

## **NHA Public Affairs Packet**



NHA Board Meeting, October 20-21, 2010

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# STATEMENT

25 Massachusetts Avenue, N.W. · Suite 450 · Washington, D.C., 20001-202/682-1700 · [www.hydro.org](http://www.hydro.org)

**Contact:** Kristen Nelson  
301/654-2003 · [kristen@hydro.org](mailto:kristen@hydro.org)

## For Immediate Release

### **NHA Applauds House Hearing on Small Hydro** *Water and Power Subcommittee looks at important energy resource*

Washington, D.C. (August 9, 2010) – The following is a statement from National Hydropower Association Executive Director Linda Church Ciocci on the House Committee on Natural Resources Subcommittee on Water and Power July 29 hearing on small hydropower:

"The National Hydropower Association applauds the Subcommittee on Water and Power for holding the recent hearing on small hydropower resources. Small hydro offers some of the most promising opportunities we have in the United States for developing new clean generation from waterpower.

"As NHA member Gia Schneider, co-founder, chairman, and CEO of Natel Energy, pointed out to the Subcommittee, small hydro resources also offer a way to capture energy in locations where they would have a minimal -- if any -- environmental footprint, such as in irrigation canals, water-treatment plant outfalls, or at existing hydroelectric facilities. Many of these sites already have electricity infrastructure, minimizing cost and development impacts even more.

"But, we still need federal support to foster development of small hydro resources. Federal R&D programs, for example, can help increase the efficiency of existing technologies, improve environmental performance, and lower operational costs. New technologies can also make capturing energy from more potential sites cost effective and efficient.

"Greater intergovernmental cooperation will also be critical to maximizing small hydro's potential. We urge Congress and the Administration to build on the Memorandum of Understanding signed by the U.S. Department of Energy, the U.S. Department of the Interior, and the U.S. Army Corps of Engineers earlier this year.

"NHA thanks the Subcommittee for holding this hearing, and we encourage support for small hydro development. We stand ready to work with Congress, the Administration, and other stakeholders as we make hydropower work for America."

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## For Immediate Release

### NHA Statement on Loan Guarantee Funding

Washington, D.C. (August 10, 2010) – The following is a statement from National Hydropower Association Executive Director Linda Church Ciocci on the August 10 action by the U.S. House of Representatives, which passed a bill removing \$1.5 billion from the Department of Energy’s loan guarantee program for renewable energy job creation.

“At a time when our nation is trying to protect and create manufacturing, transportation, and related jobs, it is very disappointing to see Congress take much-needed funds away from the renewable-energy industry. DOE’s clean energy loan guarantee program is a proven job-creator, and it deserves to be strengthened, not weakened. We sincerely hope that Congress rights the situation as soon as possible, to help ensure that the 21st century’s most promising industry – clean energy – will be based here in the United States.”

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## For Immediate Release

### **NHA Applauds FERC-Colorado MOU on Small Hydro** *MOU creates a path to more federal-state licensing efficiency*

Washington, D.C. (August 26, 2010) – National Hydropower Association Executive Director Linda Church Ciocci made the following statement on yesterday's announcement from the Federal Energy Regulatory Commission (FERC) and the State of Colorado regarding their new memorandum of understanding on small hydropower projects:

"NHA welcomes the news that FERC and the State of Colorado have signed a memorandum of understanding simplifying the procedures for developing small -scale hydropower projects in Colorado. This pilot program will be an important step toward an efficient licensing process that recognizes the needs of small developers, while encouraging the growth of new clean energy resources.

"As FERC points out in the MOU, this effort could help realize some of the 1,400 megawatts of potential small hydro capacity in Colorado. That is an important step to doubling our national hydropower capacity and creating some 1.4 million jobs in our industry.

"We also see this MOU as an important development in terms of fostering better intergovernmental cooperation. Just as the MOU signed earlier this year by the U.S. Department of Energy, U.S. Department of the Interior, and the U.S. Army Corps of Engineers established an important precedent on the federal side, this MOU between FERC and Colorado could help create a more efficient, effective bridge between federal regulators and the states.

"We are especially pleased that this pilot program will offer assistance to small developers, who often face considerable challenges in navigating a complex process that involves many parties and stakeholders. We hope the pilot program will lead to an effective approach that can be replicated throughout the country, and we urge every state to consider similar efforts that support small hydropower development.

"NHA looks forward to working with FERC, Colorado, and other stakeholders as this program moves forward. We applaud this, and other efforts, to put hydropower to work for America."

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## For Immediate Release

### **NHA Congratulates Snohomish PUD on DOE Funding Award**

*Tidal turbine project will generate electricity, provide technology performance data*

Washington, D.C. (September 14, 2010) – The following is a statement from National Hydropower Association (NHA) Executive Director Linda Church Ciocci on the U.S. Department of Energy's (DOE) announcement regarding marine and hydrokinetic energy technology development funding awards.

"NHA is pleased to congratulate member company Public Utility District No. 1 of Snohomish County (WA) for receiving \$10.1 million in matching funding from DOE for its tidal turbine project in Puget Sound's Admiralty Inlet. This award creates a strong partnership federal-industry partnership that will yield both clean electricity and important technical and cost data.

"A recent nationwide study commissioned by NHA shows that tidal technologies have the potential to provide an additional 4,000 MW of clean, renewable generating capacity by 2025. Snohomish PUD's project will help the industry reach that goal by advancing the state of the technology and our understanding of tidal energy's potential.

"Through the marine and hydrokinetic energy technology development program, DOE is demonstrating its growing support for developing new hydropower resources and expanding our country's largest renewable energy resource. By seeking this funding through DOE's competitive process, Snohomish PUD and other companies are signaling the industry's strong commitment to working with federal, state, and local officials -- and other stakeholders -- as we work to double America's hydropower capacity.

"NHA is proud of Snohomish PUD's success in this effort, and we applaud their vision and leadership in the ocean-tidal sector. We encourage companies throughout the industry to follow Snohomish PUD's lead and participate in similar federal initiatives."

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## For Immediate Release

### **NHA Applauds Chu Comments on Hydro and Pumped Storage** *Energy Secretary shows vision and leadership as a hydro advocate*

Washington, D.C. (September 17, 2010) – The following is a statement from National Hydropower Association (NHA) Executive Director Linda Church Ciocci responding to Energy Secretary Steven Chu's comments supporting hydropower and pumped storage at the Montana Economic Development Summit this week:

"NHA applauds Energy Secretary Chu's comments this week on the critical role hydropower and pumped storage must play in the development of a clean, reliable energy infrastructure for the United States. As the Secretary pointed out, hydropower's potential for creating clean, domestic generating capacity -- with minimal environmental impacts -- is considerable. Pumped storage, as he also highlighted, is one of the best ways available to maximize output from variable renewable resources and provide utility-scale storage.

"As he also noted, much work remains on the policy front in Washington to make this happen. The MOU Secretary Chu signed earlier this year with the U.S. Department of the Interior and the U.S. Army Corps of Engineers is a strong step in the right direction, as is the growing support for hydropower and pumped storage initiatives through the DOE waterpower R&D program.

"But, these developments are just a beginning. To develop those clean, domestic hydropower resources the Secretary described, Congress needs to extend necessary tax incentives, such as the Section 1603 grants program and the investment tax credit. Providing hydropower resources full parity with other renewables under the production tax credit is an equally important measure. Support is also needed to spur the pumped storage resources that will help integrate more renewables onto the grid. Congress must pass an investment tax credit for energy storage project development. These tax policies will send a strong market signal about hydropower's potential.

"Through more efficient regulatory policies, we can move projects with a minimal environmental footprint forward more quickly. That, too, will provide more stability and certainty to developers as they work to secure investment in their projects.

"Secretary Chu also noted how climate policy can encourage the growth of renewables. Passing a federal renewable energy standard that recognizes hydropower's contributions and supports the development of new hydropower resources can help make this happen.

"Passing all of these measures will require leadership in Washington. Secretary Chu and Sen. Max Baucus (D-MT), who hosted the summit, are already demonstrating that they have a strong vision on these issues. NHA stands ready to work with them -- and all other stakeholders -- to realize this vision and keep hydropower working for America."



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## For Immediate Release

### NHA Supports RES Legislation

#### *National standard could create jobs and clean energy resources*

Washington, D.C. (September 21, 2010) – The following is a statement from National Hydropower Association (NHA) Executive Director Linda Church Ciocci responding to the introduction of the bipartisan RES proposal:

“The National Hydropower Association supports a national renewable electricity standard as a way to create tens of thousands of jobs, while expanding clean, reliable hydropower in every state. Along with the extension and expansion of key tax incentives, such as production tax credit parity for hydropower resources and a new investment tax credit for energy storage projects, passing a national RES is crucial to creating jobs and building America’s clean energy resources. We applaud Senators Collins (R-ME), Bingaman (D-NM), Brownback (R-KS), and Dorgan (D-ND) for recognizing the urgent need for a national Renewable Electricity Standard. NHA will continue to work with policymakers and stakeholders on passing an RES that maximizes hydropower’s contribution to our renewable energy future.”



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## For Immediate Release

### **NHA celebrates Hoover Dam 75th anniversary** *Event marks milestone for hydropower industry*

Washington, D.C. (September 30, 2010) – The following is a statement from National Hydropower Association Executive Director Linda Church Ciocchi on the 75th anniversary of Hoover Dam:

“The 75th anniversary of the Hoover Dam today marks a great achievement in American history, demonstrating how we can come together as a nation to build public works that serve the American people and support regional growth for generations. Hoover is an unparalleled marvel of engineering and an even greater feat of strength, ingenuity, courage, and determination for the extraordinary men and women who built this modern wonder.

“Hoover also has shown us how hydropower can serve as an engine for clean energy development and job growth at a time when our nation needs it most. As an industry, we continue to pursue opportunities to serve the country’s energy, economic, and environmental goals with a new generation of hydropower technologies.

“In fact, the 75th anniversary of Hoover's operations marks a milestone for our industry. We’ve incorporated the lessons learned through developing and operating facilities like Hoover, creating a new generation of even more efficient, innovative technologies that respond to stakeholder priorities and provide clean, domestic energy resources.

“NHA salutes the Bureau of Reclamation and all of those who have kept Hoover Dam – and hydropower – working for America for 75 years.”

## **Hydro development has nearly limitless potential, HydroVision speakers say**

CHARLOTTE, N.C., U.S. 7/28/10 (PennWell) --

Hydropower represents a vast renewable energy resource that has much potential to play a greater role in the renewable energy mix, said Duke Energy's Jim Turner, who delivered a keynote address during the opening keynote session of HydroVision International 2010 in Charlotte N.C.

Turner, president and chief operating officer of U.S. franchised electric and gas business for Charlotte-based Duke Energy, was among several speakers to address HydroVision attendees during the keynote event.

HydroVision International 2010 has 2,666 attendees representing 50 countries, breaking attendance records for the event. HydroVision International began July 27 and lasts through July 30. The event is being held at the Charlotte Convention Center. HydroVision 2010 features 278 exhibitors representing countries around the globe.

"Hydro is the original renewable energy source," Turner said, noting also that hydropower makes up 75 percent of renewable energy in the United States.

Even though hydroelectric power is such a large source of renewable energy, the hydropower industry needs to work to make certain hydropower does not get overlooked in the renewable energy generation mix, Turner said.

"Hydro has gotten lost in the race toward solar, wind and other currently popular green energy sources," Turner said. "Yet, in fact, hydro represents a vast renewable energy resource that should not be ignored."

Turner noted that hydropower has much room to expand, both in new development of all kinds and in the form of adding hydro generation capabilities to existing dams that do not produce electricity. Turner cited figures that indicate that only three percent of the 79,000 dams in the United States generate hydropower.

