Researchers evaluate highway rest areas for wind power

March 20 2009

Illinois is the Prairie State and home to the Windy City. And sometimes, when standing out in that prairie and feeling the wind racing across the state, you begin to wonder if there is anything between here and Kansas that is slowing down the wind at all. With people thinking more and more about alternative energy sources, it appears sure that wind power would be a logical source of energy for Illinois.

But is it really viable for the state?

That is a question that Patrick Chapman, a professor in the Department of Electrical and Computer Engineering at the University of Illinois, and his graduate student Piotr Wiczkowski set about finding out. Together they performed an in-depth study for the Illinois Center for Transportation and the Illinois Department of Transportation to determine the feasibility of using wind to provide electrical power at highway rest areas, weigh stations, and team section buildings. They wanted to examine the degree to which wind power could offset electricity costs while also providing a reasonable return on the investment expense for the necessary wind turbines.

"We basically got the maps out, and we received tons of data from the local weather stations," said Chapman. "We applied all the wind generation models to figure out the wind resources at these particular sites."

Wiczkowski and Chapman then found all the available information on

wind turbines, which they matched against their data to determine which turbines would work best at which sites. "There were 32 rest stops and more than 20 weigh stations to go through," said Chapman. "So there were a lot of sites to evaluate. And a lot of different wind turbines."

What they were looking for was "grid parity." Basically, they determined what the cost would be to install and maintain wind turbines at the sites for 20 years versus the cost of the energy generated over that time. If they found that the cost would match the cost of obtaining electricity directly from the grid, then grid parity would be achieved. "If you have grid parity," said Chapman, "it's an economically wise decision to put the wind turbine in. The numbers add up, in other words."

And how many of the sites of rest areas and weigh stations actually achieved grid parity? Well, none. And that is not unusual. Currently, most groups that do begin installing wind turbines and other renewable energy are able to make it cost efficient through the use of government rebates and subsidies. "This is generally true for renewable energy right now," said Chapman. "It's not quite viable except with some very particular sites."

Part of the difficulty in achieving grid parity in Illinois is that, compared to some other states, Illinois's electricity is very inexpensive. Another difficulty was the amount of electricity rest areas require. Running vending machines and lights 24 hours a day takes up a lot of electricity.

However, when the available rebates and subsidies are factored in, some sites in Illinois showed promise for wind power generation. They delineated four rest areas and six weigh stations that seemed favorable for wind power generation.

In addition to the power generation capabilities, Chapman said that having wind turbines at rest areas could also provide an educational

benefit that they state may consider, even though its benefit cannot be easily quantified. "Having these wind turbines in these highly visible rest stops and weigh stations would also do a lot to educate the state," he said. "They could put plaques there and information to raise awareness of the issue. Millions of travelers go past these sites every year."

Source: University of Illinois at Urbana-Champaign (news : web)