National Renewable Energy Laboratory
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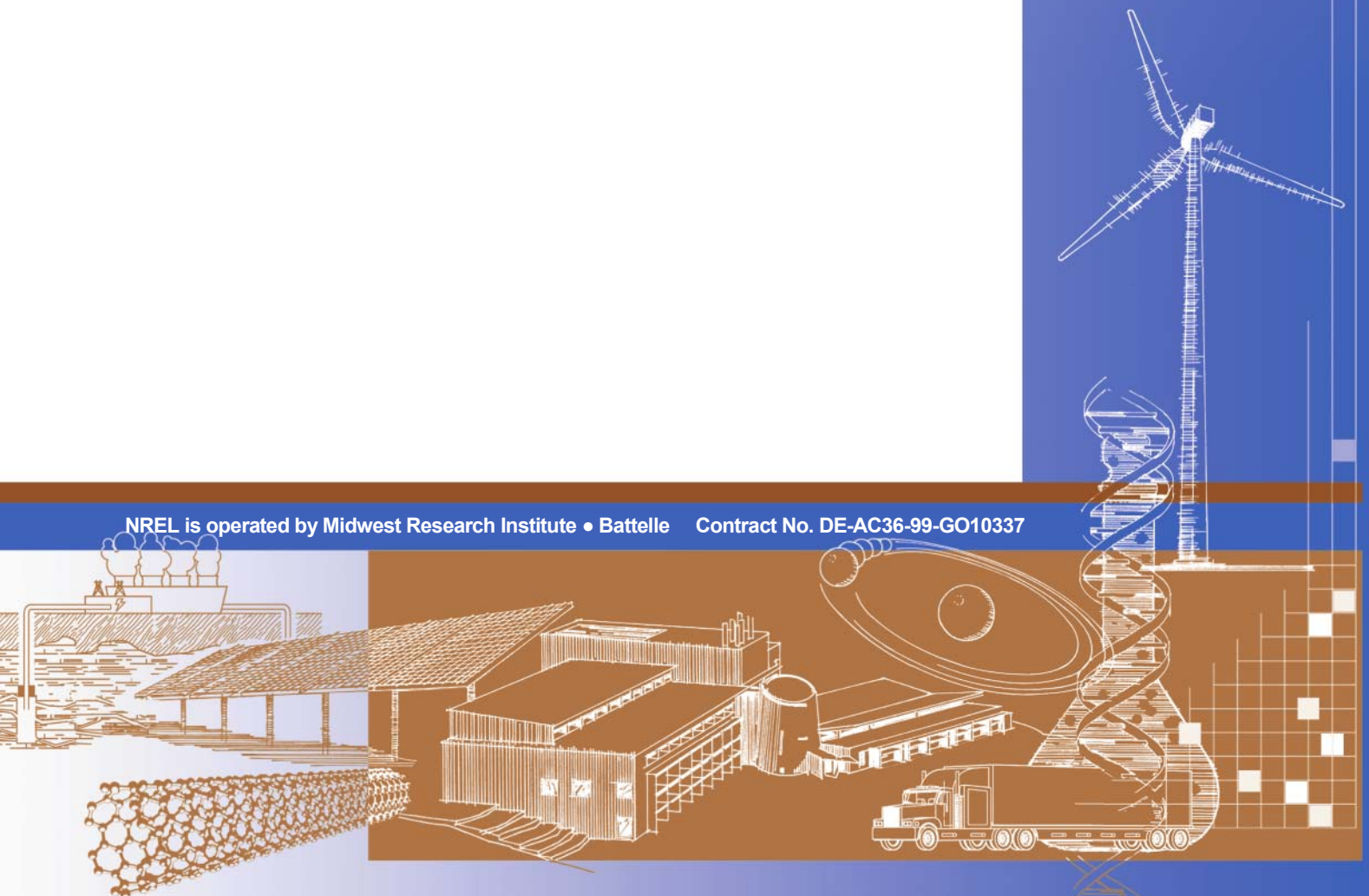
Office of Energy Efficiency & Renewable Energy
Innovation for Our Energy Future

An Overview of Existing Wind Energy Ordinances

F. Oteri

Technical Report
NREL/TP-500-44439
December 2008



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Prepared under Task No. WER9.8503

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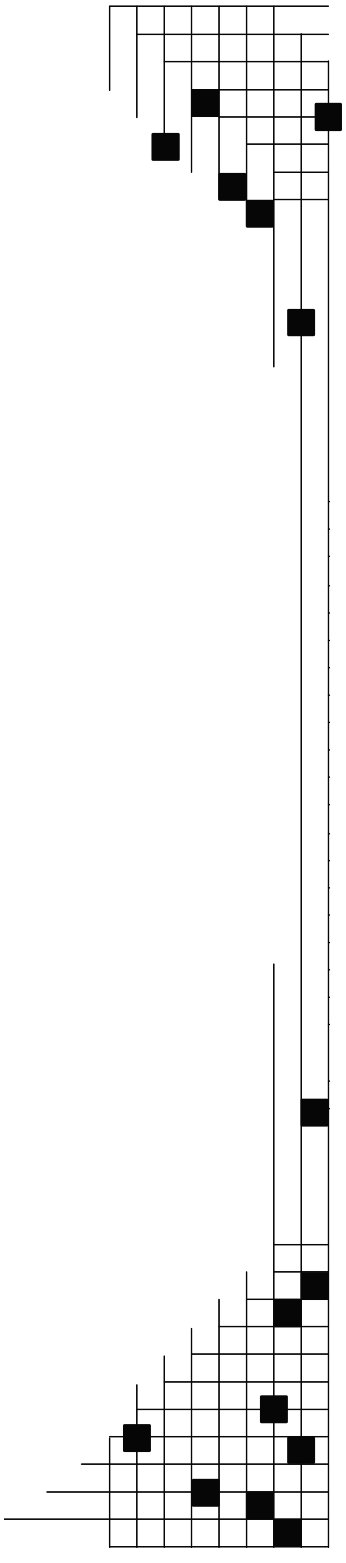

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Purpose

Due to increased energy demand in the United States, rural communities with limited or no experience with wind energy now have the opportunity to become involved in this industry. Communities with good wind resources may be approached by entities with plans to develop the resource.

Although these opportunities can create new revenue in the form of construction jobs and land lease payments, they also create a new responsibility on the part of local governments to ensure that ordinances will be established to aid the development of safe facilities that will be embraced by the community.

The purpose of this report is to educate and engage state and local governments, as well as policymakers, about existing large wind energy ordinances. These groups will have a collection of examples to utilize when they attempt to draft a new large wind energy ordinance in a town or county without existing ordinances.

Methodology

A combination of Internet-based newspaper research and Internet research utilizing multiple search engines was utilized to identify the existing large wind energy ordinances.

The first step in the research was to compile a list of towns with existing ordinances. The next step was to find the official Web sites for the local governments and to verify through those sites that the ordinances did in fact exist and that they were final, approved ordinances as opposed to draft ordinances waiting for approval.

All information presented in this report is derived from official county or town Web sites.

Conclusion

Although wind energy ordinances currently exist in rural communities throughout the country, many communities have no regulations in place.

The specific details vary among the existing ordinances, but similar themes are addressed in many of them.

Ordinance Themes

The following themes are typically included in ordinances regulating the development of commercial Wind Energy Conversion Systems (WECS). This list is provided to help towns or counties develop ordinances regulating utility-scale WECS.

Access
By defining access standards, towns/counties can ensure safety by limiting direct contact to the interior of the wind turbine tower, electrