

April 21, 2009

Proposed Wind Conversion Systems and Solar Bylaw
Town Meeting Article 33 - CC-TV Presentation

Drafted by the Alternative Accessory Clean Energy Generation Committee:

Robert J. Koning, Chair, Retired Building Commissioner
William R. Tice, Jr. Vice-Chair, Board of Selectmen
Greg D. Peterson, Planning Board Representative
William Morgan, Zoning Board of Appeals Representative
John Dalton, Community Representative
Keith Therrien, Community Representative
Elizabeth D. Barnett, Administrative Coordinator

Background Timeline

- **March 2008 –**
 - Town of Carlisle Board of Selectmen appointed the Alternative Accessory Clean Energy Generation Committee (AACEG).
 - Action responded to numerous Building Department inquiries about permitting procedures for:
 - residential wind turbines
 - residential solar power installations.
 - Resident interest fell into several categories:
 - Energy independence (as with electrical generators);
 - Geothermal heating systems and obtaining low cost electricity;
 - Commitment to green energy production.
 - AACEG Committee Charter approved.
 - Mission: provide draft language to Board of Selectmen for a residential wind conversion systems and solar energy bylaw.
 - Goal: bring bylaw to 2009 Annual Town Meeting.
- **May 2008 to October 2008 -**
 - AACEG Committee reviewed current residential wind conversion system technologies and solar installations.
 - Listened to technical presentations.
 - Reviewed residential wind conversion system and solar bylaws from communities across the United States.
 - Visited residential wind conversion system installations.

Background Timeline

- **December 2008**

- **Planning Board invited the AACEG Committee to make a presentation on the proposed wind conversion systems and solar power generation bylaw.**
 - **PB comments integrated into the proposed bylaw.**
 - **Among the PB recommendations was the request that the AACEG Committee offer a public educational component prior to Town Meeting.**

- **January to March 2009**

- **AACEG Committee made a presentation on its work and the proposed bylaw to the Board of Selectmen.**
- **Proposed bylaw circulated to Town Hall Boards for Review**
 - **The Planning Board provided revised-bylaw language and comments to the AACEG Committee .**
 - **The Planning Board invited the AACEG members to speak at its February 9th meeting.**
- **The Planning Board held Public Hearings on February 26th and March 9th.**
 - **In response to public comment, which called for increased restrictions in the noise and aesthetic language; bylaw changes were made and accepted by Committee vote.**

Electricity Facts

kwh = kilowatt hour, or the amount of energy expended by ten 100-watt bulbs over an hour.

US/New England Electricity Facts

- For every kwh of electricity used in a house 2.2 kwh of energy are lost in transmission and generation!
- Centralized electrical generation is very inefficient and costly. Decentralized electricity generation is more efficient. It also has the side benefit of a smaller "carbon footprint."
- New England has some of the highest rates in the nation.
- Most of New England's electricity is generated from burning of natural gas.

Basic Carlisle Electricity Facts

- The average Carlisle household uses more than 1000 kwh/month.
 - February 2009 kwh cost from NSTAR 20.3 cents
 - January 2009 kwh cost from NSTAR 19.7 cents
 - February 2008 kwh cost from NSTAR 18.2 cents

Comparison - Germany

- Carlisle has comparable wind to Germany, which is the world's largest user of wind power with an installed capacity of **22.3 gigawatts (GW)** in 2007, ahead of USA which had an installed capacity of **16.8 GW**.
- More than 19,460 wind turbines are located in Germany and the country has plans to build more. Germany has started to plan for installations offshore and near shore. Turbines also are installed near towns and villages.

AACEG Review of other Wind Conversion Systems Bylaws

- Acton, Massachusetts
- Barrington, Rhode Island
- Chelmsford, Massachusetts
- Dover, Massachusetts
- Hamilton, Massachusetts
- Harvard, Massachusetts
- Manchester-by-the Sea, Massachusetts
- New Mexico (state guidelines)
- Sonoma County, California
- Winsor, Massachusetts

