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#### MANUFACTURES SMALL WIND TURBINES

- 10kw-50kw distributive generation. - THREE MODELS: 12 kW, 24 kW, 48 kW
- Tower heights 50 ft., 80ft., and 103ft.
- Affordable for private ownership -
- Typical customers will be farmers, groups, businesses, and communities
- Supporting Vermont programs;
  - Net metering program
  - Standard Offer programs



#### STAR WIND TURBINES ARE NOT LARGE WIND TURBINES

- Low visual impact: The swept area for Star Wind turbines is approximately 200 sq. meters compared to 10,000 sq. meters.
- The blades have about half the tip speeds of a typical wind turbine.
- Star Wind Turbines are designed for low to moderate winds. The ridgeline is not needed.
- Low RPM blades are silent at the property line. (at 200 ft. the turbine is 43dBa and the trees are 52dBa)
- Low RPM blades reduce bird and bat collisions. Low wildlife impact
- Qualify under the Section 248j expedited CPG net metering application. Under 150ft and under 150kW

# LARGE WIND TURBINE VS. SMALL STAR WIND TURBINE



## Large Wind Turbine:

### VESTAS V117 3.3MW

Rotor Diameter	117m (384ft.)
Swept Area	10,751 sq. meters
Tower Height	450 ft.
Tip Speed	169-180 mph
Rotation Speed	13-16 RPM
Noise	42dBA @ 800ft.

## Small Wind Turbine:

### STAR 52-33 33KW

Rotor Diameter	15.8m (52ft.)
Swept Area	196 sq. meters
Tower Height	103 ft.
Tip Speed	27-84 mph
Rotation Speed	0-45 RPM
Noise	42dBA @ 200ft.
Low Frequency Noise	None

## Impact Factor:

Swept Area	55:1
Tip Speed	2:1
Total Impact	110:1

PG 2

# LARGE WIND TURBINE BLADES

## VS.

# SMALL WIND TURBINE BLADE



**V117 Blade**

### **Large Wind Turbine:**

#### **Vestas V117 Blade Dimensions**

Length	57.15 m	(187.5 ft.)
Max. Chord	4 m	(13.1 ft.)
Approx. Area	143 m <sup>2</sup>	(1539 ft <sup>2</sup> )
Shadow Flicker Range	1170 m	(3839 ft.)

### **Small Wind Turbine:**

#### **Star Wind Turbines STAR 52-33 Blade Dimensions**

Length	7.62 m	(25 ft.)
Max. Chord	0.66 m	(2.16 ft.)
Approx. Area	3.85 m <sup>2</sup>	(41.5 ft. <sup>2</sup> )
Shadow Flicker Range	158.5 m	(520 ft.)

