

Experimental 'wind to hydrogen' system up and running

Xcel Energy and the U.S. Department of Energy's National Renewable Energy Laboratory today unveiled a unique facility that uses electricity from wind turbines to produce and store pure hydrogen, offering what may become an important new template for future energy production.

Several dozen journalists, environmental leaders, government officials and Xcel Energy managers today toured the joint venture, which is located at NREL's National Wind Technology Center between Golden and Boulder, Colo.

"Today we begin using our cleanest source of electricity – wind power – to create the perfect fuel: hydrogen," said Richard C. Kelly, Xcel Energy chairman, president and CEO. "Converting wind energy to hydrogen means that it doesn't matter when the wind blows since its energy can be stored on-site in the form of hydrogen."

The facility links two wind turbines to devices called electrolyzers, which pass the wind-generated electricity through water to split the liquid into hydrogen and oxygen. The hydrogen can be stored and used later to generate electricity from either an internal combustion engine turning a generator or from a fuel cell. In either case, there are no harmful emissions, and the only by-product from using the hydrogen fuel is water. On site is a new building that houses the electrolyzers and a device to compress the hydrogen for storage; four large, high-tech tanks to store the hydrogen; a generator run by an engine that burns hydrogen; and a control room building, where computers monitor all the steps of the process. Xcel Energy and NREL are each paying part of the \$2 million budget for the two-year project.

"The project allows our researchers to compare different types of electrolyzers and work on increasing the efficiency of a wind-to-hydrogen system," said Dan Arvizu, NREL director. "And, it has the potential to point the way to a completely emissions-free system of making, storing and using energy."

Currently, there are limitations to both wind power and hydrogen. Wind farms only generate electricity when the wind is blowing, which is about one-third of the time in the United States. This creates the need for backup generation, which is usually fossil-fueled. Hydrogen, while the most common element in the universe, isn't found in its pure form on Earth and must be either electrolyzed from water, or stripped out of natural gas, which are energy-intensive processes that result in greenhouse gas emissions.

"By marrying wind turbines to hydrogen production, we create a synergy that systematically reduces the drawbacks of each," Kelly said. "Intermittent wind power is converted to a stored fuel that can be used anytime, while at the same time offering a totally climate-friendly way to retrieve hydrogen, to power our homes and possibly cars in the future."

NREL and Xcel Energy expect to offer a public update on the operation of the project around the middle of 2007. Results will also be shared with the Hydrogen Utility Group, made up of Xcel Energy and nine other utility companies interested in hydrogen's future role in the utility industry.

"Advancing knowledge and sharing innovation are among NREL's primary goals," Arvizu said. "Our growing strategic partnership with Xcel Energy – especially on this project – helps us reduce the time and effort between research discoveries and sharing the benefits of what we learn with energy consumers."

Source: National Renewable Energy Laboratory

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