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SMALL TURBINE COLUMN:

An Open Letter:

To inventors of vertical axis wind turbines and rooftop wind 'technology breakthroughs'

--Mick Sagrillo, Sagrillo Power & Light

Dear wind turbine inventors:

(This is a blunt analysis of some of the new wind "inventions" that continuously pop up on the internet, touting outlandish claims about "breakthrough wind technologies." The focus of this column is not legitimate manufacturers or engineers working on new designs, but rather the people who are either intentionally trying to scam the unsuspecting and ill-informed buyer out of their money, or those who really have no idea what they are doing and have no business trying to sell their designs or products. Aside from the few who invest and lose their money on such "inventions", these websites only confuse the public and make them skeptical of legitimate wind turbines and manufacturers. If you are easily offended, do not read on.)

Hardly a week goes by without at least one person calling me for my thoughts about the latest wind turbine innovation. Without exception, the latest and greatest is found on a new Web site featuring either a roof-mounted or a vertical-axis wind turbine, or some permutation of the two. A typical press release might look like the following:

The claims

The Fantasy Wind Company recently unveiled their revolutionary new vertical axis wind turbine design specifically for rooftops, the *Windy 1*. Heralded as a "technological breakthrough" by celebrity George Clueless, the *Windy 1* is a radical departure from the more traditional three-bladed wind generators now available on the market. Unique cutting-edge features include:

- vertical axis turbines, unlike conventional wind turbines, can take wind from any direction;
- no tower is required as with traditional wind generators, allowing for ease of maintenance;
- designed to operate much closer to the ground than prop turbines do;

- small, low profile of only 3 by 4 feet, so you can mount it on the roof of your house, making it the perfect “urban turbine”;
- improved aerodynamic performance over traditional wind turbines—our tests show it to achieve 45%-48% efficiencies, making it superior to prop turbines;
- bird and bat friendly;
- you no longer have to be fearful about ice throws, as with traditional three-bladed turbines;
- it will not interfere with telecommunications equipment or aircraft navigation;
- energy efficient;
- has excellent cost-saving features;
- patents applied for; and
- investment opportunities (or dealerships or distributorships) available on this exciting new technology.

Click [HERE](#) to view our gallery of installations and applications, including a video of the *Wind 1* in operation.

Hmmm...

While the above is a mosaic pieced together from about a dozen different Web sites, it is interesting that the claims from Web site to Web site bear a remarkable similarity to one another. Is it possible that all of your companies use the same copy editor?

Clicking [THERE](#) takes the Web viewer to a photo album of computer simulated installations. There are few, if any, photographs of actual installations. A check of the computer simulations inevitably show that this “breakthrough technology” is just another iteration of a Savonius or Darrieus rotor, or worse, a “roof-top salad spinner” concept that does not yet exist, or will not perform as claimed.

If prospective buyers inquire about where to go to actually see one of these wonders, they are invariably informed that your “test” facility is in some faraway place with no communication access: Bayan Olgii, Mongolia or Wattenoom, Australia.

The analysis

Why does anyone with any credibility at all in the small wind turbine industry just roll their eyes with each new pronouncement? A conspiracy by the conventional wind turbine manufacturers to exclude threatening vertical-axis innovations and competition perhaps? I think not. Let’s look at the claims made by the Web sites.

- **“Can take wind from any direction.”** So does any conventional wind turbine. The only difference from a conventional turbine is possibly the addition of a tail on an upwind horizontal axis turbine.
- **“No tower required” and “designed to operate much closer to the ground than prop turbines do.”** Please learn something about fluid dynamics, that branch of physics covering air flow over things like trees and buildings. The last time I checked, no one on planet Earth was exempt from the laws of physics. Maybe your design doesn’t incorporate a tower, but you are not going to generate usable amounts of electricity without one. Hint: manufacturers of horizontal-axis wind turbines do not

put their turbines on towers because they are concerned about killing cows in the field in which the turbine is sited.