Also speaking of the potential for hydropower in the renewable energy mix, National Hydropower Association President Andrew Munro cited recent developments, such as the signing of a federal MOU for hydropower, as examples of a building momentum for the energy source.

"It's a new ball game," Munro said, adding that "We're on a new field, and hydropower is a leading player."

Another keynote speaker, International Hydropower Association President Dr. Refaat Abdel-Malek, noted that hydro developers must place sustainability among the top of their priorities. Advancing hydropower sustainability is an integral part of the IHA's mission, he said.

Brad Carson, director of the National Energy Policy Institute, who also delivered an address during the keynote session, said hydropower has potential to play an important role in reducing harmful emissions, an issue that is at the forefront of energy production.

In addition, Carson said every U.S. state has potential for developing one form of hydropower or another.

"There is a very bright future for hydropower," he said.

*Hydro Review*, *HRW-Hydro Review Worldwide* and PennEnergy are flagship media sponsors of HydroVision International, which is owned and produced by PennWell.

*This article was written by HydroWorld.com Online Editor Shaun Epperson*

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**<http://www.hydroworld.com/hrhrw/en-us/index/article-tools-template.articles.hrhrw.News-2.2010.07.hydro-development.html>**



## **PPL's Holtwood hydroelectric plant inducted into Hydro Hall of Fame**

July 30, 2010

Source: PPL Corporation

PPL's [Holtwood hydroelectric plant](#) was honored for a century of clean, renewable electricity generation by being inducted into the Hydro Hall of Fame during the annual HydroVision International Conference in Charlotte, N.C. [PennWell](#), the organization that publishes the hydroelectric trade publications [Hydro Review World](#) and [Hydro Review Magazine](#), selected Holtwood for the Hall of Fame in recognition of its place in engineering history, and its commitment to the future.

"As we celebrate the historic accomplishment of 100 years of power generation, we're also building for the future with an expansion that will allow us to produce electricity for generations to come," said Chris Porse, plant manager of Holtwood, who accepted the award. "It's an honor to have the Holtwood plant inducted into the Hall of Fame and recognized for its significance in engineering history as well as its investments for the future."

Holtwood was one of five hydroelectric plants inducted into the Hydro Hall of Fame in 2010. The other inductees are: Duke Energy's 99 Islands plant in Cherokee County, S.C.; Puget Sound Energy's Snoqualmie Falls plant in Snoqualmie, Wash.; and Wisconsin Public Service's Grand Rapids and High Falls plants.

The Holtwood plant has been generating electricity since 1910, using the power of the water held back by a 55-foot-high dam across the Susquehanna River between Lancaster and York counties.

In addition to celebrating 100 years of operation, 2010 marks the beginning of a construction project to more than double the plant's capacity. [The \\$434 million project is expected to add 125 megawatts of generation capacity](#) to the plant when it is completed in 2013. Additional benefits of the project are improved passage for migratory fish along the Susquehanna River and its tributaries, and improved recreational opportunities.

Expanding the Holtwood plant is part of PPL's commitment to make sound financial investments while increasing the proportion of non-fossil-fuel resources in its generation portfolio. About 40 percent of the electricity PPL generates annually comes from nuclear, hydroelectric and renewable sources that do not emit carbon dioxide to the atmosphere.

PPL Corporation, headquartered in Allentown, Pa., owns or controls nearly 12,000 megawatts of generating capacity in the United States, sells energy in key U.S. markets and delivers electricity to about 4 million customers in Pennsylvania and the United Kingdom.

# Adirondack Daily Enterprise

## Village looks to boost hydroelectric capacity

August 2, 2010 - By CHRIS KNIGHT, Enterprise Senior Staff Writer

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SARANAC LAKE - The village is looking to increase its capacity to generate hydroelectric power.

The village Board of Trustees agreed last week to hire the consulting firm Barton and Loguidice to study the costs and benefits of modifying the current hydropower facility at the Lake Flower dam and creating new hydroelectric generating capacity. The \$15,600 cost of the study will be split by the village and the New York State Energy Research and Development Authority.

The village currently uses two water-powered booster pumps, located in the village Water Department building next to the dam, to pump the water that comes from its current drinking water source, McKenzie Pond, up to a storage tank off of View Street. But that system will no longer be needed when the village's new, well-based drinking water system is completed.

"Once the hydro-mechanical pumps go offline, what we're looking to do is utilize them for production of power," said village Manager John Sweeney.

The village currently has a 200-kilowatt hydro turbine in the village office building that captures some of the water coming over the dam and creates electricity that's sold to National Grid. The village makes \$20,000 to \$30,000 per year from those sales, which is used to offset its sewer system costs, Sweeney said.

But that existing hydro system is not used to its full capacity because most of the water coming over the dam is diverted to the water pumps in the Water Department building. If those pumps are no longer needed, the village can direct more water to the turbine.

"The study will also look at raising the dam about 6 inches, so we can capture and utilize more of the water that's going over the dam right now," Sweeney said.

The village's consultants will also evaluate two other hydroelectric possibilities: retrofitting one of the existing water-powered pumps with a 100-kilowatt electric generator and installing a 20-kilowatt micro-turbine electric generator onto the existing gravity-fed water line from McKenzie Pond, which will be abandoned as part of the new water system upgrade.

"We're talking potentially three electric production facilities," Sweeney said.

The village wants to use the electricity generated by the facilities at the dam to power its wastewater treatment plant on Bloomingdale Road. That power could also be used to operate the new groundwater wells located on village property behind the sewer plant.

In order to get electricity there, however, the village would need to use the existing electric transmission lines that are owned by National Grid. As part of the study, the consultants will determine how much power could be transmitted to the sewer plant for use by the village. They will also ask National Grid about the logistics and the charges associated with using the company's power lines.

Sweeney said it could take up to six months to complete the study.

"The whole question mark is what's the cost of the investment versus what's the payback," Sweeney said. "That's what we're trying to figure out."

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Contact Chris Knight at 891-2600 ext. 24 or [cknight@adirondackdailyenterprise.com](mailto:cknight@adirondackdailyenterprise.com).



## And NEWSWISE

### **Stony Brook University And WMHO Give Historic Grist Mill New Life Producing Electricity**

**Released:** 8/4/2010 8:00 AM EDT

**Source:** [Stony Brook University](http://www.stonybrook.edu)

Newswise — The historic Stony Brook Grist Mill has been given a new life by Stony Brook University faculty and students, in concert with the Ward Melville Heritage Organization (WMHO), owners and operators of Mill, c. 1751, as part of a demonstration project on the untapped potential of New York State's renewable energy sources. The mill, constructed in 1751 and placed on the National Register of Historic Places in 1990, is now producing electricity using the same hydropower once used to mill grain thanks to the efforts of Assistant Professor Lei Zuo, and undergraduate students Dimauro Edwards, Brian Bates, Edwin Gonzalez, all from the graduating class of 2010 in the Department of Mechanical Engineering, with the assistance of machinist Lester Orlick.

Working with the WMHO, which operates the historic site, the Grist Mill Hydropower system was installed in April. Prof. Zuo said he believes this is the first instance of an old water-powered mill in New York State being retrofitted to produce electricity.

"The Grist Mill Hydropower System was developed to show the viability of retrofitting water mill sites with electromagnetic generators for the production of hydroelectricity," said Prof. Zuo. "The motivation behind the project is to increase the awareness of sustainability and development of renewable hydropower sources within New York State, 43% of which remain undeveloped."

"Some 2 years ago WMHO and Professor Jeffrey Ge, deputy chair of SBU's Mechanical Engineering Department, discussed the development of an extracurricular educational program for high school students," said Gloria Rocchio, President of WMHO. "Subsequently, we were approached by Professor Zuo to create this wonderful hydropower demo project. In the 1700s the Stony Brook Grist Mill was the only mechanized facility in the area. Because of its ability to harness energy, in addition to grinding grain into flour, the mill was also a sawmill, a winery and a cabinet shop over the years. Having this unique project brings it back full circle and illustrates a practical application for the effectiveness of waterpower."

The Grist Mill Hydropower is now producing up to 1.5 kilowatts of electricity using a generator with 80% efficiency installed in the mill's lower level room, roughly the amount needed to supply electricity to two homes in New York State, according to Prof. Zuo.

Although much of the national conversation about alternative energy sources has focused on wind and solar energy, "I believe the small hydropower is also worth of attention in the U.S.," said Prof. Zuo, citing a recent report of the World Bank Energy Unit that found small hydroelectricity of 1-100 kW has a much lower cost than similar sized wind turbines or solar PV. "The potential benefits of such a small scale hydropower systems include comparatively low costs of construction, installation, and generation when referenced to other energy sources, the production of emission-free renewable energy which can be integrated into the existing power grid, and longevity in performance with high conversion efficiency."

Adam Smith built the first grist mill on the site in 1699 using hydropower from a nearby pond to turn its water wheel, which operated the gears that turned the millstones. When that structure was washed away by a flood, the current mill was built in 1751. In addition to grinding grains into flour, the mill was also used over the years to saw lumber. In 1947, Ward Melville purchased the Grist Mill from its last operator and gave it to what is now the Ward Melville Heritage Organization.

"Since the Stony Brook Grist Mill no longer processes harvested crops but instead serves as a museum, the hydroelectricity system will educate its visitors on the capabilities of producing hydropower and allow them the chance of seeing it in action," said Prof. Zuo.

The project's intellectual merit, he said, is that it expands the knowledge base of the most effective method of converting hydropower to electricity from developed machinery, which is useful for future applications. New York State alone once had more than 10,000 such water mills, most of which were abandoned after industrial revolution, "but the energy sources generated by water flow remain there and can be harnessed." Small hydropower using running water has economic and energy benefits and less environmental impact than other energy sources, he said.

#### About the Stony Brook Grist Mill

The Stony Brook Grist Mill is listed on the New York State and National Register of Historic Places and is designated as a New York State Revolutionary War Heritage Trail site. Located on Harbor Road off Main Street in Stony Brook, it is open Saturday and Sunday, Noon to 4:30 pm. Cost is \$2 for adults and \$1 for children 12 and under. For further information visit [wmho.org](http://wmho.org).

#### About the Stony Brook University

Part of the State University of New York system, Stony Brook University encompasses 200 buildings on 1,450 acres. In the 50+ years since its founding, the University has grown tremendously, now with nearly 24,700 students and 2,200 faculty and is recognized as one of the nation's important centers of learning and scholarship. It is a member of the prestigious Association of American Universities, and ranks among the top 100 national universities in America and among the top 50 public national universities in the country according to the 2010 U.S. News & World Report survey. Considered one of the "flagship" campuses in the SUNY

system, Stony Brook University co-manages Brookhaven National Laboratory , joining an elite group of universities, including Berkeley, University of Chicago, Cornell, MIT, and Princeton, that run federal research and development laboratories. SBU is a driving force of the Long Island economy, with an annual economic impact of \$4.65 billion, generating nearly 60,000 jobs, and accounts for nearly 4% of all economic activity in Nassau and Suffolk counties, and roughly 7.5 percent of total jobs in Suffolk County.



## Ocean Power Takes Step Toward First Commercial U.S. Wave Farm

August 04, 2010, 4:31 AM EDT

*By Alex Morales*

Aug. 4 (Bloomberg) -- Ocean Power Technologies Inc., a New Jersey-based marine technology developer, reached agreement with 11 federal and state agencies that draws it closer to installing the first commercial wave farm in the U.S.

Ocean Power's agreement with the agencies covers issues including water quality, recreation, crabbing and fishing, the company said today in a Business Wire statement. The deal is a "major step" toward getting the first wave farm license ever issued by the Federal Energy Regulatory Commission, it said.

