

# WIND TURBINE ZONING PETITION

June 30, 2009

Public Hearing

City Council Ordinance Committee

For most cases: Special Permit required for Wind Turbines

- **Applies Citywide**
- **Building Mounted & Free-Standing Wind Turbines**

### **Criteria**

- Visual impacts:
  - neighborhood character – size, scale, bulk
  - significant viewsheds
  - sensitivity and character of abutting buildings/uses
- Impact on the natural environment and recreational use
- Shadow: extent; frequency and duration of intermittent shadow
- Noise



## In limited cases: Wind Turbines allowed As-of-Right

- **Educational Purposes only in C3, C3-A, C3-B, SD-6**
- **Building Mounted Turbines Only**

- Temporary installations up to two years; renewable
- No taller than 40 feet over the building height
- 200 feet or more from the nearest residential use
- Setbacks from the parcel line:

<u>Turbine height</u>	<u>Setback</u>
< 10'	no setback required
10' - 20'	25' setback
> 20'	50' setback

# Requirements

- **Both Special Permit and As-of-Right**

## **General**

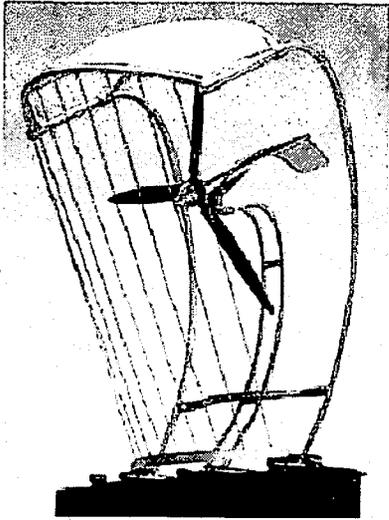
- No cellular/mobile phone equipment
- No signage, advertising , lighting, or bright colors
- Meet the Noise Ordinance, cumulatively, for the site
- Maintenance to be accommodated within the property

## **Power capacity**

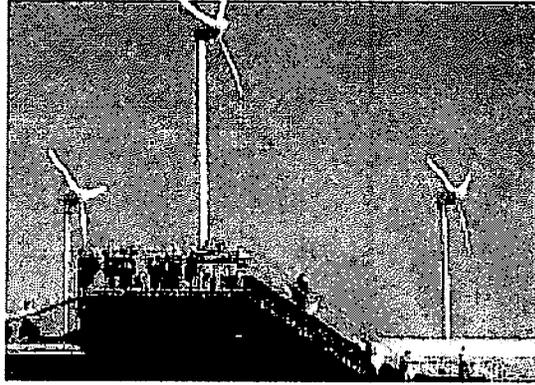
- Turbines in residential districts must be of residential scale capacity
- May send excess power to the grid consistent with State provisions

## **Safety**

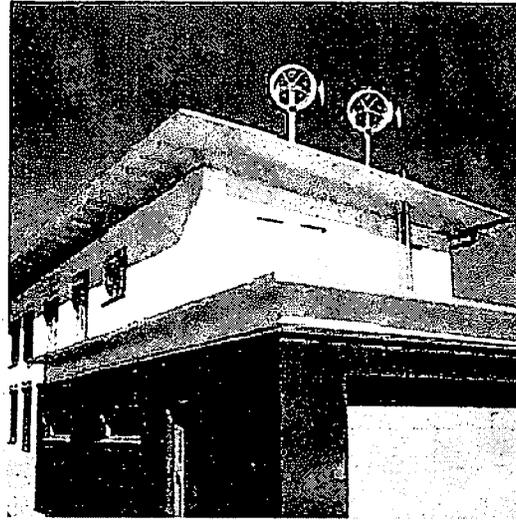
- Equipment that is non-functioning or abandoned for two years or more must be removed



