

VI.I Wind Energy Conversion Systems (Draft 3/2/10 Merged Addition)

Purpose

The purpose of this bylaw is to provide standards for the placement, design, construction, operation, monitoring, modification and removal of wind facilities that address public safety, minimize impacts on scenic, natural and historic resources and to provide adequate financial assurance for the eventual decommissioning of such facilities.

The provisions set forth in this bylaw shall take precedence over all other bylaws when considering applications related to the construction, operation, and/or repair of land-based wind energy facilities.

Applicability

This section applies to all utility-scale and on-site wind facilities proposed to be constructed after the effective date of this section. This section also pertains to physical modifications to existing wind facilities that materially alter the type, configuration, or size of such facilities or related equipment.

Definitions

As-of-Right Siting: As-of Right Siting shall mean that development may proceed without the need for a special permit, variance, amendment, waiver, or other discretionary approval if the project is located in the designated location (COD). As-of-right development will be subject to non-discretionary site plan review to determine conformance with local zoning bylaws as well as state and federal law. As-of-right development projects that are consistent with zoning bylaws and with state and federal law cannot be prohibited.

Designated Location: The location designated in accordance with M.G.L. c 40A section 5, where wind energy facilities may be sited as-of-right is in the Commercial Overlay District. Said location is shown on the Hamilton Zoning Map, revised November 2009. This map is part of the Zoning By-law and is on file in the Office of the Town Clerk.

Height: The height of a wind turbine measured from natural grade to the tip of the rotor blade at its highest point, or blade-tip height.

Rate Nameplate Capacity: The maximum rated output of electric power production equipment. This output is typically specified by the manufacturer with a "nameplate" on the equipment.

Site Plan Review Authority: When the wind conversion facility is located within the designated location, the Site Plan Review Authority will be the Planning Board.

Special Permit Granting Authority. When the wind conversion facility is located outside the designated location, the Special Permit Granting Authority will be the Zoning Board of Appeals.

Small Wind Energy Conversion Facility: A wind energy conversion facility with a blade-tip height up to 150 feet as measured from existing average grade.

Utility-Scale Wind Energy Facility: A commercial wind energy facility, where the primary use of the facility is electrical generation to be sold to the wholesale electricity markets.

Wind Energy Facility: All of this equipment, machinery and structures together utilized to convert wind to electricity. This includes, but is not limited to, transmission, storage, collection and supply equipment, substations, transformers, service and access roads, and one or more wind turbines.

Wind Monitoring or Meteorological Tower: A temporary tower equipped with devices to measure wind speed and direction, to determine how much electricity a wind energy facility can be expected to generate.

Wind Turbine: A device that converts kinetic wind energy into rotational energy to drive an electrical generator. A wind turbine typically consists of a tower, nacelle body, and a rotor with two or more blades.

General Requirements for all Wind Energy Facilities

The following requirements are common to all wind energy facilities to be sited in designated locations through Site Plan Review or outside designated locations through special permit.

Compliance with Laws and Regulations

The construction and operation of all such proposed wind energy facilities shall be consistent with all applicable local, state and federal requirements, including but not limited to all applicable safety, construction, environmental, electrical, communications and aviation requirements.

Building Permit and Building Inspection.

No wind energy system shall be erected, constructed, installed or modified as provided in this section without first obtaining a building permit.

Fees

The application for a building permit for a wind energy system must be accompanied by the fee required for a building permit.

Site Plan Review

No wind energy facility shall be erected, constructed, installed or modified as provided in this section without first undergoing Site Plan Review by the Planning Board if the project is located in the designated location (COD).

Special Permit

No wind energy facility shall be erected, constructed, installed or modified as provided in this section without first obtaining a special permit by the Zoning Board of Appeals if the project is located outside the designated location (COD).

I. A Wind Energy Conversion Systems by Special Permit (Draft 3/1/10)

Administration

Placement of Wind Energy Conversion Systems-hereafter referred to as wind turbines - on any property in the Town of Hamilton (except the Commercial Overlay District, refer to I.B) shall require a special permit from the Board of Appeals, in addition to a building permit and any relevant electrical permits. Permit procedure shall be as set forth in Section IX of this Bylaw.

