

Published: Friday, February 8, 2013

PUD tackles green energy storage dilemma

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EVERETT — Green power from windmills, water power, solar panels and tidal waves has a major problem.

It's often generated when it's not needed, it's needed when it can't be generated and it's impossible to store in large amounts.

Now the Snohomish County PUD has stepped up to launch a challenging new project focused on solving that problem for utility companies everywhere.

"This project is highly important because it's a critical step toward being able to solve storage problems on a large scale," said PUD General Manager Steve Klein. "Many utilities are using batteries to store excess power but there's no uniform standardization so they're not interchangeable. Plus, you need a uniform computer software system that will work with a wide range of electric power sources."

Klein believes the solutions the power generating industry needs may come from the PUD's team efforts to research and resolve storage issues that have restricted the maximum benefits of today's expanding green power network.

The plan focuses on 1Energy Systems' development of a 1 megawatt battery energy storage system built using its innovative Modular Energy Storage System Architecture (MESA).

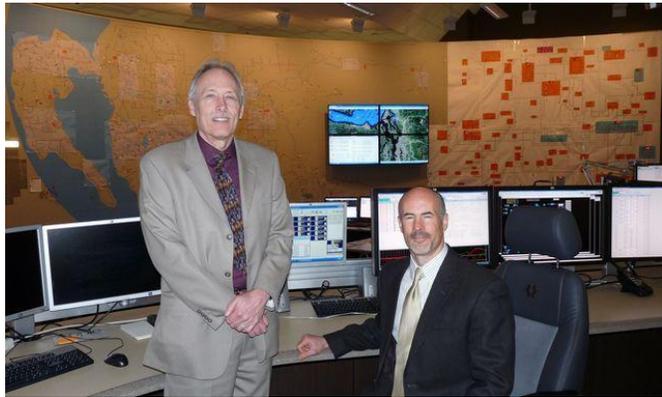
MESA uses commercially available, advanced technology batteries housed in a standard shipping container like those carried by trucks, trains and ships. The prototype container will be installed at one of PUD's substations.

Alstom Grid and faculty from the University of Washington will collaborate on research, analysis and design of technology interfaces, with 1Energy Systems leading the selection of future MESA partners who will provide batteries, power conversion and energy system balancing components.

Klein said the collaborative program will bring major equipment and software companies together to establish appropriate industry standards to make energy storage more economically and operationally viable for the entire electrical utility industry.

"This approach is much different than other energy storage projects in the past and should result in an array of plug-and-play type energy storage components to help solve the expanding needs of today's electric grid that increasingly depend on intermittent resources such as wind and solar," Klein said.

David Kaplan, CEO of 1EnergySystems, said there are a number of storage systems around the world but not on the scale necessary to handle the storage volume needed by electric power providers.



Snohomish County PUD General Manager Steve Klein (left) and Assistant General Manager Craig Collar believe this new energy control center near Paine Field is opening at an opportune time to be integrated into PUD's new research project for storing and controlling the flow of green energy from windmills, solar panels and other alternative sources.

"I worked for the PUD for 18 months in 2011 and 2012 as an in-house technologist, using my background in software and my experience as an energy entrepreneur," Kaplan said. "Out of that opportunity to learning about the power industry from the inside, and my conversations with Steve and others, came the ideas for this project."

PUD assistant general manager Craig Collar, Klein and Kaplan all agree that the scale of their integrated project is so large "that nobody else is attempting to build a comprehensive energy storage system of this size out of standardized components," integrated with a master computer software program overlaid to control the whole system.

Klein and Kaplan expect the pioneering project will be deployed in the field this year and will be operational by the end of 2013.

"First, however, we have much to do, including choosing the components for the project," said Kaplan. "This first step is to learn more so we can develop working models. The potential for the whole industry is far reaching. We'd like to be the people who define the software and prove how the system can work."

With MESA technologies that standardize the components of the system, Kaplan and Klein believe utility customers could upgrade, expand and adjust system components as needs change or new technologies emerge. Also, power suppliers can focus on their core competencies to reach a broader market at lower cost, say PUD officials.

"Using a 40-foot cargo container with one megawatt of power storage capacity would be a reliable size for a substation," said Collar. "That would be part of the standardized, scalable system approach for the power industry. What's unique about this project is that nobody anywhere has tackled this problem on this scale."

Klein noted that because of the PUD's years of experience with energy conservation and developing renewable resources, "We're far down the road in these areas. ... Imagine if energy from all those homes with solar panels operating all day while people are gone could be stored for later use," as well as wind power from the Columbia River gorge that depends on prevailing weather.

Klein noted that the PUD recently opened its new energy control operations center near Paine Field, equipped with a huge room of computers, wall maps and outlines of connected power sources and transmission grids.

"We use a pretty sophisticated software program to monitor and switch all that power we use to where it's needed," he said. "That software is a fantastic product sold around the world, but today it can't integrate storage resources into it."

Developing the appropriate software technology to operate and integrate the system will be a major part of the PUD team's project. It will need to track numerous operating systems, temperatures in substations, current flow and what's happening in the whole system so dispatchers can make real-time adjustments.

"Our new energy control center is a key element of this project," Klein said. "We talk to people all over the world and folks are excited about this project. We're in a situation where utilities all over the world would find this to be of tremendous use. It would also benefit battery manufacturers who geared up for an electric vehicle market that hasn't developed yet. This project could create a very large market for a lot of businesses."

Each of the venture's partners exude the same enthusiasm for the potential of the project.

"We're pleased to work with Snohomish PUD and our other partners to advance a new vision for utility-scale energy storage," said Kaplan. "We commend the PUD for its industry leadership and value its support toward realizing the full potential of MESA."

Alstom Grid concurred. "We are excited to work with Snohomish PUD and 1Energy to help advance a

new generation of energy storage solutions using MESA standards," said Karim El-Naggar, Alstom Grid's vice president of network management solutions.

University of Washington faculty will provide electrical engineering, power systems and computer science research expertise to the MESA Project "to help analyze the benefits of large-scale deployment of energy storage technologies within the electric distribution grid," said Daniel Kirschen, UW professor of electrical engineering.

Asked about recent battery fire issues with the Boeing 787, Klein said one of the project's goals is to be certain that the battery components involved will have no similar safety issues.

"At this point we don't know what type of batteries will be best for our system, but research into the Boeing 787 problems could help us determine our choices," Klein said. "I don't see those present incidents as any reason to delay what we're doing. It only gives us one more factor to examine."

Meet the partners

Who are the players in the PUD's new energy storage research project?

Snohomish County PUD: The second largest publicly owned utility in Washington, the PUD serves nearly 325,000 electric customers and 20,000 water customers. Its service territory covers all of Snohomish County and Camano Island.

1Energy Systems: An electric power industry research center in Seattle, 1Energy Systems provides software, communications and systems engineering for utility-grade energy storage systems and other electric energy assets, including wind and solar power, improved reliability, outage backup and system upgrades.

Alstom Grid: With more than 130 years of electrical grid expertise, Alstom is among the top three global leaders in electrical transmission. The company is at the heart of Smart Grid development and offers products, services and energy management solutions in power generation, transmission and distribution grids.

University of Washington: UW is one of the pre-eminent research universities in the world and is particularly well known for the quality of its research in sustainable energy.