Ocean Power plans to install 10 of its PowerBuoy devices off Reedsport, Oregon, once it gets the go-ahead. The farm would have a capacity of 1.5 megawatts, enough to provide electricity for 1,000 homes.

"This development will help pave the way for the United States to retain a technological advantage in wave power," Ocean Power Executive Chairman George Taylor said in the statement. "Wave energy has the potential to create manufacturing jobs in America while providing low-cost clean, environmentally benign electricity to help replace the use of fossil fuels."

Oregon Governor Ted Kulongoski said in the statement that the manufacture of the first buoy had already created dozens of jobs in the state. "When the 10-buoy wave power project is built, a whole new industry will be created to benefit our coastal communities," he said.

--Editor: Randall Hackley

To contact the reporter on this story: Alex Morales in London at [amorales2@bloomberg.net](mailto:amorales2@bloomberg.net);

To contact the editor responsible for this story: Reed Landberg at [landberg@bloomberg.net](mailto:landberg@bloomberg.net).



## Hydroelectric dams resurgent in Vermont

The tide might be turning for new hydropower development in Vermont, thanks to one company's persistence and the rise of river-friendlier turbine technology.

Plainfield-based Blue Heron Hydro LLC applied last week for a federal license for two proposed power-plant sites, which would together generate about 3 megawatts, or enough electricity to power 3,000 typical Vermont homes.

The power-generating sites would be built on existing dams.

Earlier this summer, the project cleared a major state regulatory hurdle: Its developer received approval from the Agency of Natural Resources to meet water quality standards — the agency's first such certificate for new stream-based hydro in 25 years, Blue Heron's CEO, Lori Barg said.

"Hydro is the only renewable-energy source that has this level of federal regulation," she said. "This permit is the equivalent of the brass ring on a merry-go-round."

The U.S. Army Corps of Engineers owns and will continue to operate the two West River flood-control dams in Windham County, which are located near the towns of Jamaica and Townshend.

Blue Heron has requested an accelerated, 60-day review period from the Federal Energy Regulatory Commission in order to speed the progress of yet another round of paperwork for state and federal renewable-energy incentives.

"If all goes well, we'll start construction this fall," Barg said.

The Windham County sites would help shore up service in an otherwise "transmission-and-distribution-constrained" section of the state known as the Southern Loop, said David Dunn, manager of renewable project development for Central Vermont Public Service.

Blue Heron's hydro "would be an efficient use of an existing resource," and would "inject" power into an area that might otherwise need costly upgrades to transmission lines, he said.

Brian Keefe, CVPS's vice president for government and public affairs, wrote last week in support of the project: "This new generation in conjunction with the Geo-Targeted energy efficiency efforts of Efficiency Vermont may help forestall \$70 million in new transmission infrastructure."

CVPS last year awarded Blue Heron a \$30,000 grant to help with early stage planning and permitting.

The company secured \$50,000 in feasibility-study grants (half of it in federal stimulus money) from Vermont's Clean Energy Development Fund.

Recent CVPS and Green Mountain Power investments to improve the efficiency of "legacy" plants correspond to an ongoing commitment to hydro. Online, the two utilities tout the "smoothing" effect of hydro's 24-7 generation on a grid system that increasingly juggles wind- and sun-dependent energy.

Furthermore, they add, hydro can "kick-start" a local grid in case of broader, regional black-outs.

The two Blue Heron projects will cost somewhat less than \$10 million, Barg said, adding that cost estimates will firm up during the next six months.

Disturbance to the sites will be minimal, she continued: The company plans to install clusters of plug-and-play turbine/generators on the upstream side of the dams' existing conduits, without the need for costly and disruptive excavation — and without changing the flow of the river.

The design also allows each cluster (or "matrix") to be hoisted easily out of the water during floods or for maintenance and service — a design that has gained popularity in recent decades largely through the efforts of Andritz, an Austrian company that specializes in low-flow power systems in reservoirs, canals and boat locks.

Blue Heron will use an American manufacturer for its emissions-free turbines.

Barg said her company also is investigating hydro power for a site near North Springfield, and at Littleville, Mass.

Although in-state hydro accounted for the lion's share of Vermont's electricity until the 1940s, its role has shrunk in tandem with scientists' appreciation for how old dam designs hamper fish migration and alter shoreline and river-bottom habitat.

Today, Vermont's 78 hydro plants have a capacity of about 140 MW and generate about 10 percent of the state's power.

On a larger scale, imported electricity from Hydro Quebec provides about 32 percent of the state's total — a contribution on par with the Vermont Yankee nuclear power plant.

Estimates for additional in-state hydropower range widely:

-- Barg, who authored a 2007 study for the Department of Public Service, concludes that new (undeveloped) capacity at existing dams might top out at about 70 MW.

-- A 2008 report assembled by the Agency of Natural Resources published estimates in the 50 MW range, which it termed "broad-brush assessments." It also noted that Vermont's stewardship of its water resources probably would supercede the licensing of any new hydro dams.

-- A U.S. Department of Energy study in 1996 assessed Vermont's untapped hydropower capacity (including that at un-dammed sites) at 420 MW, most of it achievable through projects smaller than 1 MW.

Barg said she's keeping her commitment focused and simple.

"I believe in gravity and falling water," she said. "You really can't outsource that."

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Read more: <http://www.burlingtonfreepress.com/article/20100806/NEWS02/100805048/-1/HEADLINES01/Hydroelectric-dams-resurgent-in-Vermont#ixzz11nikZEsB>

## Small hydropower has big potential

Monday, August 9, 2010

U.S. Rep. Adrian Smith

When most people think of hydropower, they think of huge dams and millions of gallons of water powering entire cities. Very rarely does anyone think of a small stream or an irrigation ditch. But this is exactly where the future of hydropower lies.

Hydropower is the original green energy and remains the largest source of non-carbon emitting energy in the world. It provides low-cost electricity, helps reduce carbon emissions, and accounts for 67 percent of America's total renewable electricity generation.

For generations of western Nebraskans, dams and reservoirs have provided an affordable and reliable energy source. This vision to harness the power of moving water has paid tremendous dividends for Nebraska's agriculture economy. It is vital to ensure future farmers and ranchers continue to enjoy this low-cost, renewable resource.

While we must make the most of our existing hydropower infrastructure, we also must promote new efforts designed to produce more hydropower from smaller sources. The thousands of miles of irrigation canals, pipes, and ditches in the West create an ideal opportunity for new hydropower generation too good to pass on.

Hydropower produced in smaller, man-made water delivery systems does not consume or disrupt water deliveries and has no environmental effect on temperature or aquatic life. In addition, many irrigators are eager to use small projects to reduce electricity costs and generate much-needed revenue to repair aging facilities. Furthermore, increased revenues from the sale of this renewable energy can result in lower irrigation costs to farmers. Finally, irrigation water delivery services can continue while utilizing flows for clean, emissions-free energy production.

As a member of the House Subcommittee on Water and Power, I've had the chance to see the potential of this emerging technology. Using smaller water sources to generate power seems like an easy concept, but unfortunately Federal Energy Regulatory Commission (FERC) permitting rules have stifled advancements and innovation in the small hydropower field.

As an example, during a hearing of the Water and Power Subcommittee, we heard testimony from one irrigation district which spent \$25,000 navigating FERC regulations and waiting nine months for the federal agency to approve an exemption for a very small 12 kilowatt conduit project which had no environmental impact whatsoever.

Clearly, one-size-fits-all federal regulations make small scale hydropower projects throughout the country financially prohibitive by imposing unnecessary and outdated rules.

During another recent hearing, one witness stated: "Without a statutory change to the FERC process, low-head power will never be cost-effective enough" to be considered by a small irrigation district. As an irrigator from Nebraska told me, small hydropower is simply not feasible given the complexity of the FERC permitting process.

I couldn't agree more, which is why I introduced the Small-Scale Hydropower Enhancement Act of 2010. This legislation would help stimulate the economy of rural America, empower local irrigation districts to generate revenue, and decrease reliance on fossil fuels -- all at no cost to you, the taxpayer.

My bill, which has been endorsed by the American Public Power Association and the Family Farm Alliance, would exempt from FERC jurisdiction any conduit-type hydropower project generating less than one and a half megawatt (as a point of reference, one megawatt is enough energy to serve 1,000 homes). It also would require the Bureau of Reclamation to examine its facilities for more conduit generation opportunities using existing funding.

Though large scale hydropower will continue to play an important part in any all-of-the-above approach to our nation's energy policy, my bill will help irrigators tap into a local resource without any harm to the environment. In this case it pays to think small.

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# The Quad-City Times

REDEDICATION CEREMONY

## Rock Island hydroelectric plant keeps powering up

[Rock Island hydroelectric plant keeps powering up](#)

[Dustin Lemmon](#) The Quad-City Times | Posted: Monday, August 9, 2010 10:18 pm |



The loud hum of four turbines filled the Rock Island Hydroelectric Plant on Monday as city leaders gathered for a rededication of the 98-year-old facility.

Rock Island purchased the power plant at 5200 11th St. in 2008 and began using two turbines to generate power for city facilities, such as city hall. Within the past two months two more generators went online, giving the plant four functional units and a capacity of 1,200 kilowatts.

The additions were part of a \$2.2 million investment by the city, which included the rehabilitation of the powerhouse and the two existing turbines, which have been in place since 1912, as well as adding two more 300-kilowatt generators, Robert Hawes, Rock Island public works director, said.

Hawes said the units had been shut down recently because of flooding on the Rock River.

The facility provides one-third of the electricity used by the city and powers the city's Mill Street Sewage Treatment Plant, Southwest Sewage Treatment Plant, raw water pumping station, water treatment plant and city hall. It also powers street lights and traffic signal lights.

Mayor Dennis Pauley said the plant on the north channel of the Rock River has helped the city cut energy costs. "We are leading the way in creating a green city, and this plant is a shining example of how to use a renewable energy source to save money and the environment," he said.

Former Rock Island Mayor Mark Schwiebert, who attended the dedication, said the city purchased the former White Hydropower Co. in an effort to help reduce the nation's carbon dioxide emissions and help protect the environment.

"In Rock Island, we were determined to change that," he said of high emission ratings.

The plant opened in 1912 as the Sears Powerhouse.

It is classified as a renewable energy resource by the state and produces about 5,500 Renewable Energy Certificates (RECs or Green Tags) per year. Such credits equate to a carbon dioxide emissions savings of 2,170 pounds compared to electricity generated by the burning of coal, according to the city.

Rock Island is selling the RECs for \$15 per certificate to help support the cost of operating the plant. Schwiebert presented a \$120 personal check to the city Monday for his RECs.

It's possible the city could expand the plant's energy production beyond 1,200 kilowatts in the future but that has not been discussed yet, Hawes said.



## Hydropower's Turn

August 23, 2010

Hydropower may be green energy's forgotten cousin. But industry representatives are keen to push it hard now that the U.S. Congress is grappling with energy legislation. They say that hydro holds great potential, noting that despite being an emissions-free source only 3 percent of 79,000 U.S. dams are capable of producing such energy.

Producing electricity from dams is one way to increase the hydro sector's prominence. Generating power from smaller hydro units is another way. Such facilities are less disruptive environmentally but useful in supplying electricity to remote areas. All told, researchers say that almost 60 percent of the nation's water energy resources are potentially available for development using new technologies.

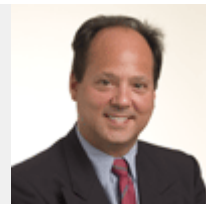
"Hydro is the original renewable energy source," says Duke Energy's Jim Turner, who spoke before a group of hydro executives. "Hydro has gotten lost in the race toward solar, wind and other currently popular green energy sources," says the executive who heads Duke's U.S. Franchised Electric and Gas business. "Yet, in fact, hydro represents a vast renewable energy resource that should not be ignored."

Renewable energy makes up less than 2 percent of this nation's generation mix. But if hydro is added to the equation, it comprises about 7 percent, or 100,000 megawatts. Beyond accessing the currently available water resources here, industry advocates also say that if Congress eventually places a limit on carbon emissions, then it would bode well for hydro.

The conventional way to produce hydroelectricity is through dams. But the amount of power is contingent upon the speed of the water that turns the turbines. Dams can increase the velocity by raising the water level. But they leave big footprints and can cause local populations to disperse. Investors, meantime, are skeptical because the permitting process is slow and costly.

Perhaps the most fruitful activity will come from so-called run-of-the-river facilities. They generate power by redirecting the river's flow using distributed hydropower units that include underwater watermills. While such technology is dependent on stream flow and access to power lines, it does not require the construction of dams that block water and kill off aquatic life.

Indeed, several hundred permits are now pending with the [Federal Energy Regulatory Commission](#) (FERC), with many of those being granted preliminary approval. Most of those would be run-of-the-river units.



Ken Silverstein  
EnergyBiz Insider  
Editor-in-Chief  
[Read Ken's Blog](#)



Respond to the [editor](#).

A [National Hydro Association](#) study released this year says that hydro energy could increase by 60,000 megawatts over 15 years and thereby create 1.4 million new jobs -- if Congress gives it fair consideration. The states most likely to see the most job growth are Alaska, California, Oregon and Washington.

"Hydropower has been a critical source of renewable energy for Pacific Gas & Electric Company as part of a diverse portfolio of low-carbon sources of energy," says Pacific Gas & Electric Hydro Director David Moller and the vice president of the hydropower group, in a letter to Congress. "We support legislation that helps expand the use of hydropower in an environmentally responsible way."

#### Seed Money

That's the major hurdle. To build dams that can generate lots of electricity, local populations oftentimes have to be dispersed and damages occur to the ecosystem. Such projects can create huge lakes that harm sensitive streams and rivers while the dams can reduce oxygen levels in associated waterways. That limits the ability of migratory fish to spawn. In fact, a movement has been afoot in this country to destroy some existing dams so that salmon can lay eggs.

Certainly, hydro plants are widely criticized for their high costs both economically and environmentally. But the focus now is on upgrading and retrofitting existing facilities. To that end, [Senator Lisa Murkowski, R-Alaska, has introduced two bills](#) that aim to achieve the hydro association's growth targets over the next 15 years.

Specifically, the bills, which also had cosponsors from the Pacific Northwest, would direct the U.S. Department of Energy to provide the seed money for not just research and development but also the commercialization of hydropower. It would give FERC the ability to streamline the permitting process -- a necessary component, given that scores of existing dams must renew their operational licenses in the coming years.

A second measure would furthermore provide tax credits to builders as well as allow them access to clean energy bonds, all to raise the needed capital. The proposed legislation comes atop a memorandum-of-understanding released collectively by the Energy Department, the U.S. Department of the Interior and the U.S. Army Corps of Engineers to promote hydropower by identifying prospective hydro sites and encouraging the use of promising new technologies.

"We have an incredible amount of hydropower potential in my home state of Alaska, and elsewhere in the country," says Murkowski. "With the proper financing, we could keep a dozen hydro construction companies fully employed in Alaska ... Hydropower is one of our greatest untapped resources for generating clean, renewable electricity."

In Alaska, hydro supplies 24 percent of the state's electricity needs. Also, more than 200 other sites there look promising for further hydropower development.

Hydropower has an edge. It is clean and the technologies to improve performance exist. But if it is to expand its national footprint, though, its advocates must emphasize their commitment to sustainability before they raise funds or endorse new legislation.

More information is available from Energy Central:

- [Hydro Revisited, EnergyBiz, Nov/Dec 2008](#)



# Making Waves with Tidal Energy

August 27, 2010

*Ken Silverstein, EnergyBiz Insider  
Editor-in-Chief*

The first-ever federal license to proceed with a utility-scale tidal energy project in this country has been issued in Oregon. After an extensive permitting process, [the Federal Energy Regulatory Commission has given the thumbs up to Ocean Power Technologies](#).

Smaller such facilities are now underway. But the commercial-scale one that is to be built in Reedsport, Ore. covers a wide array of issues such as the preservation of aquatic resources, water quality and the maintenance of marine life. In the end, regulators -- who are trying to diversify the nation's energy mix with green fuels -- concluded that wave energy is a valued part of the plan and that it is more predictable than wind or solar.

"This development will help pave the way for the United States to retain a technological advantage in wave power, an advantage that has been ceded to other countries that produce solar panels and wind turbines," says George Taylor, executive chairman of Ocean Power. "Wave energy has the potential to create manufacturing jobs in America, while providing low-cost clean, environmentally benign electricity to help replace the use of fossil fuels."

[The Electric Power Research Institute performed feasibility studies in this area](#). The Palo Alto, Calif.-based research arm of the electric utility sector said that unlike hydropower, tidal energy does not require the permanent impediment of water flow and the subsequent harm to aquatic life. Existing tidal plants, it adds, impound the water before releasing it into generators. And newer tools are even more progressive and use underwater turbines that ultimately connect to cables to transport the power.

The U.S. Department of Energy says that wave energy could eventually supply 30,000 megawatts of electricity. Right now, a number of prototypes are being tested not just in this country but also overseas in the British Isles, Italy and Portugal. Existing tidal power plants include a 240 megawatt facility in France, a 20 megawatt plant in Nova Scotia and a 0.5 megawatt one in Russia.

As for the one in Oregon: Ocean Power wants to install 10 buoys that can generate 150 kilowatts of electricity in the Pacific Ocean, and then connect them to a transmission system that would feed power to citizens of the state. Development would be phased in over time so as to protect "ocean resources and stakeholder interests."

Because the technologies to achieve such a vision are relatively untested and because the federal government wants to foster sustainable energy forms, the company was able to recently win a \$1.5 million grant from the U.S. Department of Energy. Two years earlier, it had gotten a \$2 million grant for the same Oregon project.

"Because the systems do not require dams, impoundments or other major civil works, they cause minimal public and environmental impact and have lower upfront capital costs, an aspect that makes them especially suitable for use in developing countries," says [Verdant Power](#), another company in the business of wave energy.

## **Choppy Waters**

As the world's largest solar collectors, oceans in particular generate thermal energy. Waves are unending and therefore have the ability to produce power around the clock. Moreover, seawater is 832 times as dense as air, providing a six mile-per-hour ocean current with more kinetic energy than a 217 mile per hour wind, say experts.

Verdant, for example, has a test going in New York's East River using underwater turbines. ConEdison will use the resulting electricity for a local grocery store and underground parking garage.

To bring the general idea into the mainstream, however, scientists and engineers must still show that their work can be done on a large-scale basis. And rough waters lay ahead. Environmentally, tidal power plants can impede sea life migration and can affect local ecosystems. The optimal solution, says the Energy Department, is to carefully select sites that preserve scenic shorelines.

Economically, there are also barriers. Operating tidal plants is reasonable. But building and maintaining them is expensive. Therefore, the return on investment takes a long time. It is furthermore problematic when it comes to getting the power to shore. While more predictable than current prevalent green sources, wave energy is still not as dependable as fossil-fired or nuclear generation.

But if the existing commercial and pilot projects prove out, then it would encourage other developers to get on board. With more experience and with the mass production of the essential technologies, prices would come down. At the same time, newer technologies that are around today are less problematic and don't block migratory paths.

Indeed, many places around the United States are conducive to energy derived from the waves or tides. In fact, anywhere that has major rivers or strong ocean currents is a candidate. That includes areas in the Pacific Northwest, the California coastline and Alaska. The Northeast and other parts of the Atlantic shore are also possibilities.

"This is an exciting time for our state and I look forward to continuing to foster this new industry in Oregon in a way that is sensitive to marine habitat and continues to value this important resource for Oregon's fishermen," says Oregon's Governor Ted Kulongoski.

Renewable energy will gain increasing traction in both domestic and global markets. And while wind and solar are the most advanced forms, wave and tidal energy are beginning to make waves. The key now is to prove that the power source is viable by getting a few of those facilities up and running.

# **THE WATCH**

## **Welcome to a Hydro-Powered Future**

by Martinique Davis

09.09.10 - 08:36 am

*Kurt Johnson Says to Expect More Projects Like Ouray's Micro-Hydro Power Plant*

TELLURIDE – The Telluride region has long sustained a rich history in the development of hydropower, boasting the first power plant in the world to generate, transmit, and sell alternating current electricity for commercial purposes, which was, in fact, built just south of Telluride on the San Miguel River, at the Ames Hydroelectric Plant, in 1891.

The region's reputation as a proving-ground for hydroelectricity continues, with a handful of "micro-hydro" projects currently being explored locally. At the forefront of this recent green energy movement is Kurt Johnson, owner of local hydropower development firm Telluride Energy.

According to Johnson, the national hydroelectricity industry is on the brink of a new phase of innovation thanks to a more hospitable legislative environment, both on the national as well as the state and local government level.

"There is a huge amount of renewed interest in hydropower, and that hasn't been the case in a long time," he says, explaining that a recent study commissioned by the National Hydropower Association estimates that about 60,000 megawatts of new hydropower capacity could be developed in the U.S. (To put that in perspective, consider that existing hydropower plants generate about 100 MW, or about 9 percent of the country's total energy output.) The Colorado Governor's Energy Office estimates, furthermore, that Colorado has several hundred attractive sites with a combined potential generating capacity of more than 1,400 MW (with one megawatt of small hydro potentially supplying power equivalent to the electricity needs of 500 to 750 homes).

Many of these new small hydro installations would take advantage of existing facilities, including dams, irrigation canals, and pipelines, to generate clean energy with minimal environmental impact, Johnson says.

Some of these hydro-sites exist right here in southwest Colorado, and Johnson sees great potential for the region to blaze a trail into an increasingly carbon-neutral future. Municipalities like Ouray have already leaped to the forefront of the hydropower movement, with its newly constructed 22 kW micro-hydro system that will offset electricity consumption of Ouray Hot Springs Pool.

Johnson managed the Ouray project, and is also helping to spearhead other micro-hydro projects in Silverton, Ophir, Mountain Village, and at the Ridgway Reservoir, in addition to a handful of other micro-hydro projects currently in the works across the state.

The current political climate is conducive for these kinds of projects, Johnson explains, thanks to recent legislation that has proved to be a boon for renewable energy providers.

Nearly 30 states now maintain Renewable Portfolios Standards, dictating that utility companies are required to get a certain amount of their energy from renewable sources. Last March, Colorado Governor Bill Ritter signed a bill increasing the state's RPS, and this August the Colorado Governor's Energy Office announced a Memorandum of Understanding between the GEO and the Federal Energy Regulatory Commission to streamline and simplify the authorization of small scale hydropower projects – helping to make Colorado a proving ground for responsible development of small hydropower projects.

“All of the macro trends are lining up to support the hydro industry,” says Johnson, pointing to the “looming” issue of climate change and how it has taken the spotlight in the national and international political conversation. “We have some really progressive and effective leaders in the state government taking an active interest in supporting small hydro,” Johnson says.

“Here in southwest Colorado is where the rubber meets the road.”

Johnson knows well that an accommodating political climate is important to the success of burgeoning green energy industries. He worked on Capitol Hill for many years, for the U.S. Environmental Protection Agency, where he founded and spent many years managing the Green Power Partnership, the EPA's renewable energy program. He has worked as a renewable energy specialist for the California Public Utilities Commission as well, where he developed a performance-based incentive structure for the California Solar Initiative.

Johnson founded Telluride Energy in 2008, in an effort to help pave the way for green energy development, specifically micro-hydro, in this part of the country. Telluride Energy specializes in providing start-to-finish management of micro-hydro projects, including site assessments, grant writing, feasibility assessments, permitting, utility company negotiations, and construction management. The company is currently working on a dozen small hydro projects across Western Colorado, ranging in size from 5 kilowatts to 5 megawatts.

“I'm essentially leveraging this newfound interest in hydropower, as well as federal and state [financial] support that has recently become available, to help these hydro projects become realities,” he explains.

For more information on Telluride Energy and its current micro-hydro projects, visit [www.tellurideenergy.com](http://www.tellurideenergy.com)

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# DOE Awards Millions for Marine and Hydrokinetic Energy Technology

September 10, 2010 | [HydroWorld.com](http://HydroWorld.com)

Washington DC, United States Energy Secretary Steven Chu has announced selections for more than \$37 million in funding to accelerate the technological and commercial readiness of emerging marine and hydrokinetic (MHK) technologies, which seek to generate renewable electricity from the nation's oceans and free-flowing rivers and streams.

The 27 projects range from concept studies and component design research to prototype development and in-water device testing. This unprecedented level of funding will advance the ability of marine and hydrokinetic energy technologies to contribute to the nation's electricity supply, DOE reported.

"This funding represents the largest single investment of federal funding to date in the development of marine and hydrokinetic energy technologies," said Secretary Chu. "These innovative projects will help grow water power's contribution to America's clean energy economy."

The nation's ocean waves, tides, currents, thermal gradients and free-flowing rivers represent a promising energy source located close to centers of electricity demand. The Department of Energy is working with industry, universities, national laboratories and other groups to develop technologies capable of harnessing these resources to generate environmentally sustainable, cost-competitive power. The Department of Energy will leverage private sector investments in marine and hydrokinetic energy technologies by providing cost-shared funding to industry and industry-led partnerships.

## Some of the projects selected include:

Ocean Power Technologies, Inc. (Pennington, New Jersey) will deploy a full-scale 150 kW PowerBuoy system in the Oregon Territorial Sea and collect two years of detailed operating data. This project will obtain critical technical and cost performance data for one of the most advanced wave energy converters in the U.S. DOE Funding: \$2,400,000. Total Project Value: \$4,800,000.

Ocean Renewable Power Company (Portland, Maine) will build, install, operate and monitor a commercial-scale array of five grid-connected TidGen devices on the sea floor in Cobscook Bay off Eastport, Maine, in two phases over three years. The project will advance ORPC's cross-flow

turbine tidal energy technology, producing a full-scale, grid-connected energy system and will gather critical technical and cost performance data for one of the most advanced tidal energy systems in the U.S. The completed project will comprise an array of interconnected TidGen hydrokinetic energy conversion devices, associated power electronics and interconnection equipment into a system fully capable of commercial operation in moderate to high velocity tidal currents in water depths of up to 150 feet. DOE Funding: \$10,000,000. Total Project Value: \$21,100,000.

Public Utility District No.1 of Snohomish County (Everett, Washington) will deploy, operate, monitor and evaluate two 10-meter diameter Open-Centre Turbines, developed and manufactured by OpenHydro Group Ltd, in Admiralty Inlet of Puget Sound. The project is expected to generate 1 MW of electrical energy during periods of peak tidal currents with an average energy output of approximately 100 kW. This full-scale, grid-connected tidal turbine system will gather critical technical and cost performance data for one of the most advanced tidal turbine projects in the U.S. DOE Funding: \$10,000,000. Total Project Value: \$20,100,000.

<http://www.renewableenergyworld.com/rea/news/article/2010/09/doe-awards-millions-for-marine-and-hydrokinetic-energy-technology>



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SEPTEMBER 13, 2010

PRODUCERS

# Water Surge

**Hydropower, once shunned because of environmental concerns, is making a comeback**

By [STEPHANIE SIMON](#)

LEADVILLE, Colo.—The giant pipes wheeze and rumble, the whoosh of water coursing through them as noisy as a freeway. The Mount Elbert hydropower plant high in the Rocky Mountains isn't much to look at—or listen to. But to true believers, it's a road map to a greener future.

[View Full Image](#)



*Larissa Bender, Bureau of Reclamation*

The Mount Elbert plant (center) in Colorado uses pumped storage to generate electricity. Using wind power or cheap electricity from the grid overnight, it pumps water from the lake in the foreground through underground pipes to the reservoir above the plant. At times of high demand, it runs the water back down through the plant and its turbines to make electricity.

Hydropower, shunned just a few years ago as an environmental scourge, is experiencing a remarkable resurgence in the U.S. Dams are still viewed warily; in fact, Congress is considering dismantling four hydroelectric dams blamed for depleting salmon in the Klamath River basin in southern Oregon and northern California.

But engineers and entrepreneurs are pressing an alternative view of hydropower that doesn't involve new dams. They argue that plenty of efficient, economical energy can be wrung from

other water resources, including ocean waves, free-flowing rivers, irrigation ditches—even the effluent discharged from wastewater treatment facilities.

There's a surge of interest, too, in adding small power plants to dams built years ago for flood control or navigation—as well as in turning reservoirs into battery packs of sorts, releasing energy when the grid needs it most.

## **Journal Reports**

Read the complete [Energy report](#) .

Globally, hydropower provides 16% of electricity, slightly more than nuclear power and closing in on natural gas, according to the London-based International Hydropower Association.

In the U.S., by contrast, hydropower now provides about 7% of electricity generation. All other renewable sources combined account for about 3%.

Even without building large dams, expanding efforts to draw power from water could add 40,000 megawatts to the grid by 2025, says the Electric Power Research Institute, a nonprofit research firm in Palo Alto, Calif. That's the equivalent of putting at least two dozen new nuclear power plants online.

### **Pouring It On**

Such estimates are stirring action. The U.S. Department of Energy spent nothing on hydropower research as recently as 2007 but allocated \$50 million this year. The Federal Energy Regulatory Commission issued 50 preliminary permits for small hydro projects last year, up from 15 in 2007. At least two dozen states have mandated that utilities draw more power from renewable sources—and many include small hydropower as an option, along with wind and solar. Colorado Gov. Bill Ritter recently announced an agreement between his state and the federal government that will streamline the permitting process for developing small hydropower projects in Colorado.

The Department of Energy estimates a new hydro project in 2016 would generate power at a cost of \$120 per megawatt-hour. By contrast, the cost per megawatt-hour would be \$150 at a wind farm going online that year and nearly \$400 at a photovoltaic solar array. (Those figures don't take into account various tax incentives meant to offset the cost of renewable energy, especially wind and solar.)

Hydro also has technical advantages over other renewables. Daily water flow in many areas is far more predictable than wind or sunshine. It's relatively easy to store the energy pent up in water so it can be released when the grid needs it most. And certain types of hydro plants can rev up from low power to full capacity within seconds.

"There remains tremendous untapped potential in North America," says Don Erpenbeck, a vice president at MWH, a global hydropower construction and engineering firm in Broomfield, Colo. "After decades of delay, we are starting to realize that potential."

But Mr. Erpenbeck adds that years-long waits for federal permits and high capital costs make hydropower a tough sell to some utilities and investors. Maximizing water energy in the U.S., he says, "is going to take some guts."

Countries such as Brazil and China remain committed to large hydroelectric dams and are forging ahead with big projects. Yet they are also looking at smaller solutions favored by environmentalists. The International Hydropower Association estimates that North America has developed nearly 70% of its available hydropower resources and Europe 75%. But the group sees huge potential in South America, Asia and especially Africa, where just 7% of resources have been developed.

### **Dam Smart**

In the U.S., one strategy gaining popularity is to add power plants to some of the 80,000 existing dams that don't have hydroelectric capacity. Technological advances like turbines that are gentler on fish and oxygen-injection systems that help balance aquatic ecosystems have won favor even among some environmental groups.

In one such project, American Municipal Power Inc. is spending \$2 billion to add power plants to three dams on the Ohio River and invest in additional hydropower elsewhere.

The utility's CEO, Marc Gerken, says the new hydropower will cost more initially than coal or natural gas. But after the construction costs are paid off in 30 years, the utility will enjoy cheap power for several decades because the fuel—the rushing river—is essentially free and the plant is designed to run without much maintenance for 60 or 70 years. AMP, based in Columbus, Ohio, is a nonprofit corporation owned and operated by municipal utilities in the six states the company serves.

Other technologies are more speculative. A much-ballyhooed experiment that involved suspending a turbine from a barge in the Mississippi River didn't prove to be worth expanding. The turbine is generating power, but Hydro Green Energy LLC, the Houston-based start-up that developed the device, says it has moved on to more promising ventures. "It's still a power-producing, money-making device," but the economics don't support expansion, says Vice President Mark Stover.

Several companies are experimenting with "low-head" turbines that can pull energy from relatively small volumes of water dropping as little as five feet over natural or man-made falls. One such project, launched by Natel Energy Inc. of Alameda, Calif., uses low-head technology to extract energy from an Arizona irrigation canal.

Federal scientists say some of these approaches look promising but need more study. "With these new technologies, nobody knows what their environmental impacts might be," says Doug Hall,

who manages the water-energy program at the Department of Energy's Idaho National Laboratory.

### **Pump Action**

A less-experimental technology, dating back more than a century, is also gaining currency as a means to store energy and back up the grid: pumped storage, the system used by the Mount Elbert hydro plant outside Denver.

The plant, sitting on the jewel-like Twin Lakes and managed by the Bureau of Reclamation, plays a key role in keeping lights on and air conditioners humming across the West.

At night, when demand on the power grid is low, the Mount Elbert plant sucks water from the lakes, sometimes using wind power to pump that water up into a reservoir above the plant. The reservoir acts as a liquid battery—a huge pool of potential energy.

As the day warms up and the grid shows signs of strain, workers begin to release the water down a 470-foot drop, through devices that turn the pent-up energy into usable electricity. The water eventually pours back into the lakes, where it can be recycled into power again the next evening.

Pumped storage is quite popular abroad; China has 2,200 projects under construction, and India and Ukraine aren't far behind. An analysis by MWH shows that countries as varied as Romania, Thailand, Switzerland, South Africa and Italy are also moving heavily into pumped-storage construction. The U.S. has lagged, but federal authorities saw a surge in permit applications in 2008 and again so far this year.

"No new dams are being built," says Dave Sabo, a senior adviser with the Bureau of Reclamation. But just about every other approach to hydropower, he says, is being studied and tested intensively. Says Mr. Sabo, "All this stuff is in play right now—pretty heavily."

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## INNOVATION ECONOMY

## A ‘wetlab’ could put Mass. in the lead in ocean energy race

By Scott Kirsner, Globe Correspondent | September 19, 2010

If you want to build an iPhone app or develop a drug for Alzheimer’s disease, finding the place to do it isn’t a challenge. Massachusetts is dotted with incubators, accelerators, labs, and co-working spaces where you can rent a desk by the day.

But if you want to drop a tidal generator into the briny deep, or plunk a prototype wind turbine onto the continental shelf, you will inevitably face a few years of permit wrangling with a half-dozen federal and state agencies. Testing new renewable energy technologies isn’t cheap, fast, or easy.

John R. Miller would like to change that. As director of the Marine Renewable Energy Center at the University of Massachusetts Dartmouth, he’s campaigning for the creation of a vast saltwater incubator in the channel between Martha’s Vineyard and Nantucket, and the ocean waters south of the islands.

Technically, the project is being called the National Renewable Energy Innovation Zone. I prefer to think of the rectangular area as the Big Wetlab: a place where entrepreneurs and big energy companies can beta test the energy technologies of the future, sooner and with fewer hassles than they’d face anywhere else. (In the world of drug development, wetlabs are where all the important experiments are done.)

