

Tri-County Regional Planning Commission

WIND ENERGY FACILITIES

MODEL ORDINANCE

Introduction

A model ordinance has been created to regulate the installation, operation and use of wind energy facilities. The model ordinance was developed using a variety of ordinances from municipalities around the state and from ordinances in surrounding states.

The model ordinance is an “all-inclusive” ordinance. The model is intended to provide a thorough review of all aspects of wind energy facilities that could be regulated. Municipalities should review this ordinance, examine their local situation, and adopt the regulations that make the most sense for their municipality, modifying anything they deem inappropriate.

The model regulations for principal wind energy facilities are primarily from the Tri-County Regional Planning Commission’s Model Zoning Ordinance, Section 1882. In some instances additional regulations have been added to coordinate with the provisions for accessory wind energy facilities and incorporation of regulations in more current models.

The model regulations for wind energy facilities offer regulations which could be modified to suite a particular municipality. In some cases, multiple ways to regulate a certain aspect of wind energy are offered. In these cases the word “OR” has been placed in the text of the ordinance. Municipalities should choose the option that works best with their existing ordinances and regulatory framework. Also, in some instances, a range of options may be provided. In these cases, the sample range is provided in brackets with the regulations commonly found in other ordinances and an “XX” (15’, 20’ or XX) to indicate that municipalities may want to adopt a different standard.

This model ordinance is intended to be advisory only and is not intended to be relied upon as legal advice. A municipality is not required to adopt this ordinance. Municipal officials are urged to seek legal advice from their solicitor before enacting such an ordinance.

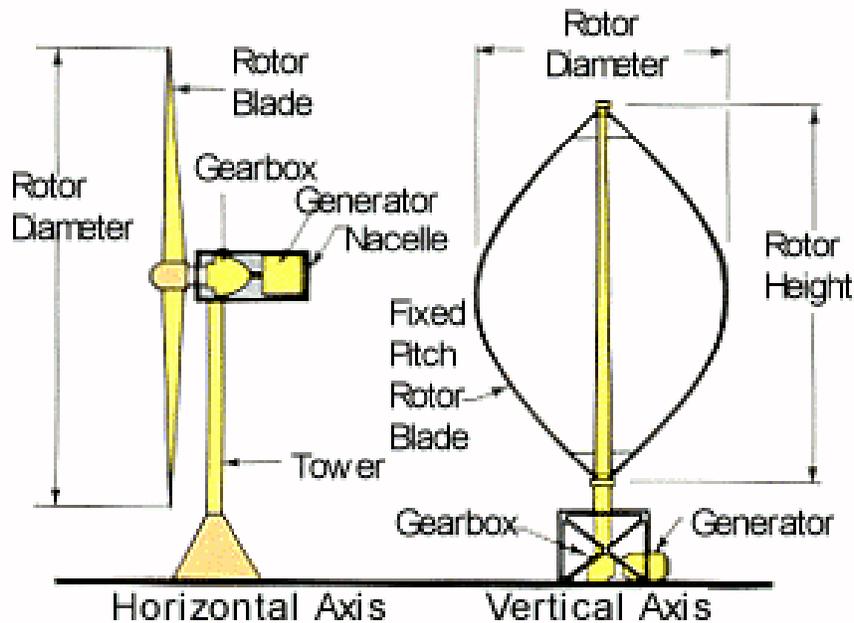
What is a wind energy facility?

Wind is a form of solar energy. Winds are caused by the uneven heating of the atmosphere by the sun, the irregularities of the earth’s surface, and the rotation of the earth. Wind flow patterns are modified by the earth’s terrain, bodies of water and vegetative cover. The wind flow, when “harvested” by modern wind turbines, can be used to generate electricity.¹

The term wind energy describes the process by which the wind is used to generate mechanical power or electricity. Wind turbines convert the kinetic energy in the wind into mechanical

power. This mechanical power can be used for specific tasks (such as grain or pumping water) or can convert mechanical power into electricity to power homes, businesses, schools and the like.ⁱⁱ

Modern wind turbines fall into two basic groups: the horizontal axis variety, like the traditional farm windmills used for pumping water, and the vertical axis design, like the eggbeater style Darrieus model, named after its French inventor. Most large modern wind turbines are horizontal axis turbines.ⁱⁱⁱ In limited instances turbines are installed directly onto building rooftops or designed as part of the building itself. These installations appear mostly in urban areas where small property sizes may prevent the use of towers elsewhere on the property.^{iv}



Wind Turbine Configurations

Source: Lancaster County Planning Commission, Municipal Guide to Planning for and Regulating Alternative Energy systems, October 2010



Source: American Wind Energy Association (AWEA) website

When regulating wind energy facilities the distinction should be made between principal wind energy facilities and accessory wind energy facilities.

Both types of wind energy facilities should be defined and regulations developed for each type of use. Only providing for one type could be construed as exclusionary. Furthermore, regulating all wind energy facilities with a one-size fits all approach will result in inconsistent and inappropriate regulations.

It is also critical to examine industry standards when developing ordinances for wind energy facilities. Technology is changing at a rapid pace and failure to seek advice from industry professionals may result in an ordinance that may not reflect the requirement and capabilities of the industry.

Principal Wind Energy Facility

A principal wind energy facility is an electric generation facility comprised of a group of wind turbines and associated control/conversion/distribution/ equipment and structures whose main purpose is to supply electricity for commercial use.

Accessory Wind Energy Facility

An accessory wind energy facility is an electric generation facility comprised of a wind turbine, tower, and associated control/conversion/distribution equipment and structures constructed primarily for generation of electricity for on-site use.

ORDINANCE CONSIDERATIONS

Principal Wind Energy Facility (PWEF)

In 2006, the Pennsylvania Wind Working Group developed a model ordinance for principal wind energy facilities. The Working Group included representatives from both the public and private sectors. The complete model can be found online at www.pawindenergynow.org. Following is a summary of the model ordinance considerations for principal wind energy facilities.