- **“Allowing for ease of maintenance on the generator.”** Generators and alternators are the most reliable part of any wind system. The components that need attention are usually the blades, rotor bearings, and governing device, all of which become more difficult to access with many vertical axis designs than their horizontal-axis counterparts.
- **“Small rotor profile.”** The rotor is the “collector” of any wind turbine design. In a solar system, if you want to double the amount of energy “collected” you double the size of the collector. The same holds true for wind. Fact: the amount of energy extracted from the wind is more dependent on the size of the rotor--that is, the collector--than any other part of the wind turbine.
- **“Mounts on your roof.”** Have any proponents of such a practice ever performed an engineering analysis on a given roof to determine if the structure can sustain such loads? If not, prospective purchasers might want to check in with the home owners insurance company to see if it will honor the inevitable claim for damages once they occur.
- **“Urban turbine.”** This is, by far, one of the most clever clichés about wind conjured up in decades. The only problem is the lack of a suitable wind resource in urban and suburban areas, followed closely by the unpredictability of the wind due to the turbulence created by the extensive and complex ground clutter.
- **“Improved aerodynamic performance.”** Most claims tout unachievable performance by any wind technology, irrespective of blade orientation, based on the laws of physics that the rest of the planet is bound by. In addition, there is no information offered to back up these claims—who did the testing?
- **“Bat and bird friendly.”** The implication is that small horizontal axis turbines are bat and bird hostile. Where is the data substantiating either the claim or the implication?
- **“No ice throws.”** Fact: small-wind horizontal axis technology cannot throw ice either.
- **“Will not interfere with telecommunications.”** Again, the implication is that horizontal axis technology does interfere with telecommunications. Fact: one of the largest niche markets for small wind turbines is powering telecommunications, particularly at remote sites. They would not be used if they caused interference.
- **“Or aircraft navigation.”** Is there any evidence that any small turbine, regardless of blade orientation, interferes with aircraft navigation?
- **“Energy efficient.”** This is an energy *generator*, not an energy-consuming appliance. Energy efficiency does not apply.
- **“Excellent cost saving features.”** Such as no tower? Although most people do not realize it, what they should be interested in is not up-front cost, but life-cycle cost of energy generated over the life of the system. Cutting out, for example, the tower, means that the amount of electricity generated, along with the economics, plummets.
- **“Investment opportunities available.”** Quite often, this is associated with the prompt to “get in while you can, on the ground floor.” We may, at this point, be getting down to the real purpose of the Web site. Hint: legitimate wind turbine manufacturers do not sell dealerships or distributorships.
- **“Patents applied for.”** If every wind turbine with a patent were available on the market today, we’d be awash in such “innovations” as giant revolving castanets, opening and closing based on their orientation to the wind and merrily clapping away

in the breeze like happy clams. Fact: a patent is only a legal protection for an idea that no one else has yet patented. Holding a patent does not mean that your invention will actually generate electricity, which, after all, I assume is the purpose of the “invention.”

More analysis

Speaking of generating electricity, your Web sites are universally bereft of any annual energy output data. I’m not talking about a power curve, as that tells you nothing. Give me real data as to what the “revolutionary technology” will actually generate in kilowatt-hours over a period of time—say, a month or year—at a given average wind speed. This omission has always perplexed me, because performance is, after all, the only measure (along with reliability) of the viability of the wind turbine. If it spins but doesn’t generate any usable electricity, then why should I buy it? If all I want is to see something spin, I can certainly buy a whirligig or ornamental windmill for a lot less money than some “technological breakthrough.”

And while they inevitably lack actual performance data, the Web sites often highlight the size of the alternator or generator on the wind turbine. This is a relatively meaningless number, akin to touting the size of the gas tank on the car I’m interested in buying. Both are capacities, nothing more. Generator size has little relevance as to how much electricity the device will generate over time.

Another highlight of most of the Web sites is a video clip of the device spinning. I’m not interested in spending time downloading a 5 GB file of a spinning whirligig—it conveys no useful information.

Most Web sites feature a portfolio of computer simulations of installations or possible applications. Computer simulations indicate to me that the inventor or manufacturer does not have a bona fide product, or real installations at actual locations—always a red flag.