If Miller is successful — and the project recently landed \$1.5 million in new federal grants — the Big Wetlab could be among the first test areas in the United States, positioning Massachusetts at the center of the emerging clean-tech economy.

“Having an area like that, which has been pre-approved for wave, tidal, and offshore wind testing, would be a huge thing that this country needs,” says Bill Staby, cofounder of Resolute Marine Energy Inc. “If Massachusetts can grab the ring, you’ll see a greater number of marine energy technology companies locate here, because companies want to be closer to their test sites.” It’s true of Staby’s Boston-based start-up, which is developing a system to pull power from ocean swells: It set up an office in Rockland, Maine, where Resolute hopes to test its wave energy technology next summer.

The race to establish test beds for ocean-based power generation technology is global. Britain, for instance, recently approved a site in the North Sea with 20 designated “pods” where companies can deploy prototype wind turbines. In the United States, says Ian Bowles,

Massachusetts' secretary of energy and environmental affairs, "all of the mid-Atlantic and Northeastern states are vying to figure out how we can be the epicenter of this ocean energy industry. The goal is to develop the expertise here, build the workforce, and create the supply chain connections that say to companies, 'Here is where the industry is going to happen.' "

Bowles's agency has been assisting UMass with pursuing permits for the Big Wetlab.

In New England, Maine is in the lead now; legislation passed last year mandated the creation of several ocean energy test sites in state waters, and earlier this month the state put out a call for proposals for offshore wind and tidal energy projects that could actually start delivering juice to the state's utilities soon.

One company already testing a tidal power generation system in Maine is Portland-based Ocean Renewable Power Co. Chief executive Chris Sauer says the company's next-generation system, which could be in the water and connected to the electrical grid by late 2011, will have turbines moored to the seafloor that will be spun by tidal currents. Located in a bay near Eastport, it will generate enough power for 50 to 75 homes.

Ocean Renewable Power also hopes to be involved in the first project that could be part of the Big Wetlab. The town of Edgartown on Martha's Vineyard is hoping to set up its own tidal generation system about a mile offshore in the Muskeget Channel. The initial stage of the project would provide sufficient power for Edgartown, and later stages could meet much more of the island's needs.

Nantucket has been exploring the possibility of erecting its own small wind farm to the south of Tuckernuck Island, with as many as 11 large turbines generating power for the entire island, and selling the excess to the Cape. A tower to gather data about wind speeds and bird and bat activity could go up soon. Steve Barrett, director of the clean energy group at Harris Miller Miller & Hanson Inc., an environmental consulting firm in Burlington, says the turbines, located about 5 miles out, would likely be visible from the western end of Nantucket. "The view from shore would be comparable to the Cape Wind project," Barrett says.

Another site in the Big Wetlab could be used to test both offshore wind and wave generation technology.

For marine energy companies, the appeal of the Big Wetlab is that it would cut down on the amount of time and money they have to spend navigating the permitting process. "We think we might reduce the permitting cost by as much as two-thirds," Miller says, adding that his center at UMass would monitor the activity, and is already beginning to conduct environmental studies of the area. Connections to the electrical grid may also await companies that come to the Big Wetlab for testing.

An area like the Big Wetlab "would be very useful to a company like us, for certain," says Mike Werle, a founder of FloDesign Wind Turbine Corp. in Waltham. "And it could bring other companies here, because everyone needs a place to test." The project will cost tens of millions of dollars to develop, says UMass assistant chancellor Paul Vigeant, but companies using the test sites would pay rent, generating some revenue. Key to the project's success will be getting it up

and running quickly, and promoting it widely.

Miller isn't yet tossing out figures about the project's potential economic benefits or the number of jobs it could create, but he does say that he has been talking to Cape Cod Community College and the Massachusetts Maritime Academy about creating training programs for the kinds of workers required to set up and maintain ocean energy equipment.

Inevitably, as the project proceeds, it will attract opponents: homeowners who don't want to look out at wind turbines, or commercial fishermen who worry about dragging their nets across submerged gear.

Audra Parker, chief executive of the Alliance to Protect Nantucket Sound, which opposes the Cape Wind project nearby, sounds at least somewhat supportive. "We've always advocated for renewable energy that is responsibly sited," she says, "assuming that you have few environmental impacts, community support, and it makes sense from a cost perspective."

At the Conservation Law Foundation, Priscilla Brooks says that the group "is very supportive of this sort of incubation and innovation zone, provided that any project undergoes a proper environmental review." She notes that wind, wave, and tidal generation systems are "new technologies for New England's ocean waters," and their impact on the fishing industry, marine mammals, and birds isn't yet well understood.

Miller notes that Nantucket and the Vineyard were at the center of the global energy industry back when whale oil was a valuable commodity. This time around, he's hoping the islands can play a more environmentally-friendly part.

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CNBC

## Renewable energy goal stalls in US

Published: Thursday, 16 Sep 2010 | 2:05 AM ET

EDITOR'S NOTE — An occasional look at how behind-the-scenes influence is exercised in Washington.

By **FREDERIC J. FROMMER**

Associated Press Writer

WASHINGTON (AP) — A powerful lobbying coalition is campaigning to require more electricity to come from renewable energy sources such as wind, solar and geothermal. But the effort hasn't gotten any traction in the Senate this year, despite the push by environmental groups, renewable energy providers, more than half the nation's governors and even some utilities.

When he unveiled a scaled-down energy bill this summer, Democratic Senate Majority Leader Harry Reid left out the renewable electricity mandate, which would require utilities to produce a certain percentage of their energy from renewable sources. Reid said that although he supports the idea, he didn't have the votes needed for passage.

The lack of progress shows the limits of even a well-funded, sophisticated, all-out lobbying campaign, especially in the Senate, which requires a supermajority of 60 votes out of 100 for most legislation. In this case, election-year politics and opposition from some utilities, particularly in the Southeast, have helped stall the renewable energy initiative. And a soon-to-expire legislative calendar makes the picture even bleaker.

It hasn't been for lack of trying. In March, the bipartisan Governors' Wind Energy Coalition, which includes Republican heavyweights such as Arnold Schwarzenegger of California, urged passage of such a mandate to help the wind industry. The group, which has 26 governors, sent a letter to Senate leaders this week reiterating the call.

The American Wind Energy Association, one of the groups leading the effort, has enlisted a consummate Washington power broker, former Senate Democratic leader Tom Daschle, as a strategic adviser. Daschle, an expert vote-counter in his day and one-time mentor to Reid, has put pressure on his successor by publicly stating that the 60 votes are there for passage.

With Congress back at the Capitol this week, the group is ramping up the effort with several days of television advertising in the Washington market.

The BlueGreen Alliance, which includes environmental groups like the Sierra Club and labor unions like United Steelworkers, held round-table discussions and news conferences in 17 states last month to promote renewable energy and other clean-energy efforts.

Others pushing for a renewable mandate include farm interests like the National Farmers Union and the National Association of Wheat Growers, renewable groups such as the Biomass Power Association and the National Hydropower Association and utilities like Xcel Energy and AES Corp.

Meanwhile, the Glover Park Group, a Washington public affairs-lobbying firm, has blitzed reporters with minute-by-minute updates and news conferences on the latest efforts by the coalition, hoping to drum up coverage to keep the issue alive in the Senate. The breathless e-mails also highlight any glimmers of success, such as Reid's comment last month that he was open to the idea of adding the mandate to the energy bill — although he didn't commit to it.

Even if the Senate does adopt a mandate, it is sure to fall far short of President Barack Obama's goal of producing one-quarter of the nation's electricity from renewable sources by 2025.

A broader House climate change bill, which won a bare majority in that chamber last year, set the mandate at 20 percent by 2020. The Senate was forced to scuttle its own climate bill this summer because of lack of Republican support.

With hopes dead for passing climate legislation this year, environmentalists are looking at a renewable mandate as a way to curb emissions of carbon dioxide, a greenhouse gas blamed for contributing to global warming. Proponents also argue that a mandate would generate manufacturing and construction jobs for renewable energy projects.

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# Energy Storage takes on the Variability Conundrum

By Andrew Lee, Contributor, Renewable Energy World magazine | September 28, 2010

Experts eye energy storage as the way to overcoming the inherent variability that dogs the progress of most renewable technologies.

Essex, UK -- The Holy Grail, the final piece in the renewable energy jigsaw, an unnecessary luxury - energy storage has been described as all of these in relation to large-scale renewables' penetration.

Storage that can be deployed at multi-MW scale is knocking on the door of the power industry and announcing its ability to, among other virtues, help deal with wind's intermittency, integrate renewables more smoothly into the grid, store renewable energy for sale at peak times and compensate for creaking power networks.

An array of technologies including compressed air, multiple species of batteries, flywheels and the use of molten salt with CSP plants may all have a part to play, and an old favourite, pumped hydropower, certainly will (see sidebars).

But what part, and to what extent, is still not clear. What is not in doubt is that storage is firmly on the agenda, especially in the US.

The US government has committed significant funds to help develop various storage technologies via its economic stimulus programme and Congress is looking at the possibility of offering incentives to grid-deployed storage.

In California, a bill working its way through the state legislature would require utilities to develop procurement programmes for energy storage systems to be achieved by the end of 2015, with an additional target at the end of 2020.

The California Energy Storage Alliance (CESA), an association of companies involved in developing storage technologies and systems, was predictably delighted when the state's assembly passed the legislation in June. "This landmark bill puts California at the forefront of a growing global market that will spur economic development," said CESA director Janice Lin.

## Utility-scale Storage Set to Total 150 GW by 2015

That growth will be in the order of 22 GW of utility-scale energy storage worldwide by 2015, according to 'Renewable Energy Storage', a study by ABI Research released in May. ABI

forecasts that by then, 150 GW of large-scale storage will be in place thanks to government incentives, increased performance through technical advances and declining costs of production.

Larry Fisher, research director at ABI, said he expects renewables to be the focus of much of the growth. "A good deal of utility-scale energy storage will be associated with renewable energy sources to compensate for their intermittency," said Fisher. "In the context of wind, we found Compressed Air Energy Storage well-suited for use on wind farms, as developments can be sited in places with appropriate geographic features to enable CAES. We forecast CAES will grow to nearly 1.6 GW globally by 2015."



*The 290 MW Huntorf CAES station in Germany was commissioned in 1978.*

While most of the noise surrounding storage is coming from the US, Fisher pointed out that the Asia-Pacific region, and particularly China, Japan and Korea, has seen heavy investment in battery technologies. "Those and other Asia-Pacific nations have aggressive renewable energy goals. Combined with government support, it appears likely the region will comprise the greatest share of global utility-scale energy storage, at least over the next five years."

Fisher expects batteries to play a key role at utility level, not least because of the huge amount of development going into systems for hybrid and electric vehicles. He also pointed to work on molten salt energy storage for solar thermal generation as a technology likely to see greater use in the future.

ABI's study is the latest to predict a significant role for bulk energy storage in helping to integrate renewables, and particularly wind power.

### **US Eyes Storage to Tackle its Transmission Issue**

The advantage most often cited, as referred by Fisher, is storage's potential to compensate for intermittency in renewable generation levels.

According to Cian McLeavey-Reville, analyst at Delta Energy & Environment in Edinburgh, Scotland, a complete list of the potential benefits of storage could run to more than 100 items. Thus far, however, he believes much of the activity, particularly in North America, has boiled down to a single issue - compensating for the deficiencies in the transmission and distribution grid.

"In the US in particular they are worried about the integration of large, concentrated areas of wind production. It's not so much an intermittency issue as a transmission issue."