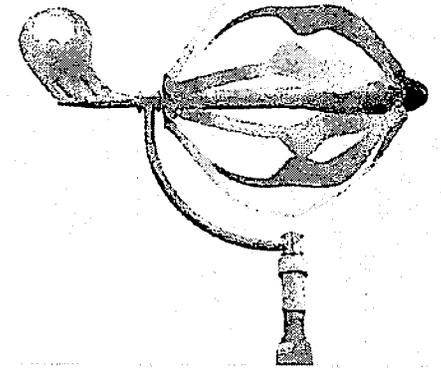
Architectural Wind



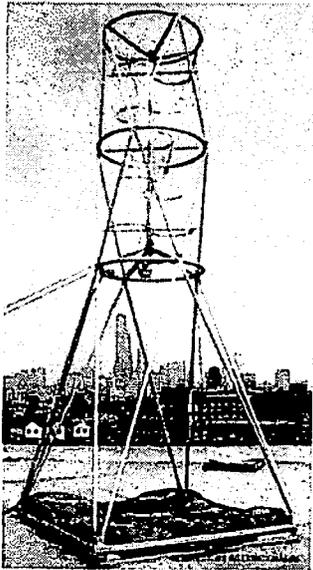
WES Tulipo



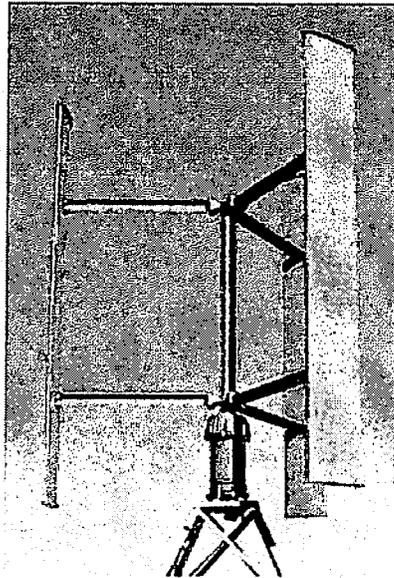
Enflo Windtec



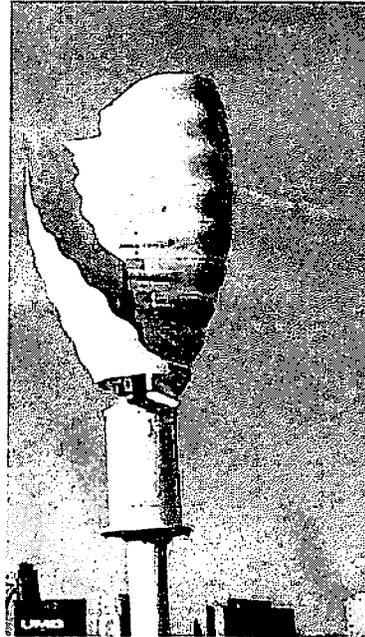
Energy Ball



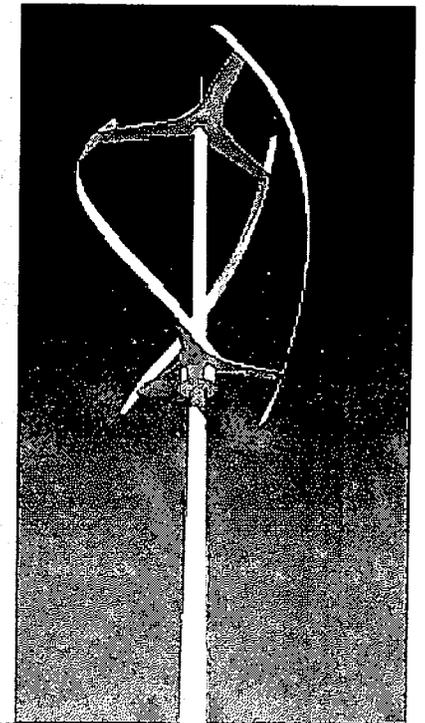
Aerotecture



Cleanfield



Helix Wind



Quiet Revolution

STATEMENT TO THE CAMBRIDGE CITY COUNCIL ORDINANCE COMMITTEE  
ON PROPOSED ZONING AMENDMENTS TO ALLOW WIND ENERGY TURBINES

David Rabkin, Chair  
Cambridge Climate Protection Action Committee

June 30, 2009

As chair of the Cambridge Climate Protection Action Committee, an advisory committee to the City Manager on the implementation of the Cambridge Climate Protection Plan, I am conveying the Committee's support for the approval of proposed amendments to the City's Zoning Ordinance that would allow wind energy turbines to be installed in Cambridge.