- **Zoning Districts/Use Standards:** Consideration should be given to the appropriate zoning districts and whether the PWEF should be permitted by right, conditional use or special exception. PWEF should be considered a principal use and should be restricted to agricultural, rural, commercial, industrial and light industrial districts. Rarely are they permitted by right, but are commonly permitted by conditional use or special exception. The use of an overlay district that permits PWEF where wind resources are most prominent is also a consideration.
- **Lot Size:** Conformance with required setbacks generally guides determination of minimum lot size.
- **Setbacks:** Setbacks should be established from occupied buildings, property lines, public rights-of-way and public buildings. The height of the PWEF should be related to the minimum setbacks with higher structures being permitted with larger setbacks.
- **Height:** The Federal Aviation Administration (FAA) has oversight over any object that could have an impact on communications in navigable airspace. The FAA requires that a Notice of Proposed Construction or Alteration be filed for any project that would extend more than 200 feet above the ground.^v
- **Design and Installation:** The layout, design and installation of principal wind energy facilities should conform to applicable industry standards, including those of the American National Standards Institute (ANSI), Underwriters Laboratories (UL), Det Norske Veritas, Germanischer Lloyd Wind Energies, the American Society of Testing and Materials (ASTM), or other pertinent certifying organizations and comply with all applicable building and electrical codes. As technology evolves, municipalities developing design and installation regulations should consult these organizations and other industry associations such as the American Wind Energy Association to research current standards.
- **Visual Appearance:** PWEF should be non-obtrusive in color, should not be artificially lighted (except as required by FAA), should not display advertising, and have all transmission and power lines placed underground.
- **Use of Public Roads:** Due to the size and weight of the equipment, the applicant should identify how the equipment will be transported to the site and demonstrate how damage to the transportation system will be repaired.

- **Local Emergency Services:** Applicant should coordinate with local emergency services.
- **Noise:** Sound from the PWEF should not exceed 55 dBA, as measured from the property line and at the rated wind speed.
- **Shadow Flicker:** Applicant should compute and minimize shadow flicker on adjoining inhabited buildings.
- **Warning and Safety Measures:** Warning signs concerning voltage and safety should be displayed. Wind turbines should not be climbable and access doors to wind turbines and equipment should be locked and fenced.
- **Liability Insurance:** Applicant should be required to maintain general liability insurance.
- **Decommissioning:** Applicant should be required to have a plan for decommissioning the PWEF.
- **Public Inquires:** Applicant should be required to identify a responsible person and provide full contact information for public inquires.



Accessory Wind Energy Facility (AWEF)

In 2008, the American Wind Energy Association developed model ordinance considerations for small wind energy systems. The document, In The Public Interest: How and Why to Permit Small Wind Energy Systems^{vi}, provides an overview of issues to be considered when regulating AWEF. Following are ordinance considerations for regulating AWEF taken from that document and other models throughout Pennsylvania and surrounding states.

- **Zoning District/Use Standards:** The zoning districts that allow AWEF vary by municipality depending on the nature of the community. In more rural municipalities, AWEFs may be permitted in all zoning districts as larger lot sizes easily accommodate setbacks required by AWEF. In more urbanized areas, the use of AWEFs may be limited to certain zoning districts such as agriculture, commercial or industrial as smaller, densely populated lots may not have the land required to support SWEF related setbacks.
- **Number of AWEFs:** Generally, the number of free standing AWEFs should be limited to one per lot.
- **Location:** A municipality should consider where on the property the AWEF should or should not be located (i.e. front or rear yard, in or out of required setbacks, etc.).
- **Lot Size:** Minimum lot requirements vary by municipality and range from approximately 1-5 acres. Conformance with required setbacks should guide determination of the minimum lot size.
- **Setbacks:** Required setbacks should be established from property lines, public rights-of-way, public utility lines and occupied buildings. Minimum required setbacks should be the distance equal to the total extended height of the tower, but greater setbacks are common.
- **Height:** Tower height is the most important factor in the viability of a small wind energy system. Taller towers allow for access to faster, unobstructed winds. The average height of a small wind turbine is about 80 feet, with a range of 30-140 feet. The bottom of the turbine should clear the highest wind obstacles (trees, rooftops, etc.) within a 500 foot radius by at least 30 feet. Most commonly height is limited to the tower height plus the length of one blade (the turbine's "total extended height") from the property line, inhabited neighboring structures, utility lines and/or road rights-of-way.^{vii} In some instances, there are no maximums placed on tower height, except those required by the FAA, as long as noise limits and minimum setback requirements are met.
- **Sound:** Modern AWEF generally emit sound that is barely discernable from ambient noise. If municipalities choose to regulate sound, the sound produced by the turbine under normal operating conditions, as measured at the property line, should not exceed the definition of nuisance noise in that municipality. Fluctuations in sound that exceed nuisance are to be expected, but are associated with short term events generating excessive wind.
- **Design and Installation:** The layout, design and installation of AWEF should conform to applicable industry standards, including those of the American National Standards Institute (ANSI), Underwriters Laboratories (UL), Det Norske Veritas, Germanischer Lloyd Wind Energies, the American Society of Testing and Materials (ASTM), or other pertinent certifying organizations and comply with all applicable building and electric codes. As technology evolves, municipalities developing design and installation

regulations should consult these organizations and other industry associations such as the American Wind Energy Association to research current standards.

- **Structures:** When an accessory building is necessary for storage cells or related mechanical equipment, the accessory building shall be required to comply with the accessory building requirements of the underlying zoning district.
- **Soil Studies:** Soil studies should be required only for installations of 20kW systems or greater as manufacturer's specifications typically consider the full realm of operating conditions and associated foundation needs.
- **Compliance with FAA Regulations:** FAA coordination is required for towers over 200 feet tall. Municipalities with Airport Hazard Overlay Zoning may be required to have further coordination with PennDOT's Bureau of Aviation and the FAA.
- **Utility Notification:** Applicants installing AWEF should be required to apply for and have the approval of the public utility for the interconnection of the AWEF with the utility grid. Off-grid systems should be exempt from this requirements.
- **Abandonment/Decommissioning:** The municipality should consider requiring owners to decommission AWEF that are inoperable for a period of time (6-12 months) for safety reasons.
- **Signage:** AWEF should not be permitted to display any advertising.
- **Lighting:** No illumination of the turbine or tower should be allowed unless required by the FAA.
- **Warnings and Safety Measures:** The owner should be required to post hazard warning signs on or near the AWEF. AWEF owners should be required to propose mechanisms such as removing climbing rungs or blocking lattice towers to discourage unauthorized climbing. Some municipalities require fencing of AWEF sites which can increase project costs.
- **Permit Requirements/Registration:** Zoning and/or building permit applications for AWEF should be required and should be accompanied by a site plan, standard drawings of the wind turbine structure and stamped engineering drawings of the tower, base, footings and/or foundation as provide by the manufacturer.