Small Scale Wind Energy Conversion Systems

The applicant shall submit a plan and supporting data, which shall bear the seal and signature of a registered professional engineer licensed to practice in Massachusetts. Submissions shall include the following:

1. Submittal Requirements

- a. a plan showing:
 1. property lines of the applicant and abutters within 300 feet;
 2. proposed location of the wind turbine.
 3. location and uses (residence, garage, shed, etc.) of the proposed and abutters' buildings within 300 feet including distance from the proposed wind turbine to each of the buildings;
- b. a dimensional representation of the wind turbine mounted on its support structure, including foundation dimensions (both surface and depth), foundation materials, method of attaching tower to foundations, wind turbine dimensions including, tower height and rotor diameter, and clearance distances of blades to ground and nearest structure to be prepared by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts;
- c. Certification: Small scale wind turbines must be approved by a small wind certification program recognized by the American Wind Energy Association;
- d. wind turbine design data including manufacturer's specifications and installation/operation instructions; certification by the manufacturer or a registered engineer that tower design is sufficient to withstand wind load requirements for structures as established by the Mass. Building Code;

2. Small Scale Wind Turbine Standards

- a. Setback: A wind turbine may not be sited within one and one-half times (1.5x) the height of the wind turbine from the nearest property line. A wind turbine may not be sited within a distance equal to (1x) the height of the wind turbine from critical infrastructure, or private or public ways.

Setbacks distances of the wind turbine may be reduced by the Special Permit Granting Authority based on site specific criteria and if the project is consistent with Special Permit granting criteria and only after review of substantial evidence, including but not limited to detailed engineering reports or product engineering certification, which demonstrate that safety concerns have been minimized and that setbacks have been complied with to the maximum extent practicable. Setbacks for other than the wind turbine shall comply with the by-laws of the Town of Hamilton.

No part of the small wind energy conversion facility support structure, including guy wire anchors, may extend closer to the property boundaries than the standard structure setbacks for the zoning district in which the land is located.

- b. Height: The height of a wind turbine shall be no greater than 150 feet.
- c. Sound: The operation of the wind energy conversion facility shall conform with the provisions of the Department of Environmental Protection's, Division of Air Quality Noise Regulations (310 CMR 7.10).
- d. Access: To prevent unauthorized climbing, tower access shall be restricted by EITHER:
 - 1. an impassable fence and locked gate, both at least 6 feet high, constructed around the perimeter of the base of the supporting structure, provided that such barrier is not required for any wind turbine erected on dwelling or other structure which provides no opportunity for climbing for at least 6 feet;
 - 2. OR removal of climbing apparatus on the support structure to at least 10 feet above the ground;
 - 3. OR anti-climbing shrouds over the bottom portion of the structure.
- e. Compliance is Required with the following:
 - 1. Regulations of the Federal Communications Commission (FCC)
 - 2. Massachusetts Uniform Building Code
 - 3. Regulations of the Federal Aeronautical Administration (FAA)
 - 4. National Electric Code
 - 5. Regulations of the Federal Energy Regulatory Commission

- f. **Utility Notification:** No wind energy conversion facility shall be installed until evidence has been given that the utility company has been informed of the customer's intent to install an interconnected customer-owned generator and an interconnection agreement has been approved by the utility. Off-grid systems shall be exempt from this requirement.

- g. **Special Permit Approval Criteria:** Any Special Permit granted for a Small Scale Wind Energy Conversion Facility shall meet the following conditions:
 - 1. The specific site is an appropriate location for such use including but not limited to consideration of sound, flicker and visual impact;
 - 2. The use will not pose a significant adverse impact to the health and safety of the neighborhood;
 - 3. There will be no serious hazard to persons or vehicles from the use;
 - 4. Adequate and appropriate infrastructure will be provided for the proper operation of the small scale wind energy conversion system.

- h. **As-Built Plan:** The facility shall not commence operation until an “As-Built” plan and a certificate of compliance have been submitted to the Special Permit Granting Authority and the Inspector of Buildings representing that the facility has been constructed substantially in compliance with the plan approved by the Special Permit Granting Authority. Said certificate and plan shall be signed and stamped by a registered professional engineer licensed in the Commonwealth of Massachusetts.

- i. **Abandonment:** A small wind energy conversion facility will be considered to be abandoned if it is inoperable for a period of one year, or considered hazardous by the Inspector of Buildings. Once a small scale wind energy conversion system is designated as abandoned or hazardous, the owner shall immediately physically remove the installation, which shall include, but not be limited to:
 - 1. Removal of small scale wind energy conversion system, any equipment shelters and security barriers from the subject property;
 - 2. Proper disposal of the waste materials from the site in accordance with local and state solid waste disposal regulations;
 - 3. Restoration of the location of the small scale wind energy conversion system to its natural condition, except that any landscaping and grading may remain in the after-condition.

Utility Scale Wind Energy Conversion Systems

The applicant shall submit a plan and supporting data, which shall bear the seal and signature of a registered professional engineer licensed to practice in Massachusetts.

The Plan

Please refer to plan submittal requirements listed under I.B. Wind Energy Conversion Systems in Commercial Overlay District – Permitted Use with Site Plan Review and note that when plan requirements indicate 500 feet, the extent of inclusion will be revised to be 300 feet for Wind Energy Conversion Systems application for Special Permit.

Utility Wind Turbine Standards

Please refer to all standards as listed in VI.I.B. Wind Energy Conversion Systems in Commercial Overlay District – Permitted Use with Site Plan Review and note that The Zoning Board of Appeals may reduce the minimum setback distance as appropriate based on site-specific consideration or written consent of the affected abutter(s) if the project satisfies all other criteria for the granting of a building permit under the provisions of this section.

- a. Utility Connections: Reasonable efforts, as determined by the Special Permit Granting Authority (Zoning Board of Appeals), shall be made to place all utility connections from wind energy facilities underground as depending on appropriate soil conditions, shape and topography of the site and any requirements of the utility provider.
- b. Modification: All material modifications to a wind energy facility made after issuance of the required building permit shall require approval by the Special Permit Granting Authority (Zoning Board of Appeals).
- c. Abandonment: Any wind energy facility which has reached the end of its useful life or has been abandoned shall be removed. The owner/operator shall physically remove the facility no more than 150 days after the date of discontinued operations. The applicant shall notify the Zoning Board of Appeals by certified mail of the proposed date of discontinued operations and plans for removal. Decommissioning shall consist of:
 1. Physical removal of all wind turbines, structures, equipment, security barriers and transmission lines from the site.
 2. Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations.
 3. Stabilization or re-vegetation of the site as necessary to minimize erosion. The Zoning Board of Appeals may allow the owner to leave landscaping or designated below-grade foundations in order to minimize erosions and disruption of vegetation.
 4. Decommissioning shall occur after one year of discontinued use without the Zoning Board of Appeals written consent. If the applicant fails to remove the facility in accordance with the requirements of this section within 150 days of abandonment or proposed date given by the applicant, the town may enter the property and physically remove the facility at the applicant's cost

through the financial surety set by town and applicant during Special Permit Approval.

I. B Wind Energy Conversion Systems in Commercial Overlay District – Permitted By-Right Use with Site Plan Review (Draft 3/1/10)

Administration

Placement of Wind Energy Conversion Systems-hereafter referred to as wind turbines - on any property in the Commercial Overlay District in the Town of Hamilton shall be a permitted use, however, will require Site Plan Review under the authority of the Planning Board, in addition to a building permit and any relevant electrical permits.

1. Submittal Requirements

The applicant shall submit a plan and supporting data, which shall bear the seal and signature of a registered professional engineer licensed to practice in Massachusetts. Submissions shall include the following:

- a. a plan showing:
 1. property lines of the applicant and abutters within 500 feet;
 2. proposed location of the wind turbine;
 3. location and uses (residence, garage, shed, etc.) of the proposed and abutters' buildings within 500 feet including distance from the proposed wind turbine to each of the buildings;
 4. overhead transmission and distribution lines, and any radio or telecommunications towers within 500 feet of the wind turbine;
 5. drainage or utility easements crossing within 500 feet of proposed power or control lines to or from the wind turbine;
 6. location of guy wire anchors, if any;
 7. location of all ways, driveways or roads, public or private, temporary or permanent within 500 feet of the proposed wind turbine;
 8. existing areas of tree cover, including average height of trees, on the site parcel and any adjacent parcels within a distance measured from the wind turbine foundation, of 1.2 times the height of the wind turbine;
 9. proposed changes to the landscape of the site, grading, vegetation clearing and planting, exterior lighting (other than FAA lights), screening vegetation or structures;
- b. a dimensional representation of the wind turbine mounted on its support structure, including foundation dimensions (both surface and depth), foundation

materials, method of attaching tower to foundations, wind turbine dimensions including, tower height and rotor diameter, and clearance distances of blades to ground and nearest structure to be prepared by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts;