Based on the City's inventory of greenhouse gas emissions, we know that the burning of fossil fuels, such as coal and oil, to generate electricity is the largest source of emissions in Cambridge. We also know that the scientific community is advising that the rate of emissions going into the atmosphere – which is still actually increasing – level off around the year 2015 and begin to decline at a rate that enables us to reduce emissions globally by about 80 percent by 2050. The longer we wait to start decreasing emissions, the harder and more costly it becomes to reach the 80 reduction level by 2050. The City Council recently recognized this dire situation when it passed a resolution recognizing the "climate emergency". It is critically important that we substitute renewable energy sources such as wind and solar, for fossil fuels as soon as and as much as possible.

The Committee understands that there are limited opportunities to generate renewable energy from wind in Cambridge due to a number of site factors. In fact, we expect that the use of renewable energy in the regional electric grid, from which our city receives its power, will be the most important arena where renewable energy really needs to expand and that there are also important renewable energy opportunities for solar. But, Cambridge has an important role to play in advancing wind technology.

Wind energy companies are working on designs that may operate more effectively in urban environments, where wind turbulence and obstructions are a major hindrance. In order for these entrepreneurs to advance their products, they need places to try them out. With the presence of our prestigious research universities, the Committee thinks Cambridge can play a key role as an incubator and host for small wind turbines. We also have major corporations and citizens that are willing and able financially to host wind energy systems on their buildings.

Allowing wind turbines as of right within the boundaries of university campuses and by special permit elsewhere strikes a reasonable balance between the need to adopt renewable energy technology while addressing potential issues such as noise and aesthetic impacts. The Committee supports this approach and urges the City Council to approve the proposed amendments.

C

**A. Amend the Table of Use Regulations, Section 4.30, by adding a new use category "j. Wind Turbine" in Section 4.32.**

---

**4.30 TABLE OF USE REGULATIONS**

**4.32 Transportation, Communication & Utility Uses**

- a. Bus or railroad passenger station
- b. Automobile parking lot or parking garage for private passenger cars <sup>18</sup>
- c. Railroad freight terminal, railroad yard and shops
- d. Truck or bus terminal, yard or building for storage or servicing of trucks, trailers or buses, parking lot for trucks
- e. Radio and Television transmission station, including towers
- f. Radio and television studio
- g. Utilities
  - 1. Telephone exchange (including switching, relay and transmission facilities serving mobile communications systems) and any towers or antennas accessory thereto<sup>49</sup>
  - 2. Transformer station, substation, gas regulator station, or pumping station
  - 3. Power Plant for the non-nuclear production, generation, and distribution of electricity or steam.
- h. Helipad or Airport
- i. *Vehicle Sharing Parking Facility*

PB<sup>56</sup>

**j. Wind Turbine Installation**

**PB<sup>57</sup> (in all districts)**

**B. Amend the Footnotes to the Table of Use Regulations, Section 4.40, by adding a new Footnote 57 to read as follows:**

---

**4.40 FOOTNOTES TO THE TABLE OF USE REGULATIONS**

**57 Subject to the provisions of Section 11.40.**

**C. Amend Section 5.22 to read as follows:**

---

**5.23 Height Exceptions.** The provisions of this Ordinance governing the height of buildings and structures in all districts shall generally not apply to (a) chimneys, water towers, air conditioning equipment, elevator

bulkheads, skylights, ventilators and other necessary features appurtenant to buildings which are usually carried above roofs and are not used for human occupancy, (b) to domes, towers, or spires above buildings if such features are not used for human occupancy, and occupy less than ten (10) percent of the lot area, **and** (c) to wireless or broadcasting towers and other like unenclosed structures which occupy less than ten (10) percent of the lot area **and (d) to wind turbines, subject to the requirements and limitations set forth in Section 11.40.**

However, building elements enumerated in (a) above shall be limited in height where they are placed on a building located in a non-residential district, which district abuts a Residence A-1, A-2, B, C, C-1, C-1A, C-2, C-2A, C-2B district. In these instances the following height limitations shall apply to those building elements:

1. The elements must be below one or more forty-five (45) degree bulk control planes. Each bulk control plane shall begin, in the vertical dimension, at the maximum height limit permitted in the non-residential zoning district. In the horizontal dimension, the plane shall begin at the residential/non-residential zoning district line: however, where that line lies within a street, the plane shall begin at the front lot line, located nearest the zoning district line, of the lots on which the building is sited. Thereafter the bulk control plane shall rise from its beginning over the non-residential zoning district. *(See illustrative figure 5.23)*
2. The limitations in Paragraph 1 above may be waived by special permit from the Planning Board upon a finding by the Board that the additional height is necessary. In making that determination the Planning Board shall consider the special and unique requirements of the use that the elements are serving, any special constraints imposed by the site upon which the building is located, the nature and character of development in the adjacent residential district, and the extent to which successful efforts are made to minimize the visual and acoustical impact of the elements on neighbors.