McLeavey-Reville said the combination of new large-scale power production in remote areas and an ageing grid will inevitably put strain on the system in specific areas. Storing what the grid cannot handle looks like an attractive option, at least in the short term, given the massive costs of upgrading the transmission system.

With the exception of pumped hydro developments in countries such as Spain and Scotland, storage has yet to gather the same pace in Europe as it has in Japan and the US.

European pioneers of renewables generation such as Denmark have tended to boast robust networks with the ability to handle what wind and other resources can throw at them.

"It's fair to say the storage industry has struggled slightly to find a foothold here [in Europe]," said McLeavey-Reville. "Any storage technologies that are being developed here are tending to focus on the North American market at the moment, because there's so much money floating around there. The fundamental drivers for storage just aren't as strong as in America."

That is not to say there is no European activity in the storage arena. In August, for example, the UK Energy Technologies Institute announced a technology demonstrator programme to develop a storage device capable of delivering a minimum of 500 kW on an 11 kV distribution network for around four hours. This would be enough to keep 400 homes powered for four hours, said the ETI, and would be used as a reserve to compensate for down-periods in renewable generation.

Delta Energy & Environment expects the continent's energy sector to take a much stronger interest in storage over the next few years. Indeed, it goes as far as predicting that what is currently a "very poor third behind Japan and the US" will become a "hotbed of storage activity".

The falling cost of storage technologies and the concentration of ever-larger renewable resources in far-flung areas of Europe are among the factors expected to drive activity.

But, while its momentum is undeniable, the case for bulk energy storage as a key imperative for renewables integration is far from universally accepted.

### **Wind Industry Fears Extra Costs of Storage**

There is unease in the wind power industry, for example, at the suggestion that wind inevitably needs storage to make it viable at high levels of market penetration, with the associated costs this would add.

An alternative school of thought sees storage as a "nice-to-have" rather than a "must-have", and points to other, cheaper weapons in the power system's arsenal such as more sophisticated use of flexible generators such as hydropower, better wind and solar forecasting, and greater use of demand response mechanisms.

The American Wind Energy Association (AWEA), for example, hailed the findings of a recent study by the US National Renewable Energy Laboratory (NREL) that looked at scenarios for integrating up to 35% renewables into the electricity network of the western US.

NREL's 'Western Wind and Solar Integration Study' concluded that 30% wind and 5% solar penetration was technically feasible and economic without the use of storage, provided other measures are put in place, including improvements to the transmission system. The cost of these improvements would be small compared to the overall benefits of the new wind power, AWEA claimed. While conceding potential long-term benefits of storage to complete power networks as costs come down, AWEA characterises it as "useful, but rarely essential" for wind at present.

On the other side of the coin, a study prepared for the California Energy Commission by KEMA points to the very immediate advantages of storing renewable energy, for example from its potential to cut reliance on conventional assets for balancing the system, contributing to an overall lower emissions power economy.

The debate will continue, but the money and political support flowing towards large-scale storage suggest its hour is at hand.

*Andrew Lee is a freelance journalist and a former chief editor of Renewable Energy World.*

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### **Sidebar 1: Thinking Big - Compressed Air and Pumped Hydro Move in on New Ground**

They say that everything comes back into fashion if you wait long enough, and compressed air energy storage (CAES) may be a case in point. Basic CAES technology uses the energy to be stored to drive air compressors. The air is stored underground until required and then released to drive a turbine that operates on less than 40% of the gas normally required due to its pre-compressed air input.

A commercial 290 MW CAES plant began operating in Huntorf, Germany, in 1978. A second was set up in Alabama in the US in 1991. And that appeared to be it, until the possibility of managing variable generation sparked new interest.

First Energy announced last November that it had acquired the rights to the long-mooted Norton Energy Storage Project in Ohio, based on a former limestone mine, and said the first phase could involve around 270 MW of generation capacity. With 9.6 million square metres of storage available, the company claimed the site has the potential to expand up to 2.7 GW.

Pacific Gas and Electric has received government match funding for a US\$50 million demonstration CAES project in Kern County, California. The facility would be designed to store enough energy to deliver 300 MW for 10 hours. New York State Electric and Gas is also looking at a 150 MW demonstrator based in a salt cavern.

A striking direct link between renewables and CAES is the Iowa Stored Energy Park, which plans up to 150 MW of wind capacity with an underground storage facility.

The scale and siting issues of CAES projects make them slow burners, and the involvement of conventional generation in the process has led some to question their status in the renewables equation.

Nonetheless, while CAES promises much, as yet it has just a handful of ageing plants and some ambitious plans to its name. By way of contrast, pumped storage hydropower boasts around 127 GW of capacity worldwide and is growing at a rate that puts other storage technologies in the shade. China's state grid operator, for example, plans to raise its pumped storage capacity from 14 GW at the end of 2009 to 21 GW by 2015 and 41 GW by 2020, with the need to complement wind and solar generation given as the reason. Among a host of other developments so far in 2010, a 1.5 GW project has been announced in Vietnam, while Slovenia's first pumped storage facility started operation, and the first unit of the Dnister plant in Ukraine, one of the largest pumped storage plants in the world, came on stream.

While other technologies stake their claims and plug their potential, pumped hydro storage - just like hydro generation - is content to get on with adding capacity by the gigawatt.

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## **Sidebar 2: Rapid Responders - Batteries and Flywheels**

The battery - the storage technology of everyday life in its portable form - is set to play a role in the future of large-scale energy management, with two variants expected to feature significantly in the shorter term.

Japan has been the global pacesetter in large-scale battery storage for two decades, predominantly through the sodium sulphur (NaS) systems developed by NGK in conjunction with Tokyo Electric Power.

With more than 200 MW of installed capacity in the country, NaS is well-established in Japan, where it is used at substations and major industrial sites. Tokyo Electric Power believes NaS storage has a major part to play in the country's future renewables infrastructure, and has established a hybrid wind/NaS installation at Rokkasho in the north of Japan consisting of a 51 MW turbine array and a 34 MW NaS system.

NaS is also spreading its wings, notably through the recent installation of a 4 MW system at Presidio, Texas, the state's first utility-scale battery.

While NaS has established a track record at scale in Japan and elsewhere, market observers expect Lithium Ion (Li-ion) to quickly emerge as another serious contender.

A study by Pike Research in late 2009 forecast that Li-ion batteries will be the fastest-growing category for utility-scale applications, representing a 26% share of a \$4.1 billion stationary energy storage market by 2018.

Many believe Li-ion's ability to offer scale applications will benefit from the considerable investment it is enjoying in the automotive sector as a key enabler of low-carbon vehicles.

"Utilities will be the downstream beneficiaries of innovation and investment in Li-ion batteries for the transportation sector," said Pike Research senior analyst David Link. "While Li-ion was once limited to consumer electronics devices, it is quickly becoming the battery of choice for electric vehicle manufacturers. Improved storage capacity and economics will lead the utility sector to adopt Li-ion as well."

Few companies have created as much of a stir in the storage market in recent years as A123 Systems, a Li-ion battery specialist that became something of a green-tech superstar when it floated last year.

A123 employs electrode technology first developed at the Massachusetts Institute of Technology in battery systems for a range of markets, with grid applications high on its agenda. In August, 2010 the company signed a deal with AES Energy Storage to supply 44 MW of grid-scale systems. A123 has also worked with AES on a 12 MW frequency regulation project in Chile, said to be the country's first energy storage facility.

Alongside NaS and Li-ion, work is underway on flow battery technologies, where an electrolyte flows through an electrochemical cell. The technology is viewed as one of the most promising options thanks to its promise of fast response and long life.

The development of commercial flow battery products has been relatively slow. However, systems such as the cellcube range from Austrian group Cellstrom, which made its debut earlier this year at Intersolar Europe 2010, are now appearing on the market.



The cellcube vanadium redox flow battery

The cellcube is a vanadium redox flow battery, employing vanadium salts in its electrolyte. According to Cellstrom, the use of vanadium results in a "virtually unlimited" number of charge/discharge cycles and a 20-year lifespan.

The larger of the two cellcubes features an output of up to 200 kW and a maximum storage capacity of 400 kWh. Cellstrom is aiming the turnkey battery system at applications such as renewable energy storage, back-up power supplies and load levelling and balancing.

Frequency regulation is firmly on the radar of those developing flywheel storage systems - 'kinetic batteries' that store energy in a high-speed rotating matrix and then discharge it as electricity when required. Flywheels are hailed by their supporters as the 'greenest' storage solution as they do not consume fuel or produce emissions.

Already used for applications such as UPS, the flywheel now has bigger ambitions at utility level.

In August, Beacon Power Corporation closed the financing on its flagship 20 MW flywheel energy storage plant in Stephentown, New York, thanks to a \$43 million loan guarantee from the US Department of Energy (DoE).

The Stephentown project, billed as the first utility-scale plant of its kind in the world, is designed to aid regulation of the power grid, enabling greater use of renewable resources and reducing dependence on conventional assets. Operational by the end of the year, it will eventually provide around 10% of New York's daily frequency regulation capacity, according to Beacon Power.

In a move to directly ally flywheel and wind, Beacon has also installed a system at a wind farm in Tehachapi, California, as part of a demonstrator project for the California Energy Commission.

The company says it is now developing the next generation of its flywheel technology, aimed at storing four times the energy at one-eighth the cost of its current flagship Smart Energy 25 system.

<http://www.renewableenergyworld.com/rea/news/article/2010/09/extending-performance-energy-storage-takes-on-the-variability-conundrum>



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September 29, 2010

# The Challenge of Storing Energy on a Large Scale

By ERICA GIES

SAN FRANCISCO — Renewable energy sources like [solar power](#) and wind have been in the spotlight lately, as have ways to improve control of the power distribution system through information technology. But another crucial component of developing a climate-friendly, secure and affordable supply of electricity — large-scale storage — has received little attention.

Now storage is stepping into the light. In the United States, incentives from the Energy Department, increased interest from venture capitalists and policy shifts at the state level, where utilities are regulated, are laying the groundwork for bringing energy storage capability to the electricity grid.

“Energy storage is the killer app for taking our grid to the next level,” said Matt Rogers, a senior adviser to the U.S. energy secretary, [Steven Chu](#).

Stored energy is part of daily life: batteries power cellphones and laptops, for example. But now the focus is on building grid-scale storage technologies. Possibilities include pumped [hydroelectric](#) energy; air compression systems; flywheels; and even superlarge batteries. These technologies can perform several desirable tasks in the energy system.

Grid operators must keep power flowing reliably to users, a task known as frequency regulation that has been complicated by the addition of unpredictable generating resources like solar and wind power. Those sources can change output rapidly if external conditions shift: a cloud crossing the sun or a drop in the wind.

Aside from these minute-to-minute changes in output, solar and wind also have larger production discrepancies: the sun does not shine at night, and in many places, wind is calm during the day. Energy experts call this “intermittency.”

Utilities have generally used the more controllable output from fossil fuel power plants to compensate for intermittency. But if renewable sources are to contribute a greater share of the energy mix — California has a target of 33 percent by 2020 — the declining proportion of fossil fuel power available to smooth out the peaks and troughs of output will make storage technology essential.

“Well-meaning voters and legislators come up with things like 33 percent renewables in California by 2020,” said Maurice Gunderson, senior partner at the [venture capital](#) firm CMEA

Capital in San Francisco. “Well, it sounds like a good idea, but you really have to be a utility geek to get into the details and realize that it simply cannot be done without storage.”

Mike Gravely, an energy research manager at the California Energy Commission, agreed. “There may be a point in the future where the policy requires renewables to bring storage along with them,” he said.