**WIND ENERGY FACILITIES
MODEL ORDINANCE**

ORDINANCE NO __ - __

**AN ORDINANCE OF [MUNICIPALITY], PENNSYLVANIA, FOR THE REGULATION
OF WIND ENERGY FACILITIES AND DEFINING TERMS USED HEREIN.**

SECTION 1. TITLE

This ordinance shall be known and may be cited as the Wind Energy Facilities Ordinance.

SECTION 2. AUTHORITY

The [Council – Board] of [municipality], under, and by virtue of and pursuant to the authority granted by Act 247, Pennsylvania Municipalities Planning Code does hereby enact and ordain this ordinance.

SECTION 3. APPLICABILITY

- (A) This ordinance applies to wind energy facilities to be installed and constructed after the effective date of this ordinance, and all applications for wind energy facilities.
- (B) Wind energy facilities constructed prior to the effective date of this ordinance shall not be required to meet the requirements of this ordinance.
- (C) Any upgrades, modifications or changes that materially alter the size or placement of an existing wind energy facility shall comply with the provisions of this ordinance.

SECTION 4. PURPOSE

The purpose of this ordinance is to promote the use of wind energy and to provide for the land planning, installation and construction of wind energy facilities in [municipality], subject to reasonable conditions that will protect the public health, safety and welfare.

SECTION 5. DEFINITIONS

The following words, terms and phrases, when used in this ordinance, unless the context indicates otherwise, shall have the following meanings ascribed to them:

Accessory Wind Energy Facility – A system designed as a secondary use on a lot, wherein the power generated is used primarily for on-site consumption.

Facility Owner – The entity or entities having a legal or equitable interest in the Wind Energy Facility, including the respective successors and assigns.

Flicker – A repeating cycle or changing light intensity.

Ground Clearance – The Minimum distance between the ground and any part of the wind turbine blade, as measured from the lowest point of the arc of the blades.

Hub Height – The distance measured from the surface of the tower foundation to the highest point of the wind turbine hub, to which the blade is attached.

Meteorological Tower – A tower used for the measurement of wind speed.

Non-Participating Landowners – Any landowner except those on whose property all or a portion of a wind energy facility is located pursuant to an agreement with the facility owner or operator.

Occupied Building – A residence, school, hospital, church, public library, commercial building or other building used for public gathering that is in use when the permit application is submitted.

Operator – The entity responsible for the day-to-day operation and maintenance of the wind energy facility.

Participating Landowner – A landowner upon whose property all or a portion of a wind energy facility is located pursuant to an agreement with the facility owner or operator.

Principal Wind Energy Facility – A system designed as the primary use on a lot, wherein the power generated is used primarily for off-site consumption.

Rotor – That portion of the wind turbine, i.e. blades and associated hub and shaft, which is intended to be moved or activated by the wind.

Shadow Flicker – Alternating changes in light intensity caused by a moving wind rotor blade casting shadows on the ground or stationary objects.

Total Height – When referring to a wind turbine, the distance measured from the surface of the tower foundation to the highest point of a wind rotor blade when the blade is positioned at 90 degrees to the surface of the ground.

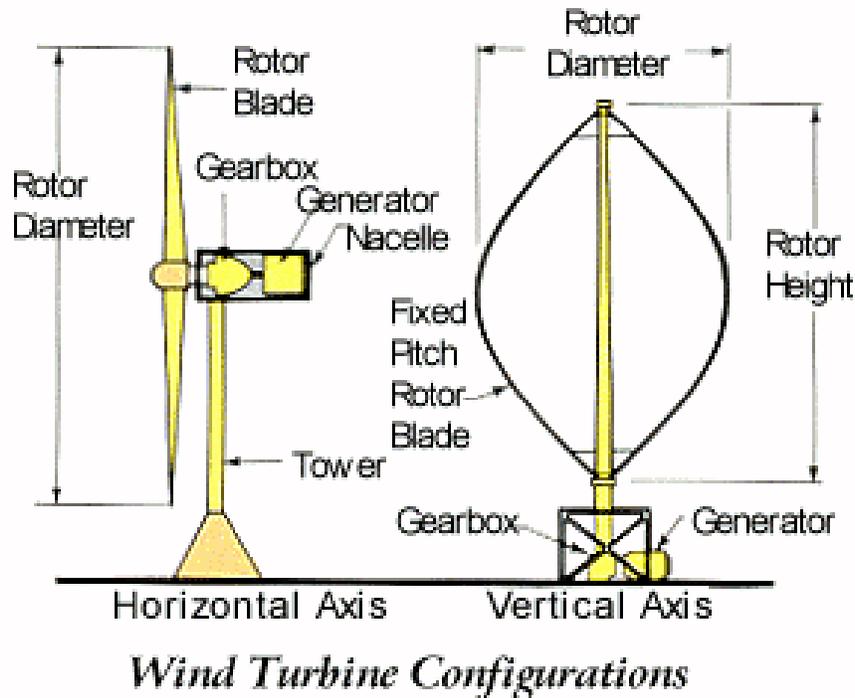
Tower – The supporting structure of a wind turbine on which a rotor and accessory equipment are mounted. The basic types of towers include self-supporting (free standing) or guyed.

Turbine Height – The distance measured from the surface of the tower foundation to the highest point on the wind rotor.

Wind Energy Facility – An electric generating facility, whose main purpose is to supply electricity, consisting of one or more wind turbines and other accessory structures and buildings,

including substations, meteorological towers, electrical infrastructure, transmission lines and other appurtenant structures and facilities. [See Accessory Wind Energy Facility and Principal Wind Energy Facility]

Wind Turbine – A wind energy conversion system that converts wind energy into electricity through the use of a wind turbine generator, and includes the nacelle, rotor, tower, and pad transformer, if any.