***D. In Article 11.000 create a new Section 11.40 to read as follows:***

---

## **ARTICLE 11.000 SPECIAL REGULATIONS**

**11.10 TOWNHOUSE DEVELOPMENT**

**11.20 *Vehicle Sharing Parking Facility***

**11.30 FAST ORDER FOOD ESTABLISHMENTS**

**11.40 WIND TURBINE INSTALLATION**

**11.50 DELETED See Article 20.000**

**11.60 DELETED See Article 20.000**

**11.70 DELETED See Article 20.000**

**11.80 EMPLOYMENT PLAN COMPLIANCE PROCEDURE**

**11.90 DELETED**

**11.100 DELETED See Article 20.000**

**11.200 AFFORDABLE HOUSING REQUIREMENTS**

**11.300 DELETED See Article 20.000**

**11.400 DELETED See Article 20.000**

**11.500 PLANNING OVERLAY REQUIREMENTS**

**11.40 WIND TURBINE INSTALLATION [ all new]**

**11.41** *Purpose.* It is the intent of this Section 11.40 to permit the limited use of wind turbines throughout the city (a) for the purpose of small scale generation of electricity for on-site consumption as an accessory use to other activities located on the same lot, (b) for the purpose of researching, testing, evaluating, or demonstration of the efficacy in an urban setting of such instruments as a means by which renewable sources of energy might be employed to generate electricity at a larger scale for both a domestic and commercial purposes, and (c) in appropriate locations in non residential districts for the generation of electricity for commercial sale as a principal use. These provisions are intended to ensure that such facilities are well designed, carefully sited, and operated in a manner that will not pose a nuisance or hazard to the general public or nearby neighbors.

**11.42** *Wind Turbine Installation Permitted As-of-right.* The installation of a wind turbine and associated monitoring and testing equipment shall be permitted as-of-right in a Residence C-3, C-3A, C-3B and Special District 6 zoning districts as a use accessory to an educational use, Section 4.56 c, Paragraphs 4-6, dormitory use accessory to such educational use, Section 4.56 c, Paragraph 8, or museum use, Section 4.56 i, Paragraph 2 where such museum has as its core mission the display, exploration and dissemination of knowledge, scientific principles, and natural phenomena to the general public. While installation of wind turbine equipment as a principal commercial use for the express purpose of selling the energy generated is not permitted, it is understood that a portion of the energy generated by the facilities herein permitted that is not immediately consumed on-site may at times be sold back or credited to the local-serving power utility.

The wind turbine must be installed on a building and may not be a freestanding structure.

The installation shall be subject to the following conditions and limitations and shall only be installed for the purpose of advancing the educational and instructional purposes of the institution to which it is accessory and shall not be installed for the specific and principal purpose of generating electricity for sale.

**11.42.1** *Dimensional Limitations.* The following dimensional limitations shall apply.

1. *Height:* The wind turbine may not extend more than forty (40) feet above the existing height of the portion of the building upon which it is mounted. Such limitation shall apply even if the height of the building is non-conforming and already exceeds the height of structures permitted in the zoning district. The

height shall be measured to the highest point of the turbine, including the height of blades when in the vertical position.

2. *Setbacks.* The following minimum setbacks shall be required and they shall apply regardless of the location of the building upon which the turbine is installed.

a. No portion of the turbine may be located nearer than two hundred (200) feet to any structure containing a residential use (exclusive of transient residential uses, Section 4.31 i) that is neither owned nor under the control of the educational or museum institution erecting the turbine.

b. All portions of the turbine shall comply with the following setbacks from any public street line or from a lot line of a lot not in the ownership of the educational or museum institution erecting the turbine.

(1) No setback shall be required for a turbine having a vertical dimension of ten (10) feet or less.

(2) Twenty-five (25) feet for a turbine having a vertical dimension greater than ten feet but no more than twenty feet.

(3) Fifty (50) feet for a turbine having a vertical dimension greater than twenty feet.

No other yard setbacks shall apply.

