

Vertical-Axis Wind Generators

I am confused. As a sustainable building developer and a longtime supporter of renewable energy, I applaud you for being a reliable source of information for laypeople. But I was surprised not to find a single vertical-axis generator listed in your article on "How to Buy a Wind-Electric System" (HP122). I also could not find any information on them in the usual wind-power reference books.

With most of my work centered in highly developed urban areas, I am limited in my use of horizontal-axis machines. Gaining acceptance of towers in the viewshed, dealing with turbulence caused by surrounding structures, and finding available space to put individual towers is a struggle. I am familiar with the limitations of old vertical-axis machine designs, but there are many new designs available. Increased airspeed due to rooftop effects should be advantageous in urban settings. The facts that these units can capture wind from any direction, pose less danger to birds, have lower mounting heights, and can be directly mounted on buildings effectively eliminate most of the arguments against using wind power in cities.

Is there something that I am missing about vertical-axis generators that makes them unacceptable for your publication or unsuitable for renewable energy generation?

Jeffrey Marlow • Huntingtown, Maryland

You are not the only one confused. And you are correct that not a single vertical-axis turbine was reviewed in "How to Buy a Wind-Electric System," for very good reasons.

Both vertical-axis and horizontal-axis turbine designs were invented in the late 1920s, following the successful development of water-pumping windmills. Designers fiddled with several possible configurations in an attempt to extract more energy out of the wind for generating electricity. While there were many vertical axis configurations proposed, these could not compete with the efficiency, reliability, and economy of materials (and therefore labor) that came from the horizontal-axis turbines of the day.

During the late 1970s and 1980s, the U.S. Department of Energy funded lots of experimental wind turbine technologies, some of which were vertical-axis machines. Again, when it came down to cost of electricity as a result of efficiency, reliability, and economy of materials, verticals could not compete with horizontals. It all boils down to the marketplace—what works and what does not.

You bring up several other misunderstandings about vertical-axis machines that are prevalent in the public mind—that no tower is necessary and that vertical-axis turbines can be roof-mounted. Although these innovative clichés are all geared to make verticals seem like they are a breakthrough technology, these ideas ignore two major criteria of physics. First is that the friction near the Earth's surface between moving air masses and the ground significantly reduces wind speed—the quantity of the fuel that powers wind turbines. There is a reason that commercial wind turbines are mounted atop very tall towers, and it is not because wind farm operators do not want to kill the cows in the surrounding fields. Atop tall towers is where the fuel is. Second is that significant turbulence is created by buildings, trees, and the clutter that we humans put in our landscapes, compromising the quality of the wind. All the claims to the contrary made by vertical proponents are simply nonsense, as they ignore all we know about fluid dynamics and airflow.



Courtesy Tammy Blyngelson

Horizontal-axis: still the state of the art.

Other claims are simply unsubstantiated or take advantage of the public's lack of knowledge on the subject. For example:

- Bird friendly. Where is the data that vertical-axis machines pose less danger to birds than small horizontal-axis machines?
- Can take wind from any direction. A horizontal-axis turbine can receive wind from any direction too. But turbulence is turbulence, which degrades the wind resource, regardless of the blade orientation.
- Endorsed by such-and-such celebrity. Do we even need to go there? Seek feedback from experienced wind energy users, installers, and consultants, not from those with money and celebrity status as their main qualifications.

When you're choosing a wind turbine, the most important information you'll need to know is how many kilowatt-hours the turbine will generate at a certain wind speed. That one piece of critical information was missing from all the vertical-axis turbine Web sites I researched. If this critical data is not available for a particular machine, rule it out, regardless of configuration. The bottom line: If turbine designers do not provide this most important information, *Home Power* will not include them in future wind turbine guides. It's not about spinning; it's about generating renewable electricity.

Mick Sagrillo, Sagrillo Power & Light • Forestville, Wisconsin

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or, Ask the Experts
Home Power, PO Box 520, Ashland, OR 97520

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