

WINDLETTER

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SMALL TURBINE COLUMN:

Home-built wind generators

--Mick Sagrillo, Sagrillo Power & Light

A spinning wind generator has an enormous amount of emotional eye appeal, similar to watching waves on a beach, or a campfire. People are mesmerized by the motion, and infatuated by the thought that that motion can produce something useful--electricity. Invariably, thoughts come around to, "I can build one of those!"

My initial response whenever questioned about what's involved in building a wind generator is, "Don't go there!" I began tinkering with renewable energy in 1973, as a result of the first oil embargo. The journey took me through almost all of the renewable energy technologies: solar air collectors, solar water heaters, passive solar structures, water pumping windmills, small-scale hydroelectric systems, photovoltaics (PV), and, of course, wind electric systems. Without question, the most difficult renewable resource to master (including, I think, casting your own PV cells) is wind electric systems. Never one to give up on a challenge, I've been seriously involved in the field of wind power for over two and a half decades.

There are smart people who have spent years trying to perfect their wind generator designs, only to have them fail in the marketplace due to overly ambitious performance claims and insufficient engineering. There are dozens of patents on the books for all sorts of "whiz-bang" wind devices that never made it beyond paper and ink. Small wind generator manufacturing companies doing business in the U.S. today, including imported machines, don't even number in the double digits. That's why I chuckle when someone thinks he can build his own wind generator.

But, like myself, some people just can't be persuaded to try something easier, like designing their own car. This isn't to besmirch the successful manufacturers selling their creations. Far from it! They have succeeded where hundreds of others have failed. So, it can be done. (Henry Ford did begin his business in a garage, so anything is possible.) In fact, trying to design and build your own wind generator can be an incredible – albeit complex and time-consuming – learning experience, taking you from mathematics and physics to fluid dynamics, material sciences, and dynamics engineering. There is no better "science project" to test one's problem-solving ability than trying to build a wind generator. In fact, for those involved with high school and junior high school students, building a wind generator can become a multidisciplinary endeavor for a group of students.

Good resources available to the do-it-yourselfer are rather limited, but there are some. The best available “plans” for do-it-yourself wind generator information include:

- *Windpower Workshop*, written by Hugh Piggott, Centre for Alternative Technology Publications, 1997; ISBN 1-898049-13-0. While not exactly a cookbook that will give you step-by-step directions on how to build a wind turbine, Hugh does take you through the design parameters required to build your own several hundred-watt wind generator, from carving the blades, to designing an alternator out of an automotive brake drum, to designing the governing system. The skill level to build one of Hugh's designs is rather high, including metal fabrication, welding, machining tool work, and woodworking. Hugh's book is available from the Midwest Renewable Energy Association, at info@the-mrea.org , or Steve Pendergrast's Web site (listed below).
- Hugh Piggott also hosts a Web site, at <http://www.scoraigwind.com> , with tips and information from his book, much of it quite expanded, as well as more up-to-date information on design and construction of wind turbines. Hugh's Web site is a very well done source of excellent information.
- Another Web site dedicated to do-it-yourself wind turbines is at <http://www.otherpower.com> . Touted as “the blunt edge of low technology,” its genesis was a Hugh Piggott-designed wind turbine. These guys started life taking Hugh’s workshop, and expanded greatly from there. This site has detailed step-by-step directions with accompanying photographs on how to build a 17-foot diameter, 3-kW wind turbine, from the blades to the alternator. Like Hugh’s design, these designs take a great deal of skill and patience. This site also offers permanent magnets and other hard to find components to build the alternator. It’s an outstanding source of high quality do-it-yourself information including a discussion board with input from other builders.
- Steve Pendergrast's Web site, at <http://www.picoturbine.com> hosts some more excellent information for do-it-yourselfers. Steve has plans for several small vertical-axis wind generators that can be built by unskilled, school-age children and high schoolers. Unlike Hugh's or the “other power” wind turbines, which can actually be installed on a tower and function well for years if properly constructed, Steve's designs are meant to educate. And while Steve's wind generators are not very durable, they will actually generate electricity. In addition to the downloadable plans, Steve sells the hard-to-find components that are required to build his wind turbines, including ceramic magnets and copper magnet wire.

Two years ago, I taught a wind installation workshop on Guemas Island in Washington. The students installed a wind turbine on that was built during another workshop in April 2005, taught by Hugh Piggott. The turbine has an eight-foot rotor diameter, and is rated at 500-watts. However, it often peaks at 1000 watts and above. While, to the critical eye, the turbine “looks crude” by the standards of a manufactured product, it is very heavy-duty and quite robust, an impressive piece, indeed. I have no doubts that it will supply the owners with decades of wind-generated electricity. It can be done!

Good luck with your project!

[Editors Note: The opinions expressed in this column are those of the author and may not reflect those of AWEA staff or board.]