#### 11.42.2

##### *Other Limitations and Requirements.*

1. *Time Limit.* A building permit authorizing the installation of a wind turbine under the provisions of this Subsection 11.42 shall lapse after two years unless a request in writing is submitted to the Inspectional Services Department for an extension of the permit for an additional two years. Such extension shall not be unreasonably withheld and may be granted if the conditions and requirements of this Subsection 11.42 continue to be met by the turbine installation and no nuisance or hazard has been identified during the previous two years of operation. Such building permit may be extended for additional two year intervals without limit.

2. The wind turbine shall be free from any appurtenances with the exception of equipment necessary to monitor, regulate, secure, and maintain the installation and the electricity it may produce. No sign may be attached to the installation equipment with the exception of unobtrusive manufacturer identification and operational guidance informational signs. No cellular or mobile phone equipment may be attached to the installation equipment.

3. The equipment shall not be independently lighted except as may be required by any local, state or federal regulation.
4. Equipment shall be painted in subdued tones of white, black, silver, grey, dark green, brown, blue or similarly subdued, non-reflective color unless otherwise required by local, state or federal regulations.
5. In operation the equipment shall meet the requirements of the Cambridge Noise Ordinance, cumulatively for all equipment installed at a single building location. All equipment shall be rated for noise generation so that it can be evaluated prior to installation.
6. The site shall be capable of accommodating the laydown of the equipment without trespass onto city streets or adjacent lots held in a different ownership.
7. Turbines shall be designed and located so as to prevent unauthorized access and otherwise be maintained in a safe operating condition.
8. *Abandonment.* Given the unique safety considerations associated with wind turbines, abandonment of the facility through disuse for a period of two years, non-functioning equipment that is unrepaired for more than 100 days, or failure to request an extension of the building permit, shall obligate the owner to remove the equipment. Failure to remove the installation 150 days after any one of these threshold events occurs, shall constitute authorization for the City of Cambridge to enter the property and remove the installation at the expense of the owner/operator where it finds that the equipment constitutes a hazard to the general public. At or before issuance of a building permit for the Installation, the permittee shall post a bond or other surety in a form and in an amount acceptable to the City that shall cover the cost of removal of the Installation by the City should that be necessary, such bond amount to be consistent with estimates for removal prepared at the permittee's expense by a qualified engineer. The surety mechanism shall account for cost of living adjustments over the expected life of the facility.

**11.43**

*Wind Turbine Installation Permitted by Special Permit.* Wind Turbine Installations not meeting the requirements of Section 11.42 above (including commercial applications and freestanding equipment) may be permitted anywhere in the city only after the granting of a special permit from the Planning Board subject to the following conditions and limitations.

Installation of wind turbine equipment as a principal use for the express purpose of the commercial selling of the energy generated shall be permitted only in non-residential zoning districts. In residential districts such commercial use is not permitted. However, it is understood that in those residential districts a portion of

the energy generated by the facility that is not immediately consumed on-site may at times be sold back or credited to the local-serving power utility. Furthermore, a cooperative facility serving multiple adjacent properties shall be permitted and may share the output of the facility without being considered a commercial use.

**11.43.1**      *Dimensional Limitations.*

1. Height. There shall be no maximum height limit but all heights proposed shall be specifically approved by the Planning Board.
2. Setbacks. There shall be no required minimum yard setbacks for the wind turbine, but all setbacks proposed shall be specifically approved by the Planning Board. All equipment and structures accessory to the wind turbine shall be subject to the yard requirements of the applicable zoning district unless waived by the Planning Board.

**11.43.2.**      *Other Limitations and Requirements.*

1. The wind turbine shall be free from any appurtenances with the exception of equipment necessary to monitor, regulate, secure, and maintain the installation and the electricity it may produce. No sign may be attached to the installation equipment with the exception of unobtrusive manufacturer identification and operational guidance informational signs. No cellular or mobile phone equipment may be attached to the installation equipment.
2. The equipment shall not be independently lighted except as may be required by any local, state or federal regulation.
3. Equipment shall be painted in subdued tones of white, black, silver, grey, dark green, brown, blue or similarly subdued, non-reflective color unless otherwise required by local, state and/or federal regulations or allowed by the Planning Board.
4. Where mounted on a building, the Installation shall be well integrated with the architecture of the building.
5. Where feasible, recognizing the potential unique prominence of some wind turbines, the Installation should be screened from view from public streets and from adjacent properties. Where their visibility cannot be minimized, the installation should be thoughtfully integrated into the larger urban landscape, with a recognition that a facility has the potential to provide an iconic, positive focal point in the landscape.
6. In operation the equipment shall meet the requirements of the Cambridge Noise Ordinance, cumulatively for all equipment installed at a single location. All

equipment shall be rated for noise generation so that it can be evaluated prior to installation.

7. The site shall be capable of accommodating the laydown of the equipment without trespass onto city streets or adjacent lots held in a different ownership.

8. Turbines shall be designed and located so as to prevent unauthorized access and otherwise be maintained in a safe operating condition.

9. *Abandonment.* Given the unique safety considerations associated with wind turbines, abandonment of the facility through disuse for a period of two years, non-functioning equipment that is unrepaired for more than 100 days, or failure to request an extension of a special permit, where that special permit may have been time-limited by the Planning Board, shall obligate the owner to remove the equipment. Failure to remove the installation 150 days after any one of these threshold events occurs, the City of Cambridge shall have the authority to enter the property and remove the installation at the expense of the owner/operator where it finds that the equipment constitutes a hazard to the general public. At or before issuance of a building permit for the Installation, the permittee shall post a bond or other surety in a form and in an amount acceptable to the City that shall cover the cost of removal of the Installation by the City should that be necessary, such bond amount to be consistent with estimates for removal prepared at the permittee's expense by a qualified engineer. The surety mechanism shall account for cost of living adjustments over the expected life of the facility.

### 11.43.3

#### *Application Material.*

At a minimum the special permit application shall contain the following material.

1. Plans of the site showing the location of the Installation and its relationship to other uses and buildings on the site, including elevations of the Installation and other features on the site; plans, descriptions, illustrations and/or photographs describing the surrounding uses and physical context in sufficient detail to allow an assessment of the proposal on those surrounding activities; illustration of the laydown options for maintenance of the equipment; any proposed screening and landscaping.

2. A detailed description of the Installation equipment including number, size, materials, noise rating, operational plan, maintenance schedule.

3. A narrative discussion of the extent to which the operation of the proposed equipment will generate continuous shadows, intermittent shadows (a.k.a. flicker), and/or noise that may be detected from adjacent properties and from the public street.

4. Photo simulations or other representations, from at least two vantage points (one of which should be from a public street), illustrating the proposal in its physical context.

**11.43.4**      *Standards for Granting of the Special Permit.*

In addition to the criteria established in Section 10.43 of the Zoning Ordinance for the granting of a special permit, the Planning Board shall consider the following specific criteria.

1. The visual impact of the Installation on the abutting properties and the neighborhood. In recognition of the fact that an Installation of any significant size will introduce a physical structure and form not typical of most residential and commercial neighborhoods in the city, the Planning Board shall consider the following when assessing whether a proposal has any unreasonable negative impacts on neighborhood character or adjacent uses: size, scale and bulk of the Installation in relationship to the scale of typical building and other elements in the neighborhood; the visibility and impact of the Installation from important view corridors and viewsheds; the nature of adjacent uses, including the historical and architectural quality of the buildings containing those uses, the consistency of that architectural character over an extended area, and the extent to which the Installation is well integrated with that character.

Where an Installation is proposed in an Open Space District or near an open space facility, particularly one with a significant natural aspect, the Installation's impact on any conservation, historic, or recreational value should be carefully analyzed.

2. The extent, frequency and duration of continuous and intermittent shadows and their relationship to interior spaces and places people will regularly occupy. Such impacts should be minimized and directed away from sensitive spaces in residential environments. It shall be the burden of the applicant to demonstrate that there shall be no significant adverse impact on adjacent properties.

3. The extent of detectable noise and vibration impact on neighboring uses.

4. Other factors with regard to the operational and visual impacts of the Installation that suggest that a time limitation should be imposed on the permit.

**11.44**      **Definitions**

*Wind Turbine Installation.* A combination of equipment designed to be permanently mounted on a building or freestanding, including wind turbines and associated and accessory equipment and structures, necessary to convert wind energy to electricity.

*Wind Turbine.* A device that converts wind energy to rotational energy that then drives an electrical generator. A conventional turbine generally consists of a tower or pole, a nacelle body, and a rotor with multiple blades. Variations may include structural elements housing and encapsulating the rotating elements of the turbine. It is anticipated that as testing and experimentation continues the physical form of turbines may become much more varied.