

## **NEWS**



*Gerry Machen / Creative Commons*

# **Nation's first integrated wind and solar project takes shape in Minnesota**

Frank Jossi | March 2, 2017

*Correction appended*

Later this year the nation's first "integrated" wind and solar hybrid project will begin producing power outside a small city in northwest Minnesota.

Developed by Juhl Energy, Inc. (<http://juhlenergy.com/users/awp.php?ln=712106>), the Red Lake Falls Project combines two 2.3 megawatt (MW) General Electric 116-meter rotor turbines with a 1 MW solar photovoltaic installation.

Dan Juhl, the company's founder, said it will be the first project in the country to use wind integrated solar energy (WiSE) allowing turbines and panels to share a converter, which transforms electrical direct-current voltage for use on the grid.

Each turbine is designed to allow 500 kilowatts of solar energy to be processed through the converter, he said. Typically, converters cost hundreds of thousands of dollars, Juhl said, so the savings are substantial when deploying a hybrid.

"It reduces the capital costs because you don't have to have duplicates," he said. "People have done wind and solar before but you have to have separate converters for them. That means additional capital costs, additional maintenance, additional monitoring systems."

The solar farm will produce peak energy in summer when it is needed while the wind turbines will perform the same duty in winter, Juhl said. The wind turbines can be curtailed to prevent output from overloading the converter, he added.

Developed by GE's Global Research Center (<http://www.geglobalresearch.com/>), the WiSE approach is expected to increase annual energy production by 10 percent and the system net capacity by three to four percent.

Steve Bravo, product manager for GE Renewable Energy, said the few wind and solar hybrids that have been built employ separate systems for moving electricity from the field to substations.

In these situations, a solar installation has its own inverter while a wind turbine has a converter. Each has a transformer and a separate power line to the substation.

The WiSE approach eliminates all that duplication, Bravo said, saving 10 to 15 percent in capital costs and 25 to 30 percent in operation costs, including maintenance. An inverter is no longer needed, and the converter — with multiple generation inputs — will operate more efficiently, he said.

“All power electronics are more efficient when they’re used near their peak capability,” Bravo said. “So with the WiSE system increasing the amount of power flowing through the converter it maximizes the amount of time the converter spends at peak efficiency.”

### **‘Cookie cutter’**

The \$10 million Red Lake Falls project is purposely “cookie cutter” to allow him to do the same project in other communities, Juhl noted.

And such an approach makes sense as larger wind and solar installations become more difficult to construct due to permitting problems and transmission access challenges, he said.

The wind-solar hybrid model usually does not require transmission upgrades or as much regulatory approval as larger installations, Juhl said.

“If we want to get commercial-scale renewables into the system we have to be strategic and blend it in,” he said. “That’s the most cost-effective way.”

GE is working on adding a storage product to add to the hybrid that would create all of the elements needed for a microgrid, Juhl said. Wind energy captured at night — when wind blows the strongest — could be stored and placed on the grid the next day, he said.

The major challenge the project faces is determining the “avoided costs” of the hybrid project. [Otter Tail Power Company \(https://www.otpc.com/\)](https://www.otpc.com/), Red Lake Falls’ local utility, suggests a lower price and a shorter contract than Juhl believes is appropriate.

Juhl filed a [complaint \(https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={18BCDFDD-CC67-4C14-BCCC-7528F8768E95}&documentTitle=201612-127125-02\)](https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={18BCDFDD-CC67-4C14-BCCC-7528F8768E95}&documentTitle=201612-127125-02) with the the Minnesota Public Utilities Commission in December of 2016 over the issue. He contends he spent a year trying to get information on avoided costs from Otter Tail.

The hybrid can produce power for 4.4 cents per kilowatt hour, a cost far below utilities’ prices in Minnesota. “That’s long-term cheap energy,” said Juhl.

The hybrid will reside on land owned by farmers two miles southwest of the city. Con Edison Development, based in New York, is Juhl’s equity partner on the project.

The company is a strong proponent of renewable energy and has announced an investment of more than \$450 million in it over the next three years.

In January Con Edison announced (<http://www.marketwired.com/press-release/conedison-development-acquires-three-key-assets-of-juhl-energy-inc-otc%20pink-juhl-2191861.htm>) the purchase of three Juhl subsidiaries. These include Juhl Energy Service Inc.’s operating and maintenance services business, three operating wind projects totaling 36 MW in Minnesota and Juhl’s “interest” in a pipeline of wind projects in the Midwest.

Wind-solar hybrids are not just a potential boon for GE and Juhl. For Red Lake Falls the project serves as an introduction to clean energy, according to Mayor Allen Bertilrud.

Con Edison has spoken to community leaders about the potential for solar on top of a city-owned mall in addition to the wind-solar hybrid project.

“We don’t know what it’s going to do for our community yet,” Bertilrud said. “We might end up with some financial benefit ... but this is the first really big project in this area with renewable energy. This is the future of energy because it is renewable and it’s not a finite energy source.”

## The origin of an idea

Juhl is one of the pioneering wind developers in Minnesota, with a portfolio of projects beginning in 1978. The first time Juhl tried a wind and solar combination came in 1998 when he built an office building and maintenance shop in Woodstock, a tiny town in southwest Minnesota.

The local rural electric cooperative told him the cost of running a line to his office would be around \$12,000. He figured a better idea would be to power the building with a small wind turbine and solar panels.

When low pressure systems came in winter and fall through the area the turbine produced energy. High pressure systems brought sun in summer that fed the solar panels, Juhl said. The mix-and-match nature of solar and wind power generation kept the office lights and electricity on.

A few years ago, when GE tried to sell Juhl a turbine with energy storage capacity, he was skeptical and suggested creating a filter that would allow solar into the converter. The result is the WiSE converter.

Other non-integrated wind and solar hybrid systems exist. The research firm Global Market Insights, Inc. reported (<http://www.genewsroom.com/press-releases/ge-renewable-energy-equip-first-commercial-us-integrated-solar-wind-hybrid-project>) last year that the United States has \$195 million of wind and solar hybrid systems, with expectations the market could reach \$300 million in 2024.

Globally, wind and solar hybrids could reach \$1.47 billion by 2024, driven by developing countries without strong electric grids.

Bravo sees market opportunities. “This growing market of hybrids is what we’ll hopefully be able to capture with the WiSE technology,” he said. “We’re hoping to use it as our first foray into the market and prove out the technology.”

For Juhl the approach simply makes sense and could create job growth in sparsely populated areas of Minnesota and other states. He sees wind-solar hybrids as a “hedge” against North Dakota coal and as a clean energy option for fueling an electric vehicle revolution.

“These projects would allow rural Minnesota to get actively involved in their own energy production,” Juhl said. “You can create jobs and economic development that will keep energy dollars in the community... And it lays the foundation for our transportation fuel of the future, as more and more electric cars come on to the table.”

*(Clarification: The original article misstated that Juhl Energy’s case had been before the Minnesota Public Utilities Commission for a more than a year. The actual complaint was filed in December, 2016. The issue with Otter Tail Company over avoided costs has lasted more than a year.)*

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