

Residential Wind Energy in NH

Topics of Discussion

- Wind Generator viability, site location and required wind speeds. Resources for finding wind speeds
- Wind Generator choices
- Utility (Grid) Connected systems
- Tower sizing and styles
- Local Zoning requirements and State requirements

SITE CHARACTERISTICS

- Wind speed at site should be 11mph annual average or better.
- Is there any flagging of branches on larger older pine trees
- Rule of thumb is to be 30' higher than anything within 300'.
- Input gps coordinates or 911 address into different wind sites to find out annual average wind speed.
 - Some web sites to visit.
 - www.awea.org
 - <http://firstlook.3tier.com>
 - <http://rredc.nrel.gov/wind/pubs/atlas/maps/chap2/2-01m.html>

- **Additional Resources**
- Wind Energy Resource Atlas of the United States
<http://rredc.nrel.gov/wind/pubs/atlas/>
- Basic Principles of Resource Evaluation
www.awea.org/faq/basicwr.html
- Basic Principles of Wind Turbine Power Production
www.awea.org/faq/basicpp.html
- Basic Principles of Wind Turbine Aerodynamics
www.awea.org/faq/basicop.html
- Understanding the Difference Between Energy and Power
www.awea.org/faq/basicen.html
- Calculating Power Potential from a Given Wind Speed
www.awea.org/faq/windpower.html
- The *Choose Renewables* Resource Estimator Tool
www.chooserenewables.com/estimator_start.php

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- National Renewable Energy Laboratory's Energy Atlas of the Western U.S. www.energyatlas.org
- *Always remember that wind maps give only broad estimates - the wind speed on any particular site is largely determined by terrain. Consult a turbine dealer or other professional site assessor to research your wind resource more thoroughly.*

Vertical and Horizontal wind generators



Grid Connected Systems

- New systems do not require battery storage
- Use the electric utility system to store excess power
- Spin the meter backwards in times of overgeneration
- Use the overgeneration of kwh when wind is still

Towers

Guy wired towers using poles or lattice structures

Towers use 3 guy wire anchor points and some use 4

4 usually means the tower can be raised or lowered with a Gin pole



- 4 wires usually means the tower can be raised or lowered with a Gin pole. This is an example of a monopole being raised by a Gin Pole



4 guy wired Lattice tower



Self supporting lattice tower



Tilt up pole tower with 4 guy wires and gin pole



Monopole towers



Monopole tower assembled and ready for Nacelle



A crane is not always necessary



Using crane to raise 120' lattice 3 guy wires tower



100' lattice tower raised without crane





10 ft. sections
lifted up
individually using
a gin pole and a
capstan winch





Assembled and on line!



Sample zoning ordinance

- **Section 1 Purpose:**
- It is the purpose of this ordinance to regulate the safe, effective and efficient use of small wind energy systems to reduce the on-site consumption of utility supplied electricity. It is recognized that , New Hampshire residents value the natural beauty of our area. A balance is sought between this value and the fact that wind power is an important and inevitable part of our future.
- **Section 2 Findings:**
- New Hampshire finds that wind energy is an abundant, renewable, and nonpolluting energy resource and that its conversion to electricity will reduce our dependence on nonrenewable energy resources and decrease the air and water pollution that results from the use of conventional energy sources. Therefore, we find that it is necessary to create proper guidelines and permits for small wind energy systems to enable a clean, renewable energy resource to be utilized in a cost-effective and timely manner and to minimize impact on the surrounding abutters and neighbors.

- **Section 3 Definitions:**
- **Small Wind Energy System:** A residential wind energy conversion system consisting of a wind turbine, a tower, and supporting structures (e.g. guy wires, if needed), and associated control or conversion electronics, which has a rated capacity of not more than 25Kw and which is primarily intended for on site consumption.
- **Section 4 Permitted Use & Requirements:**
- **Tower Height:** The distance from the base to the system hub shall be no greater than 150 feet in height or no greater than 35 feet above any surrounding canopy.
- **Total Height:** The vertical distance from the ground level to the tip of the rotating blades at their highest point.

- Set-back and Location: No part of the small wind energy system, including guy wire anchors, may extend closer than 35' from any property line including the road frontage. Setback of the small wind energy system (excluding guy wire supports) must measure at least 1.1 times the total height of the small wind energy system.
- Rated Capacity: A small wind energy system shall not have a rated generation capacity greater than 100kW.
- Noise: Noise from small wind energy systems shall not exceed 60 dBA, as measured at the property boundary. The level, however, may be exceeded during short-term events such as utility outages and/or severe wind storms.

- Aesthetics: All measures will be taken so as the system shall have as little adverse visual impact on the surrounding area and neighbors in particular, as possible. The color must be non-reflective and neutral. The less visible and the more the structure blends with the surroundings the better. All temporary or permanent signs are prohibited on the small wind energy system except for manufacturer's standard logo on the turbine or appropriate warning signs on the base of the tower not to be positioned more than 10 feet from the ground. The small wind energy system shall not be artificially lit unless required by the Federal Aviation Administration.
- Utility Notification: If the owner's intent is to connect the small wind energy system to the power grid, proof of public utility acceptance shall be required prior to installation.
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- Decommissioning: If the wind energy system is not in use for a period of 1 year, it must be disassembled by the property owner unless a specific and time-bound extension is provided by the selectmen. The wind energy system shall be maintained in good condition and good repair at all times. Any structure that is or becomes in disrepair such that it does not meet its intended usage in the opinion of the selectmen, must be repaired within 45 days. If the owner fails to comply, the selectmen shall have the tower removed at the owners' expense and any associated legal fees charged to the owner.
- Automatic Over-speed Controls: All small wind energy systems shall be equipped with manual (electronic or mechanical) and automatic over-speed controls to limit the blade rotation speed to within the design limits of the system.
- State & Federal Requirements: Evidence shall be provided that the system meets all federal and state regulations.

- Monitoring Equipment: To determine the efficacy of installing a small wind energy system, a limit of three meteorological towers, including guy wires and monitoring equipment, may be erected per lot at any given time. These structures will conform to all setback and height regulations for a small wind energy system and may remain in place for a period not to exceed 18 months with minimal permitting processes and fees. Fees and permitting to be determined by the Selectmen and will require a building permit.
- Modification: Existing small wind energy systems will require a building permit for any changes which result in an increase in size, height, width or sound output. Any change in location of the small wind energy system will be deemed to be a new installation.
- Steep Slopes Locations: For small wind energy systems located on any geologic prominence whose side(s) are incorporated in the Steep Slopes Protection Area, the highest point of a rotating blade may not extend above the highest point of ground on the geologic prominence on which the system is sited unless the applicant can demonstrate that minimal adverse impact is created.

State of NH Regulations

- HB310
- 674:59 Municipal Regulations of Small Wind Energy Systems. Ordinances or regulations adopted by municipalities to regulate the installation and operation of small wind energy systems shall not unreasonably limit such installations or unreasonably hinder the performance of such installations.

Questions or Comments?



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