New Whirlwind-Attracting Bladeless Micro Wind Turbine Gets Harvard Cred

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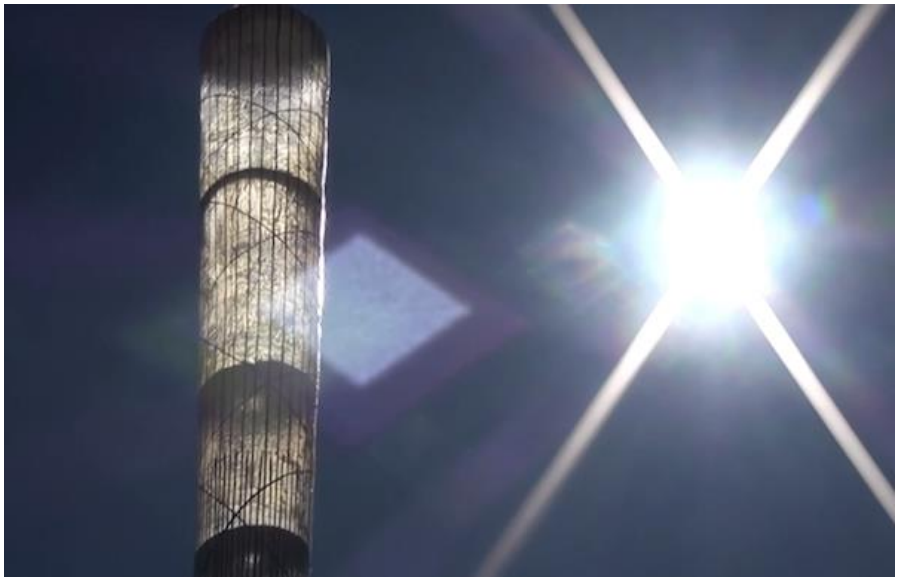

Image Credit (top, screenshot): Courtesy of Vortex Bladeless.

Tina Casey

We've covered vertical wind turbines before, but this one has them all beat. The startup Vortex Bladeless is developing a — you guessed it — bladeless micro wind turbine shaped like a super-long popsicle stick only rounder, like an ice cream cone without any ice cream. From a distance it looks like a pole stuck in the ground, so at first glance you might thing that there isn't anything there.

However, the technology does generate electricity, and it has attracted interest from Harvard University as well as SunEdison's TerraForm Power renewable energy unit and Dat Venture, a startup incubator recently launched by the IT consulting firm Efron Group, so you're probably going to start hearing more about Vortex Bladeless sooner rather than later.

The Vortex Bladeless Micro Wind Turbine

Vortex Bladeless relies on an aerodynamic phenomenon called vorticity, in which wind flowing around a structure creates a pattern of small vortices or whirlwinds. No problema as long as they are relatively small.

The parallel effect in fluid dynamics is called the Kármán vortex street (or sheet) effect, referring to the pattern of eddies that forms when a fluid goes around a body or structure.

Translated into aerodynamics, once the mini-whirlwinds get large enough, they can cause a structure to oscillate, and if you could capture the mechanical energy of that movement, there's your electricity.

Vorticity can be incredibly powerful, and you can get a dramatic example from the notorious Tacoma Narrows Bridge, which was hit by strong winds and began wriggling like a rubber band before collapsing into the Tacoma Narrows, just a few months after it opened back in 1940:

Click here to watch "Tacoma Narrows Bridge Collapse "Gallopin' Gertie"": https://youtu.be/j-zczJXSxnw

When you apply the principle to a vertical micro wind turbine, what you start with is a pole-like structure without blades or other moving parts.

That sounds simple enough, except that the individual structure will only oscillate at particular frequencies. The trick is to get more bang out of each turbine by broadening the range of frequencies.

The folks at Vortex Bladeless have addressed the problem by developing a "magnetic coupling system" that takes advantage of different oscillation amplitudes:

…when wind intensifies, the magnetic force of repulsion goes up, which reduces the distance between the rod and the magnet. As a result, the oscillation and the potential of generated energy increases to the maximum. With that, Vortex can automatically vary rigidity and "synchronize " with the incoming wind speed, in order to stay in resonance without any mechanical or manual interference.

Here's a video from Vortex Bladeless that explains the whole thing:

Click here to watch "Vortex Bladeless aerogenerador, Energías Renovables 2015 (outdated)": https://youtu.be/2_5K4kmnsL4

The icing on the cake, claims Vortex Bladeless, is a design that chops the manufacturing and maintenance costs of conventional wind turbines in half.

The Way Forward For Micro Wind Turbines

We've had some lively conversations about micro wind turbines over here at *CleanTechnica* and on our sister site *Planetsave*. The main point of contention is the cost effectiveness of micro wind turbines, variously defined as less than one megawatt or less than five megawatts per turbine. Vortex Bladeless falls into the smaller of the two categories, with an initial product line of two models, a 1-megawatt Gran and a 4-kilowatt Mini.

However, we've been noticing that at least in some market sectors, a relatively high cost per kilowatt-hour is not necessarily a deal breaker.

In the tourism sector, France's Eiffel Tower is a standout example. One of the most popular tourist destinations in the world, this iconic paean to technology recently got a full on green makeover, including a pair of high visibility vertical micro wind turbines embedded in the tower itself.

In the US, the professional sports market is an early adopter. We can think of at least two football teams that play in stadiums rimmed with micro wind turbines, the Philadelphia Eagles and the Buffalo Bills.

Representing the US commercial sector is Ford, which has been tricking out some of its dealerships with EV charging stations powered by sail-type micro wind turbines integrated with a solar array. General Electric is another US company dipping into the micro wind/EV charging market.

So at least in terms of visibility and green branding, there seems to be a growing appreciation for micro wind turbines.

The US Energy Department also foresees additional value in terms of a more resilient, distributed energy generation profile, with potential growth in agriculture as well as the commercial and residential markets.

Last year, the agency launched a modestly funded ($1.3 million) but far-reaching micro wind turbine initiative, aimed at the 5-to-250-kilowatt end of the market.

As for how Vortex Bladeless could fit into all of this, the turbine's ultra-slim silhouette could enable it to fit into all sorts of tight spaces where larger turbines can't, with additional brownie points if it generates little or no noise along with electricity.