DISTRIBUTED WIND ENERGY ASSOCIATION

our Wind our Power our Future

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August 20, 2012

RE: Requesting Wind Turbine Qualification Criteria for On-Site Renewable Energy Scoring

Dear Chris and Brendan,

My name is Mike Bergey. I am president of a 35 year old small wind turbine manufacturer, Bergey Windpower, and president of the Distributed Wind Energy Association (DWEA). DWEA (see www.distriibutedwind.org) is a national trade association representing the companies involved in on-site, behind the meter, wind generation, be it with a 2 kW turbine at a school or a 1.5 MW turbine at a brewery. DWEA has over 100 members, including all of the major manufacturers of small wind turbines and a great many distributors, dealers, and installers.

I am writing because DWEA believes the current lack of turbine certification and siting criteria under the various LEED rating systems is hurting the distributed wind industry and is counter-productive to the intent of LEED. We are requesting that USGBC add criteria that will ensure that the LEED points earned for on-site wind turbines will encourage safe and effective products and proper siting.

The small wind market, I am sorry to say, has attracted dozens of technically incompetent companies and outright hustlers over the years that have hawked substandard products with exaggerated performance claims and a plethora of unsubstantiated benefits. Current examples are the DyoCore SolAir, whose 1.6 kW rating calculates to an efficiency of 275%, the Sauer Energy 1.5 kW WindCharger, whose power curve calculates to an efficiency range of 134 – 429%, and the Windtronics/Honeywell WT6500 which Consumers Reports recently found produced less than 0.3%[1] of its projected performance over a 15 month trial. The maximum theoretical efficiency for a wind turbine (before accounting for generator, inverter, and wiring losses) is 59.3% (Betz Limit) and most

[1] Recouping cost of wind turbine may take more than a lifetime, ConsumerReports.org, August 6, http://news.consumerreports.org/home/2012/08/results-of-consumer-reports-wind-turbine-tests.html

mainstream small wind turbines have peak efficiencies in the range of 25-35%. All three of these products are marketed specifically for mounting on the roofs of buildings.

Many of the under-engineered and over-hyped small wind turbines are vertical-axis wind turbines (VAWT's), which are often claimed, without substantiation, to be "bird friendly", "turbulence tolerant", and able to "operate effectively without tall towers". Another common configuration is a ducted fan, with similar unsubstantiated attributes. All target roof-mounting and extremely short towers. What little actual field data that is available shows they perform abysmally.

But many architects and their customers like the looks and the idea of VAWT's, roof mounting, and short towers and they can find abundant claims on the internet aimed squarely at those desires. The result has been hundreds of ineffective, failed high-visibility wind projects on LEED certified buildings. It has been tremendously damaging to the mainstream small wind industry and we don't think it reflects well on the integrity of the LEED certifications.

DWEA appreciates that USGBC values on-site renewable generation over "green power". We believe that on-site small wind turbines can serve as icons of stewardship, as well as directly reducing the environmental footprint of a green building. But there are currently no wind energy equipment qualification criteria in the EA On-Site Renewable Energy awards. We are requesting that you add criteria for the turbines and for their siting.

For the turbines there is now a recognized certification standard, AWEA 9.1-2009, for turbines up to ~ 60 kW and there are consensus qualification criteria for larger systems based on the IEC 61400 series of wind turbine standards. I have attached a policy recommendation that DWEA has made to the IRS for similar qualification criteria for the federal Investment Tax Credit (ITC). These are the turbine qualification criteria we recommend for LEED points. These criteria, at least for the turbines up to ~ 60 kW, have now been adopted by the incentive programs in New York, New Jersey, California, Oregon, Nevada, Wisconsin, Maryland, and Vermont.

As an alternative, USGBC could require that turbines be listed by the Interstate Technical Advisory Council (ITAC) of the Clean Energy States Alliance (CESA). ITAC (see http://www.cleanenergystates.org/projects/ITAC/) was established by states with major distributed wind energy incentive programs to police eligibility in the state programs to reduce waste, fraud, and abuse by hucksters. They have established a "unified list" of eligible turbines and many of the previously mentioned states are now limiting participation to turbines on the ITAC list. ITAC takes a more holistic approach than just certification because they also monitor service history, after-sales support by the manufacturer and solicit customer feedback.