Source: Lancaster County Planning Commission, Municipal Guide to Planning for and Regulating Alternative Energy systems, October 2010

SECTION 6. REGULATIONS FOR ACCESSORY WIND ENERGY FACILITIES (AWEF)

Sec. 6.1. Exemptions

(A) AWEF constructed prior to the effective date of this Ordinance shall not be required to meet the requirements of this Ordinance.

(B) With respect to an existing AWEF, any physical modification that materially alters the size, type and number of Wind Turbines or other equipment shall require approval under this Ordinance and meet the requirements of the Uniform Construction Code. Like kind replacements shall not require a building or zoning permit for modification.

Sec. 6.2. Where Permitted

AWEF shall be permitted in all Zoning Districts as an accessory use. Applications for such uses shall be subject to the requirements of this Ordinance, as well as all other applicable State or Federal regulations.

Sec. 6.3 Compliance With Industry Standards

The layout, design and installation of AWEF shall conform to applicable industry standards, including those of the American National Standards Institute (ANSI), Underwriters Laboratories (UL), Det Notske Veritas, Germanischer Lloyd Wind Energies, the American Society of Testing and Materials (ASTM), or other pertinent certifying organizations and comply with the PA Uniform Construction Code and all applicable building and electrical codes of [municipality]. The manufacturer specifications shall be submitted as part of the permit application.

Sec. 6.4 Number of AWEF Permitted

See specific regulations for Ground Mounted AWEF and Building Mounted AWEF.

Sec. 6.5. Noise

Sound levels should always be measured downwind of the turbine to account for the canceling effect of the sound of the wind itself.

(A) The sound produced by an AWEF under normal operating conditions, as measured at the property line, shall not exceed that of a nuisance as identified in Section ~~XXX~~ of this Zoning Ordinance.

OR

The sound produced by an AWEF shall not exceed (45, 50, 55, or XX) dBA as measured at the property line at ground level.

(B) Noise levels may be exceeded during short-term events such as utility outages and/or severe wind storms.

(C) Methods for measuring and reporting acoustic emissions from AWEF shall be equal to or exceed the minimum standards for precision described in American Wind Energy Association (AWEA) Standard 2.1 – 1989 titled Procedures for the Measurement and Reporting of Acoustic Emissions from Wind Turbine Generation Systems Volume 1: First Tier, as amended.

Sec. 6.6. Accessory Building Storage

When an accessory building is necessary for storage cells or related mechanical equipment, the accessory building shall comply with accessory building requirements of the underlying zoning district.

Sec. 6.7. Underground Requirements

All on-site utility, transmission lines and cables shall to the maximum extent possible be placed underground.

Sec. 6.8. Utility Notification

The owner of an AWEF shall provide [municipality] written confirmation that the public utility to which the AWEF will be connected has been informed of the customer's intent to install a grid connected system and approved of such connection. Off-grid AWEF shall be exempt from this requirement.

Sec. 6.9. Signage

The display of advertising is prohibited, except for identification of the manufacturer of the system.

Sec. 6.10. Lighting

AWEF shall not be lighted, except for any lighting required to comply with Federal Aviation Administration (FAA) or Pennsylvania Department of Transportation Bureau of Aviation (BOA) regulations.

Sec. 6.11. Color

AWEF shall be painted a non-reflective, flat color such as white, off-grey or grey unless required to be colored differently by FAA or BOA regulations.

Sec. 6.12. Braking System

AWEF shall have an automatic braking, governing or feathering system to prevent uncontrolled rotation, overspeeding and excessive pressure on the tower structure, rotor blades and turbine components.

OR

All WEF shall be equipped with a redundant braking system. This includes both aerodynamic overspeed controls (including variable pitch, tip, and other similar systems) and mechanical brakes. Mechanical brakes shall be operated in a fail-safe mode. Stall regulation shall not be considered a sufficient braking system for overspeed protection.

Sec. 6.13. Shadow Flicker

An AWEF shall not cause shadow flicker on any occupied building on a non-participating landowner's property.

Sec. 6.14. Location

No part of any AWEF shall extend over parking areas, access drives, driveways or sidewalks.

Sec. 6.15. Insurance

The owner of the AWEF shall provide evidence to [municipality] that the owner's insurance policy has been endorsed to cover an appropriate level of damage or injury that might result from the installation and operation of the AWEF.

Sec. 6.16. Ice Throw

The potential ice throw or ice shedding for an AWEF shall not cross the property line of the lot on which the AWEF is located nor impinge on any right-of-way or overhead utility line.

Sec. 6.17. Electronic Interferrance

The owner of the AWEF shall ensure that the design and operation of the AWEF avoids disruption or loss of radio, telephone, television, cell, internet or similar signals, and shall mitigate any harm caused thereby.

Sec. 6.18. Warnings

(A) A clearly visible warning sign concerning voltage shall be placed at the base of all pad-mounted transformers.

(B) Visible, reflective, colored objects, such as flags, reflectors, or tape shall be placed on the anchor points of guy wires and along guy wires up to a height of ten (10) feet above the ground.

Sec. 6.19. Use of Public Roads

(A) The permit applicant shall identify all state and local public roads to be used within [municipality] to transport equipment and parts for construction, operation or maintenance of the AWEF.

(B) The [municipality] engineer or a qualified third party engineer hired by [municipality] and paid for by the applicant may be required to document road conditions prior to construction and document road conditions again thirty (30) days after construction is complete or as weather permits.

(C) [Municipality] may bond the road in compliance with state regulations.

(D) Any road damage caused by the applicant or its contractors shall be promptly repaired at the applicant's expense.

(E) The applicant shall demonstrate to [municipality] that it has appropriate financial assurance to ensure the prompt repair of damaged roads.

Sec. 6.20. Local Emergency Services

(A) The permit applicant shall provide a copy of the project summary and site plan to local and county emergency services, including paid or voluntary fire departments(s).

(B) Upon request the permit applicant shall cooperate with emergency services to develop and coordinate implementation of an emergency response plan for the AWEF.

Sec. 6.21. Decommissioning

(A) Each AWEF and related equipment shall be removed within twelve (12) months of the date when the use has been discontinued or abandoned by the system owner and/or operator, or upon termination of the useful life of same.

(B) The AWEF shall be presumed to be discontinued or abandoned if no electricity is generated by such AWEF for a period of twelve (12) continuous months.

