

VAWTs & HAWTs

As a wind industry consultant, I get a lot of mail from folks with wind generator ideas. At least weekly, someone asks if I can give feedback on a design. More often than not, these are vertical-axis wind turbine (VAWT) schemes.

VAWTs come in a variety of configurations. The simplest homebrew Savonius models use a 55-gallon drum split in half vertically, with the two halves offset. Darrieus turbines, which look like giant eggbeaters, have shown up on experimental wind farms. But these machines are rare compared to common, tried-and-true horizontal-axis wind turbines (HAWTs).

VAWTs suffer from several technical challenges:

- Half of the swept area works against the wind
- Difficulty with start-up, shut-down, vibration, and fatigue
- Challenges with mounting on towers

For these reasons and others, many wind experts conclude that VAWTs will never be able to be as efficient or cost-effective as HAWTs. But perhaps more devastating to any possible success for these designs are the misconceptions and hype that surround them. The rhetoric includes common mythical comparisons to HAWTs, such as they:

- Don't need tall towers to produce significant energy
- Can be effectively mounted on buildings or on the ground
- Are better because they "take wind from any direction"
- Are better in low wind speeds
- Are better in turbulent winds

When examined in the light of physics and real-world experience, all of these ideas are substantially false.

VAWTs actually predate HAWTs, and mechanical vertical-axis "wind machines" apparently existed more than 2,000 years ago. If VAWTs were the magic that their promoters suggest, I suspect that we would have seen success in the marketplace before now. The market is a great winnower of technology and can tell us what has promise. In the long run, people buy things that serve their needs—in this case, machines that actually generate useful amounts of energy over the long haul.

Almost all of the turbines you'll find in productive, working systems are horizontal-axis. This is not because VAWTs have been suppressed, or that there's a conspiracy against them. It's because *HAWTs work better!* Decades of wind turbine design and experience show that HAWTs outperform VAWTs in energy production and reliability—as well as profitability for the manufacturers and installers.

Does a VAWT offer any advantages? I've been asking myself this question for many years. So far, the only true advantage I can see is aesthetics—some people like how these machines look. And aesthetics are important to most people. However, if aesthetics are the only true "advantage" of VAWTs, let's not put much emphasis on it. Or, we could remove the generator, make ourselves a "spiny thing" to entertain our aesthetic senses, and save a lot of money and avoid disappointment. Underperforming VAWTs (as with underperforming anythings) distract us from products that actually deliver.

Perhaps some day we'll see a successful VAWT in the marketplace for more than a matter of years. Perhaps we'll see one that is durable and productive (though I don't expect a breakthrough, or an improvement over HAWTs). I remain open to this possibility, but remain guarded about the claims. *Caveat emptor.*

There's an easy test for whether a wind generator is worth buying or not. Find a system that has been installed for more than a year and get energy production numbers. Typically, when we ask VAWT salespeople for this info, they go scurrying to find a more gullible customer. But if you are trying to buy a machine to produce energy for you, it makes sense to verify how much energy it actually produces.

—Ian Woofenden



Courtesy Kestrel Wind Turbines



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For more on the drawbacks and realities of VAWTs, see "Thoughts on VAWTs" (HP104) and "Ask the Experts" (HP124) online at www.homepower.com/webextras.