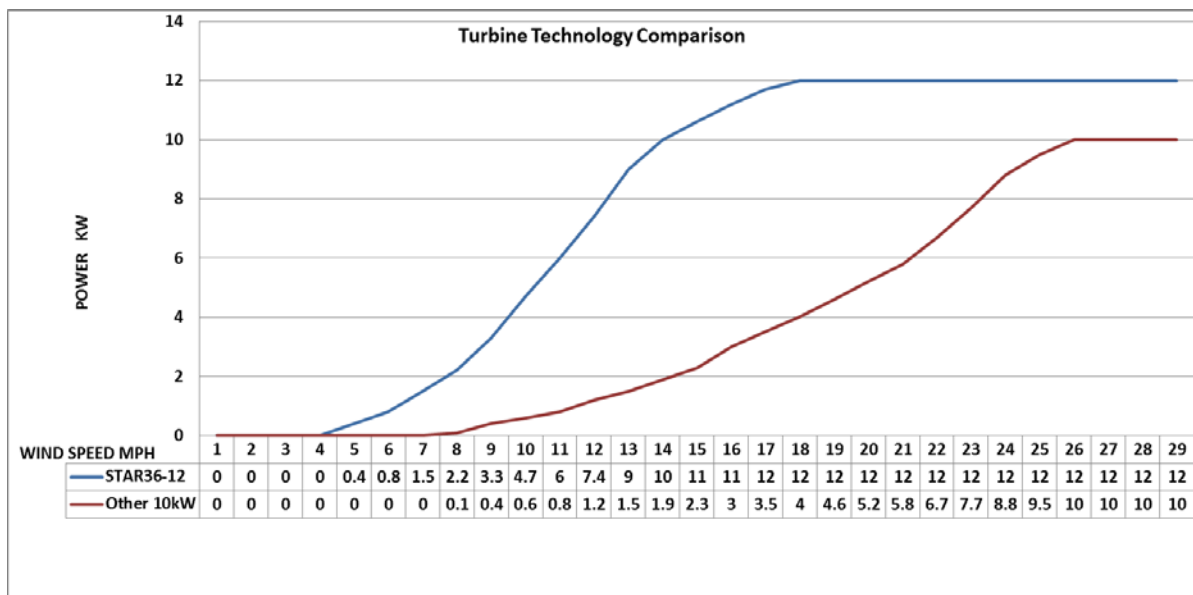
**STAR 52-33 Blade**

PG 3



STAR WIND TURBINES HAVE SPECIAL FEATURES: LOW WIND, LOW NOISE DESIGN

- Makes peak energy at 14mph wind rather than the 26mph required for comparable turbines, and 4-5 times the energy of a comparable turbine in low to moderate winds
- **Designed for Vermont: 240Volts single phase can grid connect on any road in Vermont. Three phase is not needed**
- Cut out wind speed is 3mph compared to 6-8mph of other turbines
- Articulating blades change pitch and feather 90 degrees in high winds. Glide aerodynamically in a storm.
- The low RPM makes less noise and reduce bird and bat collisions.



**TURBINES ARE HYDRAULICALLY LIFTED:**

- ASSEMBLED ON THE GROUND
- THE TOWER COMES DOWN FOR SERVICE
- NO NEED TO EVER CLIMB THE TOWER.





**MOVING TO VERMONT:**

**STAR WIND TURBINES WILL BE MADE IN VERMONT, CREATING LASTING, HIGH END JOBS**

Building a facility in East Dorset, VT up to 40,000 sq. ft.

50-200 jobs expected to be created in Vermont in the near future.

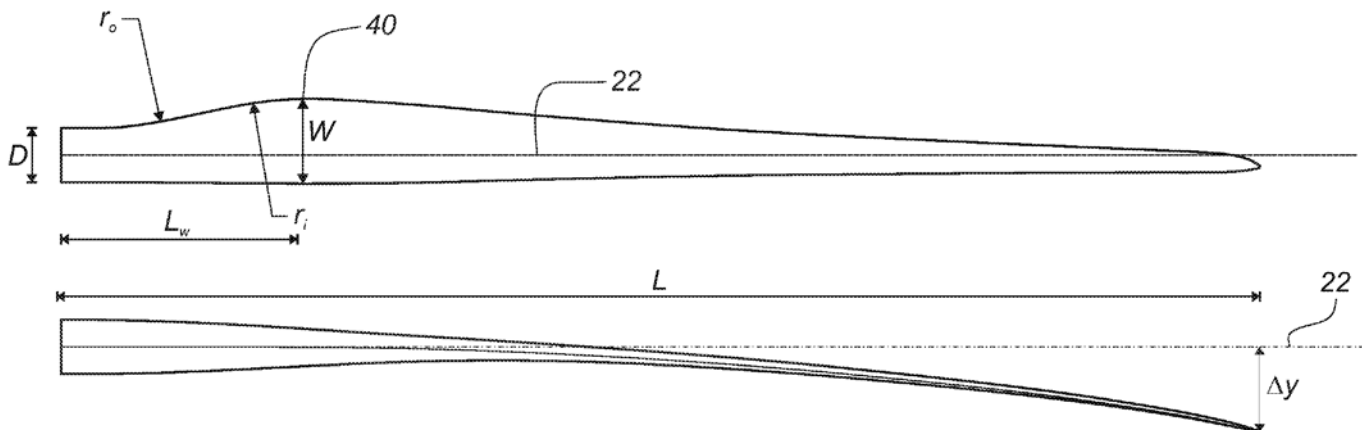
Star Wind Turbines manufactures the entire wind turbine. We make our own generator, control systems, composite blades