In addition to using a quality wind turbine, a successful and effective wind turbine implementation requires proper siting. As outlined in the attached DWEA one-pager on Tower Height, a wind turbine

must be installed such that it has adequate exposure to the wind and is not placed in a sheltered or highly turbulent environment. Any claims that a certain technology, such as VAWT's, reduces or eliminates these fundamental rules are misinformation by unknowledgeable or fraudulent purveyors. The physics and aerodynamics are immutable. There is now a considerable body of scientific[2] and antidotal[3] evidence that roof-tops are inappropriate places for wind turbines and short towers result in huge reductions in performance. Bad wind turbine siting is analogous to putting a solar system in the shade.

DWEA recommends that USGBC discourage building mounted wind turbines and require installations comply with industry best practices, as outlined in the DWEA one-pager:

> "… the industry guidance on minimum tower height, to the lowest extension of the rotor, is 60 ft., assuming no obstacles, or at least 30 ft above any obstacles within 500 ft."

If a turbine is installed on a building this guidance will give it the best chance of operating safely and effectively. However, we find very few building mounted wind turbines are mounted high enough to meet these guidelines.

We believe instituting turbine qualification and siting requirements will enhance the value of LEED certifications where on-site wind is employed and reduce support of the bad actors in our industry. DWEA stands ready to meet with you and to provide whatever technical support the USGBC might need.

We look forward to working with you.

Best Regards,

Michael J. Bergey

Mike Bergey
DWEA President

[2] Warwick Wind Trials Project Final Report, Encraft, UK, 2009, http://www.warwickwindtrials.org.uk/resources/Warwick+Wind+Trials+Final+Report+.pdf (7.5MB)
[3] See Rooftop & Urban Wind section at http://www.wind-works.org/articles/small_turbines.html

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Policy Recommendation

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Proposal to Establish Quality Standards for Small Wind Turbines

Current Situation

- The Internal Revenue Code allows purchasers of small wind systems (up to 100 kW) to receive an investment tax credit (ITC) for up to 30 percent the cost of systems installed before December 31, 2016.

- Other than granting this credit only to new equipment ("first placed in service"), there are no quality assurance or certification requirements on qualifying equipment. The current language in section 104 of H.R.1424 Emergency Economic Stabilization Act of 2008 defines a 'qualifying small wind turbine' as a wind turbine which has a nameplate capacity of not more than 100 kilowatts." \
- The federal tax credit, now in its third year, has been effective in stimulating the installation of thousands of small wind turbines at homes, farms and small businesses, creating thousands of jobs. Over 80% of the turbines installed in 2010 were built in America. But, this success has also attracted opportunists that have only short-term interests.

- There are abuses occurring that are causing damage to the legitimate small wind industry and defrauding taxpayers:

1. Small wind turbines with physically impossible performance claims are being sold to the public with the assistance of the federal tax credit. Current examples include:

    - **Opportunist A:** Offered a 1.6 kW residential turbine with a claimed performance rating that is 4.5 times the maximum theoretical efficiency of a wind turbine. In proceedings before the California Energy Commission (CEC) this company admitted that it submitted inaccurate performance data that led to a $4,800 rebate on a $1,800 product. The CEC had to stop their small wind program for 9 months while it sorted out how to handle the $52M in rebate requests stemming from this scam.
    - **Opportunist B:** Offers a 2 kW residential turbine with a claimed performance rating that is 2 times the maximum theoretical efficiency. This penny stock company tested their turbine in a wind tunnel in a manner that highly distorts the results.
    - **Opportunist C:** Offers a 200 kW commercial wind turbine with a claimed performance rating that is 25 times the maximum theoretical efficiency.

