 43 years is a huge benefit to the people of Chelan County and the Northwest," said Chelan County PUD Commission President Ann Congdon. "It's also a tribute to

**"In this time of heightened awareness of clean energy resources, having a project like Rocky Reach secured for at least another 43 years is a huge benefit to the people of Chelan County and the Northwest."**

**ANN CONGDON**  
Chelan County PUD  
Commission President

those visionary PUD pioneers who took bold steps in the 1950s to make this happen in the first place."

The license, which was approved Feb. 19, is based on a settlement agreement between Chelan PUD and stakeholder groups, including local communities, state and federal agencies, and environmental

groups, reached in March 2006.

The settlement originally called for a license of 50 years, but FERC reduced the term to 43 years in an effort to line up most licenses in the Mid-Columbia region with the end of Habitat Conservation Plans set to expire in 2052.

The license outlines approximately \$425 million in costs to Chelan PUD over the next 43 years, including continuation of a Habitat Conservation Plan for salmon and steelhead, maintaining existing parks on the Rocky Reach reservoir, renovation of Entiat Park and enhancements to Lincoln Rock and Daroga state parks.

In addition, the new license contains provisions to ensure safe passage of bull trout and lamprey past the dam, research on possible hatchery facilities to supplement the white sturgeon population, an evaluation of resident fish for future recreational fishing, funding for habitat restoration projects on federal and state wildlife lands and a variety of other actions.

Chelan PUD's license application was developed in an Alternative Licensing process that included input from members of the community.

*continued on page 20*



In 2003, Chelan PUD installed a first-of-its-kind juvenile fish bypass system to help young salmon and steelhead around the dam on their way to the ocean.

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Broad support for the application included the National Park Service, U.S. Fish and Wildlife Service, state Department of Ecology, state Department of Fish and Wildlife, Confederated Tribes of the Colville Nation, state Parks and Recreation Commission, Alcoa Power Generating, Inc., the city of Entiat, the Entiat Coalition and the National Marine Fisheries Service.

More than 7 million people throughout the Northwest benefit from the clean, renewable energy produced at the Rocky Reach Hydro Project.

The project is also nationally recognized for efforts to protect the environment.

A first-of-its-kind juvenile fish bypass system was completed in 2003 to help young salmon and steelhead on their way to the ocean. A major powerhouse upgrade started in 1995 includes new turbines that are more fish friendly. Chelan PUD is also rehabilitating the generators on all 11 units to improve the efficiency and reliability of the hydro plant. The end result will be more power generation and lower maintenance costs.

The dam and the original powerhouse with seven generating units were built between 1956 and 1961 for the purpose of power production and flood control. The PUD added four more generating units following the ratification of the Columbia River Treaty between the United States

The dam and the original powerhouse with seven generating units were built between 1956 and 1961 for the purpose of power production and flood control.

and Canada to make use of water released from reservoirs in Canada and the Libby Dam reservoir in Montana. Those units were brought online in 1971, increasing the dam's capacity to

1,280 megawatts. The modernization since 1995 has increased the nameplate generating capacity to 1,300 MW.

The original dam and subsequent improvements were financed through the sale of revenue bonds. No tax money was used.

Chelan County PUD began the relicensing effort for the Rocky Reach Project in 1999, seven years before the license was to expire in June 2006. Since 2006, Chelan PUD had been operating the dam with annual licenses issued by FERC. ☑

## More power coming for Lake Chelan

Chelan County PUD will replace two 24-megawatt generator units at its Lake Chelan Hydroelectric Project, installed in 1927, with two new 29.6-megawatt units, increasing capacity at the venerable dam by nearly 25 percent.

The Federal Energy Regulatory Commission approved the upgrade in February. The project, expected to cost about \$42 million, will run through 2010.

The 40-foot Lake Chelan dam was built in the 1920s by Washington Water Power and purchased by the Chelan PUD in 1955. An underground, concrete penstock delivers water 2.2 miles downstream to the picturesque powerhouse at Chelan Falls, a vertical drop of nearly 350 feet. The original generators were rewound in 1951 and 1952; the original turbines were replaced in 1985 and 1986.

In 2006, FERC approved a new 50-year license for Chelan PUD to operate the Lake Chelan project. It approved the upgrade in February.



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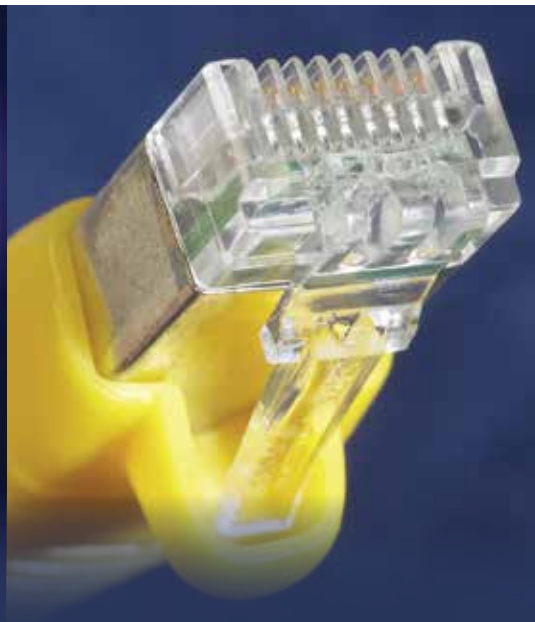
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