- c. statement as to whether the proposed wind turbine is a tested production model, or an experimental, one-of-a kind or prototype design including manufacturer and model;
- d. wind turbine design data including manufacturer's specifications and installation/operation instructions; certification by the manufacturer or a registered engineer that tower design is sufficient to withstand wind load requirements for structures as established by the Mass. Building Code;
- e. site-specific wind speed data including the monthly mean wind-speed for a period no less than 6 months;
- f. An operation and maintenance plan for the wind turbine and associated buildings, vegetation and roadways;
- g. One or three line electrical diagram detailing wind turbine, associated components, and electrical interconnection methods, with all National Electrical Code compliant disconnects and over-current devices;
- h. A location map consisting of a copy of a portion of the most recent USGS Quadrangle Map at a scale of 1:25,000 showing the proposed facility site, including turbine site, and the area within at least two miles from the facility.
- i. Documentation of actual or prospective access and control of the project site.
- j. Proof of liability insurance
- k. Certification of height approval from the FAA
- l. Statement that evidences the wind energy facility's conformance with the provisions of the Department of Environmental Protection's, Division of Air Quality Noise Regulations (310 CMR 7.10).
- m. Description of financial surety in the form of either an escrow account, bond or otherwise, to cover the cost of removal in the event the town must remove the facility and remediate the landscape, in an amount and form determined to be reasonable by the Site Plan Review Authority (Planning Board), but in no event to exceed more than 125 percent of the cost of removal and compliance with the additional requirements set forth herein, as determined by the applicant. Such surety will not be required for municipally or state-owned facilities. The applicant shall submit a fully inclusive estimate of the costs associated with removal, prepared by a qualified engineer. The amount shall include a mechanism for calculating increased removal costs due to inflation.

2. Wind Turbine Standards

- a. Setback: A wind turbine may not be sited within: a distance equal to the height of the wind turbine from buildings, critical infrastructure, or private or public way that are not part of the wind energy facility; three (3x) the height of the turbine from the nearest existing residential or commercial structure; or one point five times (1.5x) the height of the turbine from the nearest property line. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations, or written consent of the affected abutter(s), if the project satisfies all other criteria for the granting of a building permit under the provisions of this section.
- b. Height: The height of wind turbine shall not exceed 450 feet in height.
- c. Minimum blade height: Minimum blade elevation shall be not less than 15 feet above the ground at the lowest point of blade arc.
- d. Sound: The operation of the wind facilities shall conform with the provisions of the Department of Environmental Protection's Division of Air Quality Noise Regulations (310 CMR 7.10).
- e. Labeling Requirements: Signs on wind energy facilities shall comply with the Town's sign by-law.

The following signs are required:

- 1. At least one sign shall be posted near ground level on the tower structure warning of high voltage and any danger;
- 2. Signage necessary to identify the owner, provide a 24-hour emergency contact phone number;
- 3. Educational signs providing information about the facility and the benefits of renewable energy.

In addition, the following information shall be posted on a label on the generator or alternator of the wind turbine, and on the wind turbine control panel:

- 1. Maximum power output of system and wind speed at which it is achieved;
- 2. Nominal voltages and maximum current;
- 3. Manufacturer's name and address, model number and serial number.
- 4. Normal and emergency shutdown procedures;
- 5. Maximum wind speed the wind turbine, in automatic unattended operation, can sustain without damage to structural components, or loss of ability to function normally.

Wind turbines shall not be used for displaying any advertising except for reasonable identification of the manufacturer or operator of the wind energy facility.