Sec. 6.22. Permit Requirements

(A) Zoning/building permit applications for AWEF shall be accompanied by an overview of the project, standard drawings of the wind turbine structure and stamped engineered drawings of the tower, base, footings, and/or foundation as provided by the manufacturer. Permits shall show the location of the AWEF on the lot, lot lines, rights-of-way, identification of adjacent properties, adjoining occupied buildings, and above ground utility lines located on the lot. Permits shall be kept on the premises where the AWEF is constructed.

(B) The zoning/building permit shall be revoked if the AWEF, whether new or pre-existing, is moved or otherwise altered, either intentionally or by natural forces, in a manner which causes the AWEF not to be in conformity with this Ordinance.

(C) For standard soil conditions (not including gravel, sand or muck), foundations developed by the wind turbine manufacturer shall be acceptable for AWEF installations of 20kW or less and will not require project-specific soils studies. Applicants proposing projects involving substandard soil conditions or installations of AWEF greater than 20kW may be required by the Zoning Officer to submit detailed soil studies.

(D) The AWEF shall be properly maintained and be kept free from all hazards, including, but not limited to faulty wiring, loose fastenings, being in an unsafe condition or detrimental to public health, safety or general welfare. In the event a violation of any of the foregoing provisions, the Zoning Officer shall give written notice specifying the violation to the owner of the AWEF to conform or to remove the AWEF.

Sec. 6.23. Ground Mounted AWEF

(A) Location

Ground mounted AWEF may be placed on lots of any size provided they meet the height and setback restrictions of this section.

(B) Height

(1) AWEF height shall not be restricted provided that the AWEF meets the setback requirements.

OR

AWEF shall comply with the height restrictions of the underlying zoning district.

OR

AWEF shall not exceed (XXXX) feet in height. (*Models have varying heights linked to the zoning district where the AWEF is located with higher limits for nonresidential districts. Models suggest 50', 60', 85', or 100'. Note that the AWEF needs to be high to operate most efficiently.*)

OR

The AWEF may exceed the maximum permitted height requirements by one (1) additional foot for each one (1) additional foot by which the width of each yard exceed the required setback regulations for AWEF in the zoning district in this the building or structure is located.

OR

The AWEF shall not exceed one hundred fifty percent (150%) of the maximum height for principal structures for the underlying zoning district.

- (2) Applicants shall file a Notice of Proposed Construction or Alteration with the BOA and the FAA for any AWEF that is more than 200' in height or in a designated Airport Hazard Overlay Zone. Applicants shall provide evidence to (Municipality) from either BOA or FAA acknowledging that the ground mounted AWEF does not adversely affect the airspace of any airports.

(C) Ground Clearance

The minimum ground clearance for the AWEF shall be (XXX) feet. (*Models have standards of 15'-30'.*)

(D) Setbacks

- (1) AWEF shall be set back from property lines, occupied dwelling, above ground utility lines, railroads and/or rights-of-way by a distance equal to or no less than (XX) times the total height. (*Models 1.1, 1.5 or 2 times the total height.*)

(E) Number of AWEF

The number of ground mounted AWEF on a lot is not limited provided that each AWEF meets the other requirements of this Ordinance.

OR

The number of ground mounted AWEF is limited to the number of accessory structures permitted on a lot as indicated in Section **XXX** of this Ordinance. (Note: This option

could be used if the municipality regulates the number of accessory structures permitted on a lot.)

OR

One ground mounted AWEF shall be permitted per lot.

OR

The number of ground mounted AWEF per lot shall be related to the energy capacity of the system and the electric consumption of the principal use on the lot. The electrical generation capacity of the AWEF shall not exceed the electrical generation needs of the principal use on the lot. The participating landowner, at the request of the Zoning Officer, shall provide evidence as to the electrical generating capacity of the AWEF and the electric consumption of the principal use.

OR

The number of ground mounted AWEF permitted on a lot shall be based upon lot size and follow the schedule below. *(Note: The actual number of AWEF can be modified as applicable.)*

Lot Size	Maximum Number of Ground Mounted AWEF Per Lot
Less Than 5 Acres	1
5+ Acres to 10 Acres	2
10+ Acres	3

(F) Location

Ground mounted AWEF shall be prohibited in front yards, between the principal building and the street right-of-way.

OR

Installation of a ground mounted AWEF may be authorized in front of the principal building, outside the required front yard setback if the applicant demonstrates to (Municipality) that due to wind access limitation, no location exists on the property other than the front yard where the AWEF can perform effectively.

(G) Safety and Security

- (1) The owner shall post electrical hazard warning signs on or near the AWEF.
- (2) Ground mounted AWEF shall not be climbable up to (XX) feet above the ground surface. (*Models stipulate 10', 12' o 15'.*)
- (3) Access doors to any AWEF electrical equipment shall be locked to prevent entry by unauthorized persons.
- (4) All AWEF shall be surrounded by a minimum 6' high fence with a locking gate.

OR

All AWEF shall be surrounded by a minimum 6' high fence if the AWEF is not otherwise rendered unclimbable up to (XX) feet above the ground.

- (5) The minimum distance between the ground and the Wind Rotor Blade shall be 20 feet.

Sec. 6.24. Building Mounted AWEF

- (A) Location

Building mounted AWEF may be located on any lot regardless of lot size.

- (B) Height

Building mounted AWEF shall comply with the height restrictions of the underlying zoning district.

OR

Height regulations shall not apply to building mounted AWEF, provided the height does not exceed the limitations of the zoning district for which it is located by more than fifteen (15) feet. (*This type of regulation is common for steeples, antennas, belfries, silos, etc. Using this option would treat AWEF similarly to these types of structures.*)

- (C) Number of AWEF

One building mounted AWEF shall be permitted per lot.

OR

There is no limit to the number of building mounted AWEF provided that the building is capable of supporting the load of the AWEF (s).

- (D) Compliance With Codes

The applicant shall provide evidence to [municipality] that the plans for a building mounted AWEF comply with the Uniform Construction Code and other adopted building

code of [municipality], including indication that the building is capable of supporting the load imposed on the structure.

SECTION 7. REGULATIONS FOR PRINCIPAL WIND ENERGY FACILITIES (PWEF)

Sec. 7.1. Exemptions

(A) PWEF constructed prior to the effective date of this Ordinance shall not be required to meet the requirements of this Ordinance.

