

Homespun power: Energy solution blows in wind with turbine

April 23 2010, By Mary Beth Breckenridge

Last June, Frank Towns put up a wind turbine behind his home to generate electricity. Turns out it's generating interest, too. People driving by often stop to ask about it, and Towns is happy to share information about his backyard curiosity.

Towns installed the horizontal-axis wind turbine on his five acres in Stark County's Nimishillen Township to supply part of his electricity needs. Before, he was paying about \$170 a month for electricity, he said; now he pays \$70 to \$80.

The turbine -- an updated version of a windmill in which the [mechanical energy](#) is converted to electricity instead of being used to drive machinery -- sits atop a 40-foot tower behind Towns' ranch-style house. A tail fin keeps it facing the wind.

On a recent blustery day, its three 10-foot-long blades spun in a blur, producing a soft whistling sound much like wind blowing through bare trees.

The blades turn a shaft that's connected to a generator, which produces electrical energy. Underground wires carry that electricity in the form of three-phase alternating current to equipment in Towns' basement, where it's converted first to high-voltage direct current and then to the single-phase AC power that can be used in Towns' home.

When the turbine produces more power than Towns and his wife, Pam,

can use, it can be sent out to American Electric Power's grid for other customers to use or diverted into what's called a dump load and used for heat. If winds get too high, the turbine shuts off automatically.

Towns' wind generator is something of an anomaly in Ohio. [Green Energy](#) Ohio, an organization that promotes sustainable energy policies and practices, estimates only 100 to 200 residential [wind turbines](#) are in use in the state.

They're uncommon for a number of reasons, including their cost and their need for open spaces, said Stefanie Spear, whose Chagrin Falls, Ohio, company, Expedite Renewable Energy, installs solar- and wind-energy systems. Buildings, trees and other obstructions can interfere with air flow, she explained, making wind turbines unsuitable for most urban sites or small suburban lots.

Nevertheless, federal, state and utility-company incentives are making wind turbines more attractive for those who can install them. Towns said those incentives paid about \$24,000 of the \$28,000 cost of his 5-kilowatt system.

Towns said his incentive for installing a wind turbine was largely curiosity. "I was always interested in (windmills), even as a kid," he said. When he saw three turbines in a field in the Findlay, Ohio, area, "I thought, they've got to make these for residential use."

He erected an anemometer, connected it to a computer and spent about three years tracking the wind speed in his yard before determining that a wind turbine would make sense.

Towns bought the turbine from Four Seasons Windpower in Medina County's Granger Township. He kept his cost lower than average by doing all the installation, except for the electrical work, with the help of

a friend.

The American Wind Energy Association says a small wind energy system, installed, costs \$3,000 to \$6,000 per kilowatt of generating capacity.

Doug Bloom of Four Seasons Windpower, however, said a typical, 10-kilowatt residential system would cost about \$105,000 if installed by his company. After incentives, the homeowner's cost would be \$30,000 to \$40,000, he said.

That's a hefty investment, but one that insulates the owner from increases in electricity rates, Bloom noted. "Energy independence is what you're paying for," he said.

Still, even proponents say wind energy isn't for everyone.

Besides available space, a number of factors go into determining whether a wind system makes sense for home use.

One of those factors is wind speed. The American Wind Energy Association generally recommends a site should have an average wind speed of at least 10 mph.

Although much of northern Ohio has favorable wind conditions, Spear said it's still necessary to study the conditions at any particular site. Speeds can vary greatly from place to place, she said.

In addition, the Wind Energy Association says that for wind power to make financial sense, the homeowner should be paying at least 10 cents per kilowatt hour for electricity.

Ohio Edison's electricity rate is about 11.5 cents per kilowatt hour for a

standard residential customer; American Electric Power's is 9.75 cents for its Ohio residential customers.

Zoning restrictions can also be a hurdle, although Spear said many local governments are adopting or discussing wind-turbine guidelines. Laws commonly require a "fall zone" -- clear distance to buildings or property lines -- that's at least 10 percent greater than the tower's height.

Bloom, however, insisted the danger of a turbine toppling is practically nonexistent.

He said his company builds a foundation strong enough that if the soil around the base of the tower were removed, the concrete would still keep the tower upright. Besides, "how many street lights and signs fall on vehicles?" he asked rhetorically. "I don't see any problem."

Manufacturers are addressing space limitations by developing turbines that spin around a vertical axis and produce less vibration than a horizontal-axis turbine, so they can be mounted atop buildings instead of towers. They're typically smaller than horizontal-axis wind generators and more suitable to urban and residential areas, Spear said, but they don't produce as much power.

Even with a vertical-axis wind turbine, however, it's important to make sure the structure on which it's mounted can stand up to the vibration, she said. She's looking into one for a project she's working on in Bay Village, she said, but she still needs to learn more.

Other issues include the possibility that horizontal-axis turbines can throw ice off their blades when it starts to melt, Spear said.

Concerns have also been raised about turbine blades striking birds and bats, but that doesn't appear to be a major problem with residential-size

turbines, said Keith Lott, a wind energy wildlife biologist with the Ohio Department of Natural Resources' Division of Wildlife. Their blades are smaller and rotate faster than those on commercial turbines, making them easier for wildlife to detect and avoid, he said.

He recommended homeowners choose a self-supporting, single-pole tower for a wind turbine. Such a tower doesn't have places for birds to roost or guy wires that birds can fly into, he explained.

Some people object to wind turbines for aesthetic reasons, Spear said. Towns said he got signatures of approval from all his neighbors before he installed his turbine.

So far, Towns said, he's had no problems with his system. The wind turbine's bearings will need to be checked about every five years, he said, but he doesn't anticipate other maintenance requirements. He expects the turbine to last 20 years.

Long before that, he said, he expects his energy savings will have paid off his investment.

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WIND-POWER RESOURCES

Want to know more about wind turbines? Here are some resources:

- The U. S. Department of Energy's Wind Powering America program, www.windpoweringamerica.gov . The site includes the publication "Small Wind Electric Systems: An Ohio Consumer's Guide."
- The American [Wind Energy](http://www.awea.org) Association, www.awea.org/smallwind or 202-383-2500.

If you're considering installing a wind turbine, installer Stefanie Spear recommended first making your home as energy-efficient as possible. Then have a feasibility study done to assess your electrical use, the amount of wind the site experiences and the expected rate of return on your investment.

She recommended hiring a consultant or installer to help you through the process, including identifying financial incentives that are available.

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