- f. Safety: The design of the proposed wind turbine shall be such that:
 - 1. In the event of loss of utility power, wind turbine shall not back feed a dead power line;
 - 2. In the event of high wind speeds, wind turbine shall brake or feather below survival wind speed;
 - 3. In the event of blade imbalance, wind turbine shall be able to support added blade weight of at least 10% at the tip of any blade.
 - 4. The applicant shall provide a copy of the project summary, electrical schematic and site plan to the police and fire departments. Upon request the applicant shall cooperate with local emergency services in developing an emergency response plan. All means of disconnecting the wind energy facility shall be clearly marked. The applicant or facility owner shall identify a responsible person for public inquiries or complaints throughout the life of the project.
 - 5. Wind energy facilities shall be sited in a manner that minimizes showing or flicker impacts. The applicant has the burden of proving that this effect does not have significant adverse impact on neighboring or adjacent uses.
- g. Wind Capacity. The wind turbine, inclusive of its supporting structure, shall be designed to withstand a wind speed of at least 120 miles per hour,
- h. Access: To prevent unauthorized climbing, tower access shall be restricted by EITHER:
 - 1. an impassable fence and locked gate, both at least 6 feet high, constructed around the perimeter of the base of the supporting structure, provided that such barrier is not required for any wind turbine erected on dwelling or other structure which provides no opportunity for climbing for at least 6 feet;
 - 2. OR removal of climbing apparatus on the support structure to at least 10 feet above the ground;
 - 3. OR anti-climbing shrouds over the bottom portion of the structure.

And electrical equipment shall be locked where possible.

- i. Building Code: Tower construction shall conform with the Mass, State Building Code as applicable.

- j. Guy Wires. If the tower is to be supported by guy wires, fencing must be provided to prevent grazing animals from rubbing against the wires, as uneven tension on wires can make tower unstable.
- k. Electromagnetic Interference with radio frequency communication, traceable to the operation or location of the wind turbine, shall be limited in accordance with all applicable sections of the Federal Communications Commission specifications.
- l. Appearance, color and finish. Color and appearance shall comply with Federal Aviation Administration (FAA) safety requirements.
- m. Lighting. Wind turbines shall be lighted only if required by the FAA. Lighting of other parts of the wind energy facility, such as appurtenant structures, shall be limited to that required for safety and operational purposes, and shall be reasonably shielded from abutting properties. Except as required by the FAA, lighting of the wind energy facility shall be directed downward and shall incorporate full cut-off fixtures to reduce light pollution.
- n. Utility Connections. Reasonable efforts, as determined by the Site Plan Review Authority (Planning Board), shall be made to place all utility connections from the wind energy facility underground, depending on appropriate soil conditions, shape and topography of the site and any requirements of the utility provider. Electrical transformers for utility interconnections may be above ground if required by the utility provider.
- o. Appurtenant Structures. All appurtenant structures to wind energy facilities shall be subject to reasonable regulations concerning the bulk and height of structures, lot area, setbacks, open space, parking and building coverage requirements. All such appurtenant structures, including but not limited to, equipment shelters, storage facilities, transformers, and substations, shall be architecturally compatible with each other and contained within the turbine tower whenever technically and economically feasible. Whenever reasonable, structures, should be shaded from view by vegetation and/or located in an underground vault and joined or clustered to avoid adverse visual impacts.
- p. Land Clearing, Soil Erosion and Habitat Impacts. Clearing of natural vegetation shall be limited to that which is necessary for the construction operation and maintenance of the wind energy facility or otherwise prescribed by applicable laws, regulations and bylaws.
- q. Monitoring and Maintenance. The applicant shall maintain the wind energy facility in good condition. Maintenance shall include, but not be limited to, painting, structural repairs, and integrity of security measures. Site access shall be maintained to a level acceptable to the local Fire Chief and Emergency Medical Services. The project owner shall be responsible for the cost of maintaining the wind energy facility and any access road(s).
- r. Modification. All material modifications to a wind energy facility made after issuance of the required building permit shall require approval by the Site Plan Review Authority (Planning Board).

- s. Abandonment. Any wind energy facility which has reached the end of its useful life or has been abandoned shall be removed. The owner/operator shall physically remove the facility no more than 150 days after the date of discontinued operations. The applicant shall notify the Planning Board by certified mail of the proposed date of discontinued operations and plans for removal. Decommissioning shall consist of:
1. Physical removal of all wind turbines, structures, equipment, security barriers and transmission lines from the site.
 2. Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations.
 3. Stabilization or re-vegetation of the site as necessary to minimize erosion. The Planning Board may allow the owner to leave landscaping or designated below-grade foundations in order to minimize erosions and disruption of vegetation.
 4. Decommissioning shall occur after one year of discontinued use without Planning Board written consent. If the applicant fails to remove the facility in accordance with the requirements of this section within 150 days of abandonment or proposed date given by the applicant, the town may enter the property and physically remove the facility at the applicant's cost through the financial surety set by town and applicant during Site Plan Review.