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AMERICA'S ALTERNATIVE ENERGY SOURCES

Bringing Wind Home

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Towering 125-foot wind turbines topped with enormous, spinning propellers hardly fit in most people's yards, but innovators are developing "tiny" grid-connected windmills that plug into the home's existing circuitry. At least nine American companies market wind turbines for individual property owners. For example, in Norman, Oklahoma, Bergey Windpower Co. uses airfoil technology in its BWC Excel model to make its turbine efficient in wind speeds as low as nine miles per hour, while Abundant Renewable Energy of Newberg, Oregon, sells two "micro" turbines, the ARE110 and the more powerful ARE442. In Flagstaff, Arizona, Southwest Windpower is racing to keep up with orders for its Skystream 3.7, especially after *Popular Science* named the Skystream one of the magazine's "Best of What's New" for the year and *Time Magazine* included the Skystream as one of the "Best Inventions 2006."

Interest in "tiny" turbines for home use has jumped, as more and more people discover micro wind turbines can make sense for them, especially if they live in a windy spot in California, Massachusetts, New York, New Jersey, Ohio, Wisconsin, and Pennsylvania where state subsidies can make up as much as half of the cost. Currently, the federal government does not offer subsidies for residential wind turbines, and residential turbines make up only a fraction of the wind power used in the U.S.

The American Wind Energy Association, an industry trade group in Washington, D.C., estimates that U.S. sales of small-wind systems totaled \$17 million in 2005, up 62% from 2004. The association also reports the leading U.S. small wind turbine suppliers project an average annual growth rate of 32% for the U.S. grid-connected market through 2020. Even with this good news and the tantalizing prospect of slicing your utility bill by capitalizing on the same wind that flings leaves across your front yard, a wind turbine is not for every property owner.

With the exception of the Skystream, which requires a minimum lot of half an acre, all the other wind turbines require a one-acre lot. City dwellers and those living in dense suburbs have to wait for further developments before they can harness the wind. Even the Skystream needs a tower at least 35 feet high and perhaps much more, depending on the height of the tallest object with a 500-foot radius. Then perhaps the most difficult part of all: homeowners wanting to install wind turbines must wade through a snarl of zoning regulations and neighbors, who might fear toppling towers, injured birds, lower property values, or the look or the sound of a spinning wind turbine .

Zoning requirements, the need for a steady wind, and a half-acre lot requirements still eliminates many would-be wind turbine owners, but Southwest's Skystream is opening the possibility of home-grown wind power to more people. The Skystream starts generating electricity with winds as low as 8 miles per hour, and, when the wind rises to 20 miles per hour, its wide, contoured 12-foot blades produce their peak output of 1.7 kilowatts of electricity. For most people, peak output can supply at least 30 percent and as much as 90 percent of their electrical needs.

Compared to other residential wind turbines that need about five days to install, the Skystream is almost "plug and play." Because it has few parts, it can be installed in a day. Wind turbines typically require stabilizing wires running from the tower to the ground to keep the structure steady and the turbines also need two or three electrical boxes to convert the energy harvested by the turbine into useable household power. The Skystream, though its tower must still be set in concrete, does not need stabilizing wires, and its converters are inside the turbines. Only four wires connect the turbine to the home's circuit breaker. Then, hum, hum, hum. Depending on household usage of electricity and the average wind speed of the location, it can generate at least 30 percent of the energy needed and often much more.

But Southwest Windpower did not start out making wind turbines for homeowners. In 1987, co-founders, David Calley and Andy Kruse saw a need for reliable, battery-charging wind generators for rural areas, so they modified a Ford alternator to develop a 300-watt wind generator. By June of 1994, they introduced their product and by November, they had shipped 18,000 wind turbines to 100 countries. In January 2002, Southwest introduced the first microprocessor based micro-wind turbine, the AIR wind turbines, now the best-selling small wind turbine in the world.

For the last two years, Southwest's growth has been fueled by investment from Altira, a Denver-based venture capital group interested in energy technology start-ups. Altira has invested nearly \$6 million in Southwest, allowing the company to increase staff, distribution, and to launch the Skystream last August. Scientists at the National Renewable Energy Laboratory in Golden, Co. helped with the development of the Skystream by helping to engineer and test the turbines, and this year Southwest expects to reach \$12 million in sales, 50 percent more than a year ago and much from the sales of Skystream.

Prices for the Skystream and all the new micro wind turbines are based on peak capacity, which is measured in how many kilowatts the turbine produces under optimal conditions. The Skystream, for example, has a capacity of 1.8 kilowatts and costs about \$10,000 fully installed. In comparison, Abundant Renewable Energy's 10-kilowatt ARE442 can cost as much as \$80,000 when installed on the highest tower the company offers, but this turbine can produce more than

five times the electricity of the Skystream. The higher the turbine's kilowatt capacity, the more electricity it can produce, with 10 kilowatts considered the largest capacity necessary for residential use. .

All the home-sized wind turbines work like the big ones, collecting energy from the wind and converting it into electricity. Usually, the house is still connected to the local power network and the wind turbine supplements the power from the grid. Since most utilities give customers credit for producing excess power, some homeowners generate more electricity than needed and sell the excess to the utility company. Imagine the pleasure of seeing the electric meter spin backwards!

Sources

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