Wind turbines come in a range of sizes

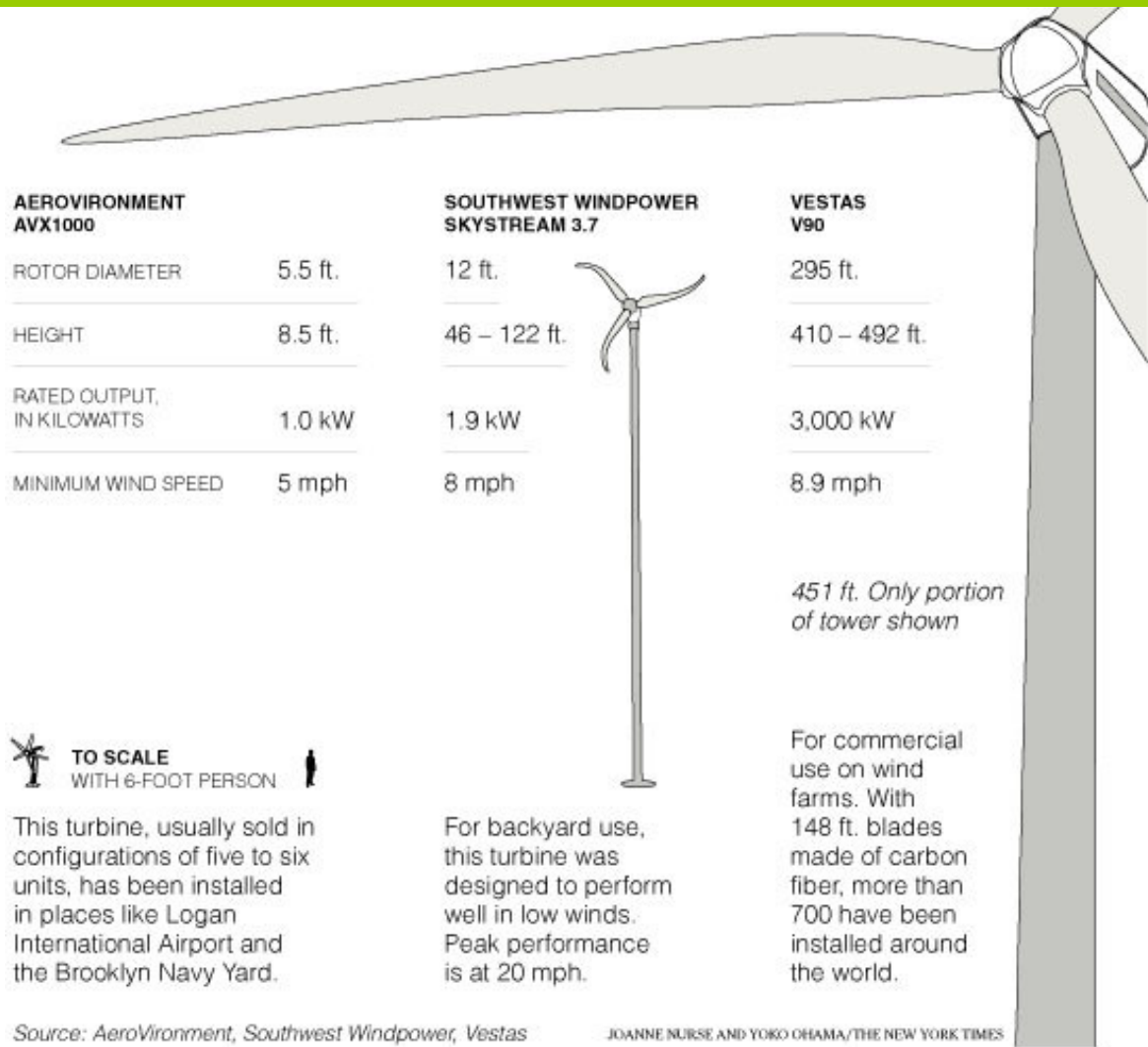
Carlisle's proposed bylaw would cover small units for residential or farm use, like the small ones to the right and those below.

POPULAR WHOLE-HOUSE UNITS:

Jacobs 20KW unit, 31' diameter rotor, tower height 80-120 feet, minimum wind speed 8mph;

Bergey 10KW unit, 25' diameter rotor, tower height 80-120', minimum wind speed 8mph;

Entegriety EW15 50 KW unit, 49' diameter rotor, tower height 80-120', minimum wind speed 8 mph.



Source: AeroVironment, Southwest Windpower, Vestas

JOANNE NURSE AND YOKO OHAMA/THE NEW YORK TIMES

**Wind turbines come in a range of sizes -
Committee's goal was to draft a bylaw for residential/onsite use**

Residential system



Large commercial/utility system



Other Residential Wind Turbine Installations



1910 Perkins Wind Mill Company 8
Mishawaka, Indiana

Wind Conversion Systems Bylaw Elements Considered and Included

- **Structure height** – 140 feet maximum, including structure and rotor. Minimum blade height above ground is twenty feet. The lowest blade tip shall not be higher than twenty feet above average tree height.
- **Impact** - Visual and sound impacts shall have minimal effects on the characteristics of the surrounding neighborhoods and the Town.
- **Abutters** – Notified of proposed ZBA wind turbine application and invited to comment.
- **Set backs from property lines** – Minimally the height of the structure and plus one rotor radius.
- **Town of Carlisle wind generation capacity** - ~ five miles an hour
- **Power** – i.e., Kilowatts peak generating capacity. Limited to 50 Kilowatt hours electricity generation.
- **Noise levels** – 5 dBA and 5 dCA above the ambient level.
- **Access**– limits on public access to structures.
- **Labeling requirements** – Voltage, “Danger”, etc.
- **Safety elements** – Only equipment designed to provide corrections for unbalanced turbines, high wind, and power blackouts (electrical “backfeed” prevention) will be permitted.
- **Limitations on use** – e.g. to supplement electricity for residential or on site commercial use, example to produce electricity for a farm.
- **Community Concerns** – initial AACEG concern was that wind conversion systems be used solely for residential electricity generation
 - No other uses, e.g. political signs, commercial transmitter use, laundry, etc.
 - Concern about utility poles in Carlisle, which once approved have become repositories for emerging technologies – with no oversight or regulation over time.
- **Documentation** – equipment tested to industry standards.
- **Abandonment** – Bylaw includes provision for decommissioning abandoned structures.