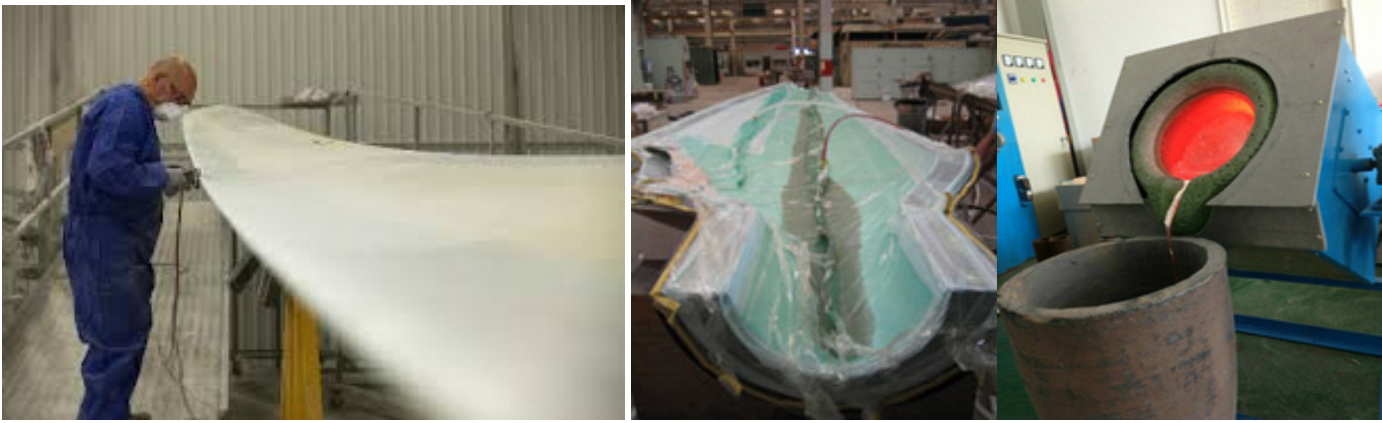
The jobs we create are high end jobs:

1. CNC milling and lathe machining
2. Robotic water jet cutting
3. Welding and fabrication
4. Automated coil winding
5. Electrical assembly
6. Aluminum casting
7. Composite Blade manufacturing and testing.
8. Wind turbine installation

Intertek certification is in process AWEA 9.1, IEC 61400-2, UL1741, UL1004, UL6142

Star Wind turbines will train installers to service and install. NAPCEP apprenticeship





**MANY VERMONTERS WILL BE ABLE TO AFFORD ONE AND PARTICIPATE IN THE ALTERNATE ENERGY MARKET**

- Federal ITC Investment Tax Credit offers a tax rebate of 30% of the wind turbine and installation cost
- Federal/Dept. of Agriculture REAP grants can pay 25% of the wind turbine and installation
- CEDF subsidy used to offer 30%-50% of the capital cost if the REC were reassigned to the utility
- VEDA has financing at 2.7% interest for 40% of the project
- Federal/Dept. of Agriculture REAP offers 4% financing for qualified projects

**IN VERMONT YOU CAN.....**

- Make your own power for your own usage
- You can share the turbine in a group or community
- You can sell the energy for cash in the Standard Offer Program.
- A farmer can still grow crops, have an orchard, or use as pasture the land under the turbine.
- Note: Vermont net metering laws allow a group of people to share the output of turbines within the same utility territory. You don't have to erect the turbine in your back yard. If you live in town, you can form a group and make your own micro wind farm in the country side.

**STAR WIND TURBINES WILL BE COST EFFECTIVE AND COMPETITIVE WITH SOLAR OR ANY OTHER RENEWABLE SOURCES ONCE VOLUME PRODUCTION IS ACHIEVED**

**VERMONT'S RENEWABLE ENERGY PROGRAMS PROVIDE CRITICAL INCENTIVES TO DEVELOPING INDUSTRIES**

**1. The Standard Offer program:**

This is an excellent program for development and potentially to produce a free enterprise for sustainable distributed generation. We hope that it gets expanded or perhaps combined with the net metering program. The goal of the Standard Offer program is to promote the development of in-state renewable energy and help bolster the Vermont economy. Star Wind Turbines will be participating in the Standard Offer development Program for the next 8 years. This program is the reason we came to Vermont as it is an excellent way for us to develop and improve our manufacturing technology. It has proved that it works in reducing cost, in that it took Solar PV 4-5 years to reduce their prices by 50% and we expect to do the same with small wind turbines. We are part of the Standard Offer work group and are waiting for confirmation that the allocation for the small wind category and the avoided cost will be in place for the 2015 request for proposal, on May 1<sup>st</sup>. We believe the small wind allocation will flow the benefits of the tariff in the best way possible to the local economy.