(B) With respect to an existing PWEF, any physical modifications that materially alters the size, shape and number of Wind Turbines or other equipment shall require approval under this Ordinance and meet the requirements of the Uniform Construction Code. Like kind replacements shall not require a building or zoning permit for modification.

Sec. 7.2. Where Permitted

Principal Wind Energy Facilities (PWEF) shall be permitted by special exception / conditional use (*Municipality needs to specify*) in the **XXXX** Zoning District(s). (*Models suggest allowing in the Agricultural, Commercial, and/or Industrial zones. Some allow in Conservation zones with conditions.*)

Sec. 7.3. Compliance With Standards

(A) The design of the PWEF shall conform to applicable industry standards, including those of the American National Standards Institute (ANSI), Underwriters Laboratories (UL) Det Norske Veritas, Germanischer Lloyd Wind Energies, the American Society of Testing and Materials (ASTM), or other pertinent certifying organizations and comply with all applicable building and electrical codes of [municipality]. The applicant shall submit certificate of design compliance obtained by the equipment manufacturers from Underwriters Laboratories, Det Norske Veritas, Germanishcer Lloyd Wind Energies, or other similar certifying organizations. The manufacturer specifications shall be submitted as part of the permit application

(B) To the extent applicable, the PWEF shall comply with the Pennsylvania Uniform Construction Code.

(C) All electrical components of the PWEF shall conform to relevant and applicable local, state and national codes, and relevant and applicable international standards.

Sec. 7.4. Noise

(A) Audible sound from a PWEF shall not exceed (45, 50, 55, or XX) dBA, as measured at the exterior of any Occupied Building on a non-participating landowner's property.

OR

Audible sound from a PWEF shall not exceed (45, 50, 55, or XX) dBA, for more than 10 percent of any hour, as measured at the exterior of of any Occupied Building on a non-participating landowner's property.

(B) Methods for measuring and reporting acoustic emissions from Wind Turbines and the PWEF shall be equal to or exceed the minimum standards for prevision described in AWEA Standard 2.1 – 1989 titled *Procedures for the Measurement and Reporting of Acoustic Emissions from Wind Turbine Generation Systems Volume I. First Tier, as amended*.

(C) Noise levels may be exceeded during short-term events such as utility outages and/or severe storms.

Sec. 7.5. Vibrations

A Wind Turbine shall not cause vibrations through the ground which are perceptible beyond the property line of the parcel on which it is located.

Sec. 7.6. Accessory Buildings, Structures & Mechanical Equipment

(A) When an accessory building or structure is necessary, it shall comply with the requirements of the underlying zoning district.

(B) Accessory buildings, structures and equipment associated with PWEF shall be screened from any adjacent property that is residentially zoned or used for residential purposes. The screen shall consist of plant materials which provide a visual screen. In lieu of a planting screen, a decorative fence meeting the requirements of the zoning ordinance may be used.

(C) The design of accessory buildings and related structures shall, to the extent reasonable, use materials, colors, textures, screening and landscaping that will blend into the natural setting and existing environment.

Sec. 7.7. Underground Requirements

On-site transmission and power lines between Wind Turbines shall, to the maximum extent practicable, be placed underground.

Sec. 7.8. Utility Notification

The owner of a PWEF shall provide [municipality] written confirmation that the public utility to which the PWEF will be connected has been informed of the intent to install a grid connected system and approved of such connection.

Sec. 7.9. Signage

PWEF shall not display advertising, except for reasonable identification of the turbine manufacturer, Facility Owner or Operator.

Sec. 7.10. Lighting

PWEF shall not be artificially lighted, except to the extent required by the Federal Aviation Administration, the Pennsylvania Department of Transportation Bureau of Aviation (BOA) or other applicable authority that regulates air safety.

Sec. 7.11. Color

(A) PWEF shall be painted a non-reflective, flat color such as white, off-grey or grey unless required to be colored differently by FAA or BOA regulations.

(B) The design of buildings and related structures shall, to the extent reasonable, use materials, colors, textures, screening and landscaping that will blend the PWEF into the natural setting and existing environment.

Sec. 7.12. Scenic Vistas

PWEF shall not significantly impair a scenic vista or scenic corridor as identified in the [municipality] comprehensive plan or other published source.

OR

No PWEF shall be installed at any location that would substantially detract from or block the view of a major portion of a recognized scenic vista, as viewed from a public road right-of-way or publically accessible parkland or open space within [municipality].

Sec. 7.13. Braking System

All PWEF shall be equipped with a redundant braking system. This includes both aerodynamic overspeed controls (including variable pitch, tip, and other similar systems) and mechanical brakes. Mechanical brakes shall be operated in a fail-safe mode. Stall regulation shall not be considered a sufficient braking system for overspeed protection.

Sec. 7.14. Shadow Flicker

(A) The Facility Owner and Operator shall make reasonable efforts to minimize shadow flicker to any occupied building on a non-participating Landowner's property.

OR

A PWEF shall not cause shadow flicker on any occupied building on a non-participating landowner's property. The facility owner and operator shall conduct, at the applicant's expense a modeling study demonstrating that shadow flicker shall not occur on any occupied building on a non-participating property.

(B) A PWEF shall be designed in such a manner as to minimize shadow flicker on a roadway.

Sec. 7.15. Location

No part of any PWEF shall extend over parking areas, access drives, driveways or sidewalks.

Sec. 7.16. Insurance

The PWEF owner shall maintain a current general liability policy covering bodily injury and property damage with limits of at least \$1 million per occurrence and \$1 million in the aggregate. Certificates shall be made available to [municipality] upon request.

Sec. 7.17. Ice Throw

The potential ice throw or ice shedding for a PWEF shall not cross the property line on which the PWEF is located nor impinge on any right-of-way or overhead utility line.

Sec. 7.18. Electronic Interference

The facility owner and/or operator shall make reasonable efforts to avoid any disruption or loss of radio, telephone, television, cell, Internet, or similar signals, and shall mitigate any harm caused by the Wind Energy Facility.

OR

The facility owner and/or operator shall ensure that the design and operation of any PWEF avoids any disruption or loss of radio, telephone, television, cell, Internet, or similar signals, and shall mitigate any harm caused by the Wind Energy Facility.