Finally, the Web sites universally include news clips or media pieces on the “breakthrough.” These are invariably gleaned from press releases supplied by none other than the designer or manufacturer of the turbine, who coincidentally happens to be the feature of the media coverage. Unfortunately, the popular press has never been noted for peer-review or accuracy in reporting. The media will print just about anything, even self-proclaimed technology breakthroughs.

The most unfortunate thing about the popular press is its gullible readership, people continuously taken in by outlandish or unsubstantiated claims in the hopes of gaining an inexpensive and painless technological fix, a magic bullet, for their high electric bills. It’s not by accident that the Web sites feature such media coverage. It is well known that “media buzz” gets exposure and results in telephone calls or hits on a Web site. The hype is perpetuated by the hope of selling something, anything, or attracting investment dollars.

Inventors, please don’t take this somewhat-cynical analysis negatively. It’s just that most all of these “breakthroughs” and Web sites appear to be carbon copies of one another, each parroting others’ claims: different layout, same unsubstantiated mythology and clichés, and all with a plethora of hype but a dearth of supporting data. That said, you may indeed have

something, but you have to do your homework, which includes providing legitimate information, not just unsubstantiated claims.

Recommendations

Interestingly, not one of these fantasy turbines is funded by any state public benefits or renewable energy program. So, inventors, if you want to be taken seriously, here's what you need to do:

- Take a physics course followed by a fluid dynamics course before heading out to the “inventor's” laboratory or making outlandish claims. Learn something about airfoils and their orientation, how the wind flows, how turbulence works against you, and how to properly site a wind turbine so that it actually generates electricity.
- If you cannot participate in such a course, at least buy Paul Gipe's book, *Wind Power—Renewable Energy for Home, Farm, and Business*. Then read it with a highlighter in your hand.
- Learn something about the history of vertical and horizontal wind technology, both of which have been around since the 1920s. Research why we see one configuration but not the other as commercially viable products. Hint: it's about what wind turbines work reliably over years of operation and actually generate cost effective electricity, not blade configuration.
- Figure out how to site your turbine so that it will not only spin but actually generate usable electricity. Sorry, but this will invariably involve the use of a tower. A different blade orientation or configuration does not exempt you from the laws of physics or sound siting principles.
- Quit trying to make your technology breakthrough look superior to conventional wind turbines by repeating anti-wind rhetoric and myths. Parroting unsubstantiated innuendo that horizontal-axis small wind turbines kill birds, throw ice, or set up vibrations in the ground, all in an attempt to make your invention shine over proven designs, is counterproductive and only succeeds in confusing the public while giving ammunition to opponents of wind.
- Quit hyping your invention to get media buzz with terms and phrasing such as, “bird friendly,” “wind from any direction,” “urban turbine,” and so on and so on.
- Don't bother with celebrity endorsements. Celebrities did not achieve that status based on their technical credentials or analytical skills. The renewable industry is not impressed.
- Don't send any more video clips of “spinning.” Hint: it's about generating. Spinning tells us nothing.
- Quit making dubious claims about breakthrough technology without substantial documentation to back it up, the same requirement we put on other wind turbine manufacturers. If you really want credibility, have an independent agency, university, or engineering firm test your device and share the results, including performance data.
- Accordingly, please give us field collected performance data, electrical production numbers, and annual or monthly energy output as a function of average wind speed. Don't bother with a power curve. Remember, it's about generating renewable electricity.
- AWEA is working with the Interstate Renewable Energy Council (IREC) to develop the Small Wind Certification Council (SWCC). The SWCC will certify the

performance of small wind turbines, holding them to very high standards. Certification means that you have a real product that actually does what you claim it will do. Such a standard will help the buying public enormously by separating companies with equipment that works from what is seen as “bozos and shysters,” or dreamers bucking the hard reality of physics with their fantasy wind turbines. If you are serious about selling your turbine on the market, then find out what the SWCC performance standards are, and test to them.

If you cannot do the above, you will always be viewed as either clueless or hiding something, or dismissed as not having a viable product.

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Editor’s note: The opinions expressed in this column are the author’s and may not reflect those of AWEA’s staff or board.