2. Small wind turbines that received federal tax credits in the 1980's and that have been in service for over 20 years are being "rebuilt" and sold as qualifying for the federal ITC (under the 20% used components rule for depreciation and ARRA qualification). Prime examples are 100 kW U.S. Windpower 56-100 wind turbines that are being removed from prime wind resource land in Altamont

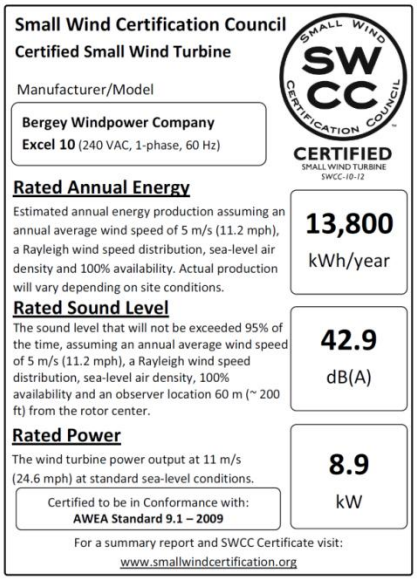
Pass as projects are being repowered with larger turbines. There are ~ 4,000 of these turbines being removed. Thousands of other machines in other projects are also being replaced with larger wind turbines. These older units are "rebuilt" and sold as qualifying for the 30% ITC. The owners of these turbines received a 25% federal tax credit in the 1980's, depreciated them as 5-year ACRS property, received a California state tax credit, and received a mandated power purchase agreement with PG&E. The "rebuilt" units are being sold at substantial discounts compared to new equipment. There are no standards for "rebuilding" and the operational experience with "rebuilt" ex-windfarm turbines has been poor.

- The small wind industry, consumers, and taxpayers continue to be hurt by these opportunists. There needs to be a quality assurance requirement to the ITC eligibility that will prevent opportunists from exploiting the federal tax credits. DWEA believes that a suitable remedy is now available.

- A multi-national certification standard for small wind systems has recently been established and a number of states are requiring certification to this standard as a condition of eligibility for their incentive programs.

  1. AWEA 9.1-2009 (http://www.smallwindcertification.org/wp-content/uploads/2011/05/AWEA_2009-Small_Turbine_Standard1.pdf) is an industry developed consensus standard covering the performance and safety of small wind turbines up to ~ 50 kW. AWEA (American Wind Energy Association) is accredited by the American National Standards Institute (ANSI) and the standard does not limit design or configuration. It does require field testing of performance and acoustics, a 6-month field duration test, standardized consumer-friendly, performance reporting, and a comprehensive structural analysis. The AWEA standard is based on a number of relevant international wind turbine standards (IEC 61400).

  2. The U.S. Department of Energy and several state energy programs have supported the establishment of a non-profit certification body, the Small Wind Certification Council (www.smallwindcertification.org) to provide certifications to the AWEA standard. In addition, Intertek, a Nationally Recognized Testing Laboratory (NRTL), is also providing certification to the AWEA standard (see http://www.intertek.com/wind/small/). A sample SWCC certification label for a small wind turbine is shown below:



3. States such as California, New York and Oregon are now requiring certification to AWEA 9.1 for eligibility in their rebate programs. Ten other states are in the process of adding a certification requirement. See http://www.smallwindcertification.org/for-stakeholders/incentives/links-to-programs/

4. The British Microgeneration Certification Scheme (MCS) has adopted the AWEA standard, with slight differences in acoustics reporting, for eligibility in their national feed-in-tariff program. See http://www.microgenerationcertification.org/installers/product-manufacturer

5. The Canadian province of Nova Scotia is requiring certification to the AWEA standard for eligibility for their COMFIT feed-in-tariff program for turbines up to 50 kW. See Page 2 of https://nsrenewables.ca:44309/sites/default/files/comfit_directive_005_final.pdf

- In the past the IRS has worked with other renewable energy and energy efficiency organizations to establish minimum qualifying standards for items such as windows, solar PV systems, solar thermal systems, and heat pumps. For example, the tax code for the solar water heater credits states “To qualify for the credit, the property must be certified for performance by the nonprofit Solar Rating Certification Corporation or a comparable entity endorsed by the government of the state in which the property is installed.”

