

Small-scale Wind

“A number of factors influence how well a small wind electric system will work for homeowners.”

by Brenda Kleinjan

ELECTRIC COOPERATIVES IN THE REGION HAVE been making significant investments in utility-scale wind projects in recent years.

In fact, of the more than 45 megawatts of installed wind projects listed with the South Dakota Public Utilities Commission, cooperatives either own or purchase the output of nearly 44.8 mw – more than 99 percent – of that capacity.

These large-scale turbines stand tall enough and large enough to more effectively harness the wind than their smaller counterparts. And, even then, they generate electricity only about one-third of the time.

Hobby wind farms – those using wind devices smaller than 25 kilowatts, typically generate less than 1,500 kilowatt hours per month and cost \$15,000 to install. (One 100-watt lightbulb burning for 10 hours will use one kilowatt.) While

that energy use is comparable to what the average electric co-op consumer uses in a month, there's a good chance that usage isn't always at the time the wind is blowing.

Homeowners looking at the small wind applications need to consider many things before embarking on a small-scale wind project.

A number of factors influence how well a small wind electric system will work for homeowners.

First is the availability and reliability of wind; second is tower height restrictions; third is space – generally at least an acre is needed for the turbine; fourth is the amount of electricity needed; and finally, economics.

Small wind systems work well in remote areas where building lines in to pump water may not be cost effective. However, for most homeowners, the system is not a cure-all.

In fact, even the main federal promoters of

small scale wind note that one of the factors in determining whether a small wind system makes financial sense is to consider the amount of money currently spent for electricity. According to U.S. Department of Energy's Energy Efficiency and Renewable Energy figures, the systems make the most sense when energy costs are 15-cents per kilowatt hour and more. According to the DOE's Energy Information Administration data, the average South Dakota electric rate is well below those levels.

Steve Wegman, an analyst for the South Dakota Public Utilities Commission, noted that first-time costs associated with the machines are an important consideration.

According to the American Wind Energy Association, small turbines cost between \$3,000 to \$50,000 installed, with a typical home system costing \$32,000. Wegman said suppliers have told him that they have sold 18 small wind machines in western South Dakota and eastern Wyoming.

One major drawback in Wegman's eyes is the durability of the small wind turbines in the often harsh winters of the Dakotas and Minnesota.

“I have yet to see a small wind machine make it through two winters in the Dakotas,” said Wegman, noting that often the materials used to make the machines are not industrial-type materials.

Wegman also noted that the small machines have a “notorious rate of failure. They come crashing down.”

Because of the machines' designs, they are high revolutions per minute (RPM) machines, making 110 to 130 million rpms annually. South Dakota's cold temps also take their toll.

“They literally tear themselves apart,” Wegman said.

He compares the needed maintenance with a car driven 100,000 miles – there is a lot of needed maintenance to keep the car functioning properly for that many miles.

“These machines do need maintenance,” Wegman said.

“Often times, people think the machine is going to work forever without any maintenance,” Wegman said.

“A lot of people believe that wind machines are a plug and play technology like a TV where you go home and plug it in,” Wegman said. Utilizing the technology is much more involved. Another factor is that the quality of the electricity – dips, surges and cycle synchronization – cause voltage and frequency problems that can be disastrous for sensitive electronics.

Nationwide, small wind machines account for less than 15 mw of production annually, Wegman said, a small fraction of the nation's overall electric needs. In contrast, the Hyde County Wind Farm operated by FPL Energy is rated at 40 mw. Electric cooperatives purchase the entire output of the farm.

Homeowners looking to small wind may want to consider efficiency improvements instead.



Above: A number of factors influence how well a small wind electric system may work for homeowners. **Opposite:** Bison stand in front of a 10 kw wind turbine near Glacier, Mont. Photos Courtesy of DOE/NREL

EERE publications say the first thing any homeowner should do is to reduce energy consumption by making their home more energy efficient.

“Because energy efficiency is usually less expensive than energy production, making your house more energy efficient first will probably be more cost effective,” the EERE says in a booklet about small wind systems

According to the EERE, homeowners can reduce heating and cooling needs by 30 percent by investing a few hundred dollars in proper insulation and weatherization. Additional savings can be realized by properly maintaining and upgrading heating, ventilation and air-conditioning systems.

Other ways to cut home energy costs are to install energy-efficient windows, replace lights in high-use areas with compact fluorescent lights and replace aging appliances with Energy Star® appliances.