Sec. 7.19. Wind Turbine Separation

Wind Turbines shall be separated from each other by a minimum of 1.1 times the total height of the highest wind turbine.

Sec. 7.20. Lot Size

Lot size shall comply with the underlying zoning district requirements.

OR

In order for a tract(s) of land to be eligible for a PWEF, it shall have a minimum lot size derived as follows: (2 acres X number of Wind Turbines) + 18 acres = minimum lot size.

Sec. 7.21. Setbacks

(A) Wind Turbines shall be set back from the nearest Occupied Building or Non-Occupied Building on the participating landowner's property a distance not less than the setback requirements for the zoning district or (1.1, 1.5, or XX) times the Turbine Height, whichever is greater. The setback distance shall be measured from the center of the Wind Turbine base to the nearest point on the foundation of the Occupied Building or Non-Occupied Building.

(B) Wind Turbines shall be set back from the nearest Occupied Building or Non-Occupied Building located on a non-participating Landowner's property a distance of not less than (2, 5, or XX) times the Turbine Height, as measured from the center of the Wind Turbine base to the nearest point on the foundation of the Occupied or Non-Occupied Building.

(C) All Wind Turbines shall be set back from the nearest property line a distance of not less than the setback requirements for the zoning district or (1.1, 1.5, 2, or XX) times the Turbine Height, whichever is greater. The setback distance shall be measured to the center of the Wind Turbine base.

(D) All Wind Turbines shall be set back from the nearest public road a distance not less than the setback requirements for the zoning district or (1.1, 2, or XX) times the Turbine Height, whichever is greater, as measured from the right-of-way line of the nearest public road to the center of the Wind Turbine base.

(E) Each wind turbine shall be set back from above-ground power lines, public telephone lines and television cable lines a distance no less than (1.1, 2.0, or XX) times its total height. The setback distance shall be measured from the center of the Wind Turbine base to the nearest point on such lines.

(F) All Wind Turbines shall be set back from any ridge a distance of not less than the Wind Turbine's total height. For this provision, "ridge" shall be defined as the elongated crest or series of crests at the uppermost point of intersection between opposite slopes of a mountain and including all land lying between such point and an elevation 250 feet below the elevation of such point.

(G) Wind Turbines shall be set back at least (2,000, 2,500, or XXXX) feet from Important Bird Areas as identified by Pennsylvania Audubon and at least (1,500, 2,000, or XXXX) feet from identified wetlands.

(H) Each Wind Turbine shall be set back from the Appalachian Trail and any historic structure, district, site or resource listed in the state inventory of historic places maintained by the Pennsylvania Historical and Museum Commission a distance no less than two thousand five hundred (2,500') feet. The distance shall be measured from the center of the wind turbine

base to the nearest point on the foundation of an historic building, structure or resource, or the nearest property line of an historic district or site or the Appalachian Trail.

(I) Accessory buildings, structures, and related equipment to the PWEF shall comply with the building setback requirements of the zoning district.

OR

Accessory buildings, structures, and related equipment to the PWEF shall comply with the accessory building setback requirements of the zoning district, or be a minimum of (10, 15, or XX) feet from the side and rear property lines, whichever is greater.

Sec. 7.22. Height

There shall be no specific height limitations, as long as the total height meets sound and setback requirements and complies with regulations imposed by the FAA.

Sec. 7.23. Slopes

No PWEF shall be located on a lot of record containing slopes equal to or exceeding 15% on 50% or more of the lot of record. These standards shall apply to each lot where a PWEF extends across multiple lots of record.

Sec. 7.24. Warnings

(A) A clearly visible warning sign concerning voltage shall be placed at the base of all pad-mounted transformers and substations.

(B) Visible, reflective, colored objects, such as flags, reflectors, or tape shall be placed on the anchor points of guy wires and along the guy wires up to a height of ten (10) feet from the ground.

Sec. 7.25. Safety & Security

(A) All access doors to Wind Turbines, including electrical equipment outbuildings and all appurtenances thereto shall be locked or fenced, as appropriate, to prevent entry by non-authorized persons.

(B) The minimum distance between the ground and any part of the wind rotor blade shall be 30 feet.

(C) To limit climbing access, a 6 foot high fence with a locking gate shall be placed around the PWEF.

(D) Wind Turbines' climbing apparatus shall be limited to no lower than (10, 12, 15, or XX) feet from the ground, or the Wind Turbines' climbing apparatus shall be fully contained and locked within the tower structure.

Sec. 7.26. Use of Public Roads

(A) The Applicant shall identify all state and local public roads to be used within [municipality] to transport equipment and parts for construction, operation or maintenance of the PWEF.

(B) The [municipality] engineer or a qualified third party engineer hired by the [municipality] and paid for by the Applicant, shall document road conditions prior to construction. The engineer shall document road conditions again thirty (30) days after construction is complete or as weather permits.

(C) [Municipality] may bond the road in compliance with state regulations.

(D) Any road damage caused by the applicant or its contractors shall be promptly repaired at the Applicant's expense.

(E) The Applicant shall demonstrate that it has appropriate financial assurance to ensure the prompt repair of damaged roads.

(F) Every effort should be made to use existing roads and logging roads. New deforestation and forest fragmentation should be kept to a minimum. Private entrance roads to PWEF shall be maintained in a mud-free condition.

Sec. 7.27. Local Emergency Services

(A) The Applicant shall provide a copy of the project summary and site plan to local emergency services, including paid or volunteer fire department(s).

(B) The Facility Owner and/or Operator shall abide by all applicable local, state and federal fire code and emergency guidelines.

(C) Upon request, the Applicant shall cooperate with emergency services to develop and coordinate implementation of an emergency response plan for the PWEF.

Sec. 7.28. Decommissioning

(A) The Facility Owner and Operator shall, at its expense, complete decommissioning of the PWEF or individual wind turbines, and all related improvements, within (12) twelve months after the end of the useful life of the facility or individual wind turbines, or when use has been discontinued or abandoned by the facility owner and/or operator. The PWEF or individual Wind Turbines will be presumed to be at the end of its useful life, discontinued or abandoned if no electricity is generated for a continuous period of twelve (12) months.

(B) Decommissioning shall include removal of wind turbines, buildings, cabling, electrical components, roads, foundations to a depth of 36 inches, and any other associated facilities.