Policy Recommendation

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Actions Requested

- The IRS should administratively implement a requirement that small wind turbine qualifying for either the residential or the non-residential federal tax credit should meet the following requirements:

1. For small wind turbines with rotor areas up to 200m2, certification to AWEA 9.1-2009 by an accredited certification agency is required for any systems installed after June 30, 2012.

2. For small wind turbines with rotors over 200m2, but with rated power up to 100 kW at 11 m/s (24.6 mph) per IEC 61400-12-1, turbines installed after December 31, 2012 are required to carry up to date certifications by an accredited certification body to IEC 61400-12-1 and IEC 61400-11. In addition, these turbines must either 1) carry an up to date design certification from an accredited certification body to IEC 61400-1 or 2) have demonstrated extensive field operational experience as evidenced by a) at least 500,000 hours of fleet operation, and b) at least 25 operating wind turbines, and c) at least 2 years operation from at least 5 wind turbines. In addition, the manufacturers of these turbines must make available to the public rating parameters that are consistent with the Rated Power, Rated Annual Energy, and Rated Sound Level parameters for smaller turbines as defined in AWEA 9.1-2009.

3. No portion of a qualifying small wind system can have been previously placed in service.

   This will require a change to IRS Publication 5695.

Prepared by the DWEA Federal Policy Committee, January 19, 2012

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DWEA Briefing Paper: Tower Height

The Biggest Barrier

Tower height limitations are the single biggest regulatory barrier to the use of small wind systems in the United States. Small turbines need to be on towers 60 – 180 ft tall to be effective, depending on the height of nearby trees and other obstructions, but antiquated zoning ordinances typically limit the tower to unworkably low heights, such as 35 ft. Putting a small wind turbine on a short tower is like putting a solar system in the shade.

It's the Physics

The wind close to the ground and around trees and buildings is choppy (turbulent) and weak because surfaces and obstacles interfere with smooth wind flow. You experience these effects when you duck behind a building to get out of the wind or experience turbulence on an airline flight. Wind blockage and turbulence radically reduce performance and they significantly increase the wear and tear on the wind turbine structure. And contrary to the claims of some wind industry hucksters, there are no wind turbine technologies that can overcome the harmful effects of turbulence and the poor energy production from short towers. Hype changes, but physics does not. As industry experts put it "Short towers shortchange customers".

Tall Towers are a Must

After 35 years of experience and tens of thousands of installations, the industry guidance on minimum tower height, to the lowest extension of the rotor, is 60 ft., assuming no obstacles, or at least 30 ft above any obstacles within 500 ft. So if the mature height of trees in the area is 75 ft and the turbine rotor diameter is 20 ft then the minimum recommended tower height is 75 ft + 30 ft + 10 ft = 115 ft. As an example, a 5 kW residential wind turbine on a 35 ft tower in an open area might produce 1,200 kWh annually in a moderate wind regime, but the same turbine on a 115 ft tower would generate 9,000 kWh per year. In other words, it would take eight turbines at 35 ft to equal the output of one more properly sited at 115 ft. This because the power in the wind increases exponentially with wind speed, so small differences in wind speed produce big changes in turbine output.

Why Not Tall Towers?

The common 35 ft height restrictions seen in many zoning ordinances were introduced over a century ago as a fire safety measure because that was how high the manual fire pumps of the day could pump water. Unfortunately for potential small wind customers these height limits were not adjusted as fire engine technology improved. Applying the 35 ft restriction to small wind is highly discriminatory for a number of reasons. First, almost all zoning jurisdictions have utility structures (power poles) that exceed 100 ft. Second, the FAA has no restrictions on towers below 200 ft unless you are near an airport. Third, towers designed to the latest edition of the International Building Code (IBC) are stronger than nearby homes and buildings and there has never been an injury related to the failure of an operating small wind turbine. Finally, there will never be a tall man-made structure that does not generate some aesthetics criticism, as was the case with the Eiffel Tower, the Brooklyn Bridge, and the Statue of Liberty. However, the minority NIMBY (Not In My Back Yard) complaints should be kept in perspective and balanced against the overwhelming societal good of wind energy. **DWEA recommends that for property sizes of one acre or more there be no height restrictions on certified wind turbines installed on towers meeting the IBC design code.**