Recent research suggests that storage technology could respond faster to supply and demand shifts than fossil fuel plants. Utility managers could address intermittency, Mr. Gravely explained, “with maybe half the amount of energy, if you have storage,” than they would require using traditional generation.

Utilities must also build systems capable of meeting peak demand, which arises at different times of the day, week and year. For this purpose, utilities have traditionally relied on bringing additional fossil fuel generating plants into action.

But fossil fuel plants run most efficiently at full power. And the marginal plants turned on to meet peak demand are often less efficient and more polluting than the power generators that run around the clock.

Using stored energy to meet peak demand could eliminate the need to switch on dirtier, more expensive plants.

Depending on where storage is sited, it could also reduce the need for transmission lines, according to Jim Eyer, a senior analyst at the consulting company Distributed Utility Associates and a lead author of a report this year by Sandia National Laboratories on energy storage. That would be a boon because utilities often struggle to get rights of way to build transmission lines. As a result, they usually overbuild after they get permission.

“That’s a waste of capital for something that might not be utilized for 20 to 30 years,” said David MacMillan, president and co-founder of MegaWatt Storage Farms, an energy storage developer and adviser. “If you deploy storage, you don’t have to add more transmission.”

Storage can also help utilities get the best price for the energy they generate, using a strategy called “time shifting.” Energy managers can store lower-cost energy produced at night, then release it to the grid during peak demand when it is more valuable. With both traditional power plants and [wind farms](#), much more energy is produced at night than can be used.

“In West Texas, there is so much wind that, at night, they effectively have to let the things turn but dump the power because there’s no demand for it,” said Mr. Rogers of the [U.S. Energy Department](#).

The Energy Department is supporting a variety of storage projects, using money from the economic stimulus funds approved by Congress.

“Today a storage solution costs about \$1,000 per kilowatt-hour,” Mr. Rogers said. “We’re trying to drive it down to somewhere between \$100 to \$200 per kilowatt-hour.”

The venture capital world has taken note. “Right now there’s a big flock forming of grid-scale storage proposals, and that indicates that the entrepreneurs of America are responding to a very big opportunity,” said Mr. Gunderson of CMEA Capital.

The most common technology already in use for grid storage is pumped storage hydroelectricity, in which managers use electricity to pump water up into higher elevation reservoirs at night, then release it at times of peak demand to recapture the energy. This technique proliferated in the United States during the heyday of nuclear plant construction in the 1960s and 1970s to absorb unused nighttime energy from reactors that produce a constant flow of power around the clock.

In 2009, the United States had 21.5 gigawatts of pumped storage generating capacity, according to the Energy Information Agency. Wider deployment, however, is limited by geography and environmental concerns similar to those associated with dams. The E.I.A. projects no change in capacity through 2030.

Another large storage option is compressed air. There is just one site operating in the United States at the moment, built in Alabama in 1991. But four new projects are in the works.

Electricity is used to force air under pressure into a cavern. To extract it, operators heat the compressed air with [natural gas](#), then push it through turbines to generate electricity. Like pumped hydroelectricity, this method is limited by geography. And its use of natural gas produces emissions that undermine some of the benefits of turning to renewable sources.

A new flywheel project in New York will be used for frequency regulation because current models can store energy for only about 15 minutes. Flywheel systems use electricity to drive a motor, which accelerates a massive disc, storing electricity in the increased momentum. When the stored power is needed, the flywheel is used to drive the motor in reverse, generating electricity.

Batteries have not yet reached grid scale for the most part, although a village in Japan has assembled a bank of them to serve that purpose. Many experts think batteries hold the most promise because they are scalable and can be used anywhere.

“I’ve been deeply impressed by the new science in this space,” Mr. Rogers said. With many battery technologies in development, he said he was confident that something economical would emerge.

New policies are also promoting energy storage in a drive to overcome barriers to its deployment. Those are needed because markets and regulators currently recognize just three types of businesses on the grid: generation, transmission and distribution.

“Storage is a peculiar animal; it’s this funny, amorphous thing with some aspects of each entity,” said Mr. MacMillan, the energy storage developer. “But market and regulatory structures have to adapt to take advantage of it.”

That might happen soon. The [Federal Energy Regulatory Commission](#) is now considering ways in which it would set regulations for cost recovery for energy storage, perhaps by creating a separate asset class for storage.

A federal investment tax credit could also help compensate for the difficulties until the need for storage is more accepted, said Jason Makansi, executive director of the Coalition to Advance Renewable Energy through Bulk Storage, an advocacy group. Senator [Ron Wyden](#), a Democrat from Oregon, sponsored such a provision in 2009 that, like most energy proposals, is currently languishing in Congress.

Some states have also introduced policies to promote storage.

The New York Independent System Operator has defined short-term energy storage devices like flywheels and batteries as frequency regulators, allowing them to participate in regulated markets. Independent system operators in Texas, California, and the Midwest, Mr. Makansi said, “have been progressively laying in policy, procedures, pricing, and other mechanisms that support deployment of storage services.”

The California legislature recently passed an energy storage bill requiring the Public Utilities Commission to set storage targets. The bill is expected to be signed by Gov. [Arnold Schwarzenegger](#) by the end of September.

But advances are likely to be slow because of the inherent conservatism of the electric utility business.

“It’s a business built on providing reliable service to customers,” Mr. Makansi said.

“People will vote you out of office, as [Gray Davis](#) found, if you screw up the electricity system,” he added, referring to the California governor who was ousted in 2003 after an energy deregulation scheme failed.



## **NYPA trustees approve contract**

20 MEGAWATTS: Pact needs Paterson's OK; hydropower will be given to river agency

By [ELIZABETH GRAHAM](#)

TIMES STAFF WRITER

THURSDAY, SEPTEMBER 30, 2010

St. Lawrence County by early next year will be able to attract industry with the promise of cheap power.

New York Power Authority trustees on Tuesday approved a contract to release 20 megawatts of low-cost hydropower to the St. Lawrence River Valley Redevelopment Agency. The agency will use the power and \$16 million from NYPA for economic development.

"It's a wonderful thing," said Robert O. McNeil, river agency chairman. "Hopefully, the governor will sign this."

Gov. David A. Paterson has 60 days to approve the contract. The deal allows the Massena Electric Department, on the river agency's behalf, to purchase the power from NYPA at a preferred rate and sell it at cost to industries the agency approves for a power allocation. The MED is not allowed to alter the rate, but can charge distribution costs.

"The rate is at the preference customer rate, which is NYPA's cost of service," said Andrew J. McMahon, MED superintendent. "The cost of energy is in the lowest 5 percent nationally."

Mr. McMahon said the rate will be adjusted periodically, but the cost is just under 2 cents per kilowatt.

The river agency will receive the proceeds from the sale of unallocated power on the open market.

River agency officials have said the low-cost power will be a great asset in getting Canadian businesses to settle in the county. The Association of Major Power Consumers in Ontario has estimated that electricity rates in the province will rise by 55 percent in the next five years.

The power also will be attractive to users seeking a reliable, renewable source at a stable rate, Mr. McMahon said.

NYPA Chief Executive Officer Richard M. Kessel said that once Mr. Paterson approves the contract, it will take two or three months to release the power.

"I don't want to speak for him, but I think he's clearly committed to signing," Mr. Kessel said.

A spokesman for Mr. Paterson's office did not return a call for comment Wednesday.

Mr. Kessel said the contract demonstrates how committed NYPA and the governor are to helping the north country's economy.

"We know the economy is very sluggish here, and when we can utilize our resources to help spur economic development and create jobs, that's the best thing the Power Authority can do," he said.

# Silverton Standard

## Hydroelectric power project gets a boost

Posted on October 02 2010, 10:55am by Mark Esper in Local News category

**8-kilowatt plant to be built near Mayflower Mill with help from History Colorado grant.**

The San Juan County Historical Society is going back to the past as it moves into the future — building its own little hydroelectric power plant at the Mayflower Mill.

Top officials from History Colorado (the agency formerly known as the Colorado Historical Society) were on hand Monday to present a \$105,000 grant to the historical society to help fund the project.

The 8-kilowatt plant will be powered by water delivered by a pipeline from high in Arastra Gulch.

The grant was awarded from a new program emphasizing sustainability projects. History Colorado funding comes from a portion of the taxes on gambling in Cripple Creek, Central City and Blackhawk.

The historical society has earmarked \$30,000 for the hydroelectric project.

An additional \$20,000 has come from the U.S. Department of Agriculture's rural development fund, \$10,000 from the Colorado Water Resources and Power Development Authority, and \$4,500 from the state Division of Reclamation, Mining and Safety.

Telluride Energy LLC plans to install the 8-kilowatt micro-turbine at the site. That company has also contributed \$5,000 to the project.

The small plant should provide plenty to power the mill for its summer tour season, and also allow the historical society to sell surplus power to San Miguel Power Association.

Once completed, the small plant will offset the \$600-a-month electricity bill the historical society now pays to keep the lights on at the Mayflower Mill, a National Historic Landmark that the society runs as a tourist attraction.

"A century ago, mills all over the San Juans were powered by hydro-electric power, a fortunate result of geography and abundant water supply," said Bev Rich, chairman of the San Juan County Historical Society, "We propose to re-use this historic technology to take our organization into the future."

Steve Turner, director of the State Historical Fund, offered praise for the pioneers of San Juan County and to the present-day residents here.

“It’s hard to imagine the challenges of building this community more than 100 years ago,” Turner said. “That ethic of hard work continues.”

Turner said that for communities like Silverton, historic preservation dovetails with economic development, and a goal for a more sustainable community.

“Without your historic resources I’m not quite sure where you’d be,” Turner said. San Juan County Commissioner Pete McKay said that “kicking off a hydroelectric power plant is tremendous. We have a winning combination here.”

Ed Nichols, director of the State Historical Fund and president of History Colorado, said the agency’s mission is to tell the stories of Colorado’s past and to preserve artifacts.

“Our goal is to highlight the stories — the people and places of Colorado’s past.”

He noted this is the first sustainability grant awarded by the agency, and said the project will produce both tangible and intangible results.

He said the immediate result will be jobs to install the power plant, and lower electric bills for the San Juan County Historical Society, which also will have the capability to sell power back to the grid.

“Less tangible is the partnerships within the community that a project like this creates,” Nichols said. He said Silverton has built quite a reputation for its historical preservation efforts.

“Heritage tourism is one of Colorado’s most important revenue sources,” Nichols said. “You’re living proof that it really does pay to preserve your heritage and link it to the future.”

Rich thanked Nichols for the grant for the hydro power project and gave a brief history of the Mayflower Mill (also known as the Shenandoah-Dives Mill) and how it ended up as a major historical attraction in Silverton.

In 1929 the visionary mining superintendent Charles Chase was called in by Eastern investors to find old properties to mine in light of the development of a new technology — flotation milling — that allowed for better recovery of metals from lower grade ores.

Despite the onset of the Great Depression, Chase managed to keep the mill open and it remained a major employer in Silverton.

“It’s remarkable he was able to run this mill up until 1952,” Rich said. “He kept this town alive.” But the mill closed in 1952 and remained idle until 1959, when Standard Metals reopened it and used it to process ore from the great Sunnyside Mine until 1991.

“Then they closed the door and gave us the key to the mill,” Rich said.

Rich said the historic mill might very well have been dismantled under reclamation rules if not for Silverton resident Zeke Zaroni's efforts.

"Zeke was worried all the old mills in San Juan County would be gone and he said we need to save this mill," Rich recalled.

"We had to do a lot of research to see if this little historical society could take on this mill," Rich said, but five years later it was a "done deal."

"We've been working on it ever since," Rich said, and restoration work continues.

She said that with the mill, along with the Old Hundred Mine Tour and the Mining Heritage Center in Silverton, "we tell the complete story of mining technology. And it's a marvelous story."