(C) Disturbed earth shall be graded and re-seeded, unless the landowner requests in writing that the access roads or other land surface areas not be restored.

OR

Disturbed earth shall be graded, re-seeded and/or reforested to reclaim the site back to its predevelopment condition, based on the subdivision/land development plan or documented predevelopment condition, unless the landowner requests in writing that the access roads or other land surface areas not be restored.

(D) An independent and certified Professional Engineer shall be retained to estimate the total cost of decommissioning (“Decommissioning Costs”) without regard to salvage value of the equipment, and the cost of decommissioning net salvage value of the equipment (“Net Decommissioning Costs”). Said estimates shall be submitted to [municipality] after the first year of operation and every fifth year thereafter.

(E) The Facility Owner or Operator shall post and maintain Decommissioning Funds in an amount equal to Net Decommissioning Costs; provided that at no point shall Decommissioning Funds be less than one hundred percent (100%) of Decommissioning Costs. The Decommissioning Funds shall be posted and maintained with a bonding company or Federal or Commonwealth chartered lending institution chosen by the Facility Owner or Operator and participating land owner posting the financial security, provided that the bonding company or lending institution is authorized to conduct such business within the Commonwealth and is approved by [municipality].

(F) Decommissioning Funds may be in the form of a performance bond, surety bond, letter of credit, corporate guarantee or other form of financial assurance as may be acceptable to [municipality].

(G) If the Facility Owner or Operator fails to complete decommissioning within the period, prescribed above, then the landowner shall have six (6) months to complete decommissioning.

(H) If neither the Facility Owner or Operator, nor the landowner complete decommissioning within the periods prescribed by above then [municipality] may take such measures as necessary to complete decommissioning. The entry into and submission of evidence of a Participating Landowner agreement to [municipality] shall constitute agreement and consent of the parties to the agreement, their respective heirs, successors and assigns that [municipality] may take such action as necessary to implement the decommissioning plan.

(I) The escrow agent shall release the Decommissioning Funds when the Facility Owner or Operator has demonstrated and [municipality] concurs that decommissioning has been

satisfactorily completed, or upon written approval of [municipality] in order to implement the decommissioning plan.

Sec. 7.29. Application Requirements

(A) A conditional use/special exception [*specify which*] application for a PWEF shall include the following:

- (1) A narrative describing the proposed PWEF, including an overview of the project; the project location; the approximate generating capacity of the PWEF; the approximate number, representative types and height or range of heights of Wind Turbines to be constructed, including their generating capacity, dimensions and respective manufacturers, and a description of ancillary facilities.
- (2) An affidavit or similar evidence of agreement between the property owner and the Facility Owner or Operator demonstrating that the Facility Owner or Operator has the permission of the property owner to apply for necessary permits for construction and operation of the PWEF and setting forth the Applicant's and property owner's name, address and phone number.
- (3) Identification of the properties on which the proposed PWEF will be located, and the properties adjacent to where the PWEF will be located.
- (4) A site plan showing the planned location of each wind turbine, property lines, setback lines, access road and turnout locations, substation(s), electrical cabling from the PWEF to the substation(s), ancillary equipment, buildings, and structures, including permanent meteorological towers, associated transmission lines, and layout of all structures within the geographical boundaries of any applicable setback.
- (5) A proposed foundation design and analysis of soil conditions by a professional engineer.
- (6) Documentation showing that the PWEF will comply with all applicable requirements of the FAA and the Commonwealth Bureau of Aviation.
- (7) A shadow flicker study in accordance with Sec. 7.14(A) (alternate).
- (8) Documents related to decommissioning.
- (9) Other relevant studies, reports, certifications and approvals as may be reasonably requested by [municipality] to ensure compliance with this Ordinance.

(B) Throughout the application process, the applicant shall promptly notify [municipality] of any changes to the information contained in the conditional use / special exception (*specify*

which) permit application. Changes to the pending application that do not materially alter the initial site plan may be adopted without a renewed public hearing.

Sec. 7.30. Public Inquiries and Complaints

(A) The Facility Owner and Operator shall maintain a phone number and identify responsible person for the public to contact with inquiries and complaints throughout the life of the project.

(B) The Facility Owner and Operator shall make reasonable efforts to respond to the public's inquiries and complaints.

(C) The Facility Owner and/or Operator shall keep a record of all such inquiries and complaints and shall submit a report thereof to [municipality] not less than quarterly.

Sec. 7.31. Remedies

(A) It shall be unlawful for any person, firm, or corporation to violate or fail to comply with or take any action which is contrary to the terms of this Article, or any permit issued under this Article, or cause another to violate or fail to comply, or to take any action which is contrary to the terms of this Article or any permit issued under this Article.

(B) If [municipality] determines that a violation of this Article or the permit has occurred, [municipality] shall provide written notice to any person, firm, or corporation alleged to be in violation of this Article or permit. If the alleged violation does not pose an immediate threat to public health or safety, [municipality] and the parties shall engage in good faith negotiations to resolve the alleged violation. Such negotiations shall be conducted within thirty (30) days of the notice of violation.

1. If after thirty (30) days from the date of the notice of violation [municipality] determines, in its discretion, that the parties have not resolved the alleged violation, [municipality] may institute civil enforcement proceedings or any other remedy at law to ensure compliance with this Article or permit.

i US Department of Energy, Energy Efficiency and Renewable Energy.
http://www1.eere.energy.gov/windandhydro/wind_technologies.html

ii US Department of Energy, Energy Efficiency and Renewable Energy.
http://www1.eere.energy.gov/windandhydro/wind_technologies.html

iii U.S Department of the Interior Bureau of Land Management, Wind Energy Development Programmatic Environmental Impact Statement (EIS).

iv Lancaster County Planning Commission, Municipal Guide to Planning for and Regulating Alternative Energy Systems, October 2010.

v Lancaster County Planning Commission Municipal Guide to Planning for and Regulating Alternative Energy Systems, October 2010.

vi

American Wind Energy Association.

<http://www.windenergy.com/documents/guides/InThePublicInterest.pdf>. September 2008

vii

American Wind Energy Association.

<http://www.windenergy.com/documents/guides/InThePublicInterest.pdf>. September 2008