**2. Net metering program:**

- o It is important to us that Class I renewable energy from a small wind turbine be treated equally to solar pv
- o Solar pv has been given a guaranteed \$0.19 or 0.20/kWh which includes a \$0.05-0.06 solar adder with the logic that solar pv delivers during the peak demand hours between 2-3:00PM. However, there has been debate that the peak demand hours are moving into the evening 5-6:00PM, which is more suitable for wind turbines.
- o If a small wind delivers the same Class I renewable energy during the peak demand hours, we believe it should earn the same peak capacity credit as solar pv.
- o Presently, net metered customers may retain ownership of the renewable energy credits (REC) generated by the customer's net metering system. Under the proposed legislation, how will the customer be compensated for the REC if the REC is awarded to the utility?
- o Presently the net metered credit reverts back to the utility after 12 months, even though the utility benefited by the use and sale of that energy in the grid. What is the logic that requires a customer to use or claim a net metered credit within 12 months? The rate payer can only modify the group and credit assignments every 6

months. This makes it difficult to fulfill a 12 month deadline. Why the deadline? A deadline can only be a deterrent to producing renewable power.

- Who gets credit for the PTC (Production tax credit)?

### 3. Net metering / Standard Offer Combined Program. An Idea...

It would be an incredible incentive for distributive generating customers to be able to make their own power and have the choice to use their own energy, share it in a group, or sell their excess energy for a “standard offer” to the utilities. This would allow the rate payer to make excess energy and create an incentive for the use of small distributive renewable energy generating facilities in Vermont, would benefit the renewable energy goals, and the local economies in the following ways.

- There would be a better chance that “to the greatest extent possible” the benefits of the feed-in tariff would flow into the local Vermont economy. In the present proposed bill there is no guarantee that any renewable energy other than net metering will be generated in Vermont if it can be done out of state for less cost. **If the utilities were required to buy a certain percentage of renewable energy in Vermont or if the net metering program had a standard offer for excess energy, every kW or dollar generated in the distributive grid would be one less dollar and one less job going out of state.**
- A combination of the net metering program and the standard offer program could look like this. For example: A farmer could use 6 acre of field to erect a small 50kW wind turbine for approximately \$100,000 (after rebates and incentives), and the income could be in the neighborhood of \$24,000/year (25% return on investment). The farmer could continue to grow crops, graze farm animals, or grow an orchard under the turbines. These days it is difficult to find secure investments better than 3-5% return on investment. Giving this opportunity of an enterprise to Vermonters would give a stable vehicle of investment that not only provides income security, and economic flow into the local community, but contributes to the clean energy goals at the same time.  
Note: if you stimulate the creation of a distributive generator that is privately owned and makes an income from a feed-in tariff, you are in actuality, creating a job. Thousands of jobs can be created this way.
- Participation could come from individuals, groups, towns, or communities. Having a flexible way to credit, share, or assign the power could be developed. A fair standard offer price could be derived for the excess power generated. In order to foster diversification, a variety of energy sources could be used including solar, wind, biomass, or methane...ETC

### 4. Clean Energy Development Fund (CEDF) small wind incentive:

The CEDF used to offer a generous and fair performance base incentive, based on the kWh produced. Even though the CEDF acknowledges that small wind fits their objectives exactly, CEDF has removed small wind technology completely from the budget. We understand that the closing of the Yankee power plant ended the funding and we hope they find new sources of funding.

### 5. Comments on H.40

- In Sec. 2 of the bill, under Section 8004(a), utilities are required to own energy produced by renewable energy plants or sufficient tradeable renewable energy credits “from plants whose energy is capable of delivery in Vermont.” Under the current language of the bill, there is no requirement that the renewable energy purchased must actually be produced in Vermont. At the very least, priority should be given to renewable generation plants located in Vermont, and ideally a certain percentage of each utility’s renewable energy portfolio would be required to come from generation plants located IN VERMONT. One way to accomplish this would be to remove the 127.5 MW cap under the Standard Offer program, and create a real open market, available to all small generators interested in taking advantage of the Standard Offer. We would like a requirement that utilities purchase a certain percentage of their required renewable energy portfolio through the Standard Offer program. Otherwise, Vermont is just funding the development of renewable energy industries in other states and in Canada, and sending jobs and revenue out of state.
- In Sec. 2 of the bill, under Section 8004(c), utilities are allowed to make alternative compliance payments into the Vermont Clean Energy Development Fund in lieu of purchasing renewable energy or tradeable RECs. A certain percentage of the funds in the CEDF should be specifically allotted to fund small wind generation development.