Wind Conversion Systems Permit Process

1. Interested property owners are to apply to the Zoning Board of Appeals (ZBA) for a Special Permit and pay the application fee (yet-to-be determined). This application will need to meet the proposed bylaw requirements and guidelines.
2. The ZBA will hold a Public Hearing on the proposed wind turbine installation application. The applicants abutters will be notified using the Assessor's (legal) Abutter List.
3. The Abutters would be invited to either comment at the Public Hearing and/or to provide written comments.
4. The ZBA would review: public comments, noise data, height proposed, engineering data, plans, drawings, site illustrations, pre-engineered equipment data, wind capacity and power generation limits, etc.
5. The Zoning Board of Appeals would render a decision.
6. After the ZBA Appeal period (anyone can appeal a ZBA decision within twenty days after written decision is produced); the Building Commissioner shall review an application for the wind turbine.
7. If all ZBA application requirements are met; the Building Commissioner would issue a permit.
8. The proposed turbine would then go into construction, and receive periodic inspections from the Building Commissioner.
9. Upon completion of the construction/installation, the installed wind turbine shall require testing by the Building Commissioner, prior to commencing operation.
10. Ongoing operation: if at any time the proposed wind turbine does not meet ZBA permitting requirements, the Building Commissioner has the right to revoke the Special Permit to operate.
11. Any Carlisle resident can contact either the Building Commissioner, or the Board of Selectmen, if there are violations and/or problems with a ZBA issued Special Permit.

Elements Considered for Solar Power Installations

- Roof-top solar power installations are allowed under the Commonwealth of Massachusetts Building Code (780 CMR) and will be permitted by the Building Commissioner.
- Solar power must be installed so that it does not “backfeed” into the power grid during power outages
- The Building Inspector has the right at any time to determine that a solar power installation – whether on a roof top or otherwise, is a hazard and to order the property owner to have it removed.
- Installation of solar power photovoltaic panels on structures other than roof tops will be permitted by the Building Commissioner under the following conditions:
 - The applicant shall submit a plot plan showing property lines of the applicant and the proposed location of the photovoltaic panels and supporting structure.
 - Setback and height shall be regulated by local zoning ordinance with a minimum of a forty foot set back from property lines.
 - Fencing shall be constructed surrounding the structure or if it is over ten feet in height – the climbing apparatus shall be made inaccessible or anti-climbing shrouds shall be installed.
 - Solar power installations, mounted on a roof-top may not be more than three feet higher than the highest point of the roof.
 - Abandonment – if after twelve months, the Building Commissioner determines that solar power non-roof top installation is not in use, the owner may be required to remove it.

Some New England Residential Solar Installations



Solar Power Resources Reviewed

- Massachusetts General Laws:
 - M.G.L. ch. 187 § 1A. Solar easements.
 - M.G.L. ch. 184 § 23C Solar energy systems; installation or use; restrictive provisions.
 - M.G.L. Ch. 40A § 1A. Definitions.
 - M.G.L. ch. 41 § 81Q. Planning board; adoption of rules and regulations.
 - M.G.L. Ch. 40A § 9B. Solar access.
- Massachusetts New Solar Electric Photovoltaic Initiative
www.mtpc.org/renewableenergy/commonwealth_solar/index.html
- Massachusetts Renewable Energy Trust: www.masstech.org/renewableenergy/mandate.ht
- California Solar Shade Act
- *Bringing Solar Energy to the Planned Community, A Handbook on Rooftop Solar Systems and Private Land Use Restrictions.* Thomas Starrs et al. Kelso, Starrs,
- www.consumerenergycenter.org/erprebate/documents/CC%2BRs_and_solar_rights.pdf –Planned communities focus, but has good section on state laws protecting solar rights of property owners (pp. 51-55) and a list of solar energy resources (pp. 57-59)
- <http://www.solarmarket.com/projects.html>

Site visits

**September 2008 - University
of Vermont, Burlington, VT**
Bergey 10 kW turbine
Guyed monopole tower



Next Steps

- **March 2009** - Revised wind conversion systems and solar power bylaw placed on Warrant for 2009 Annual Town Meeting (May 4-5, 2009)
- **April 2009 - Public Education**
 - Presentations to the Carlisle Sierra Club; the Carlisle Climate Action and the Concord-Carlisle League of Women Voters.
 - AACEG Materials for Public Access on Carlisle.org/aaceg
 - CC-TV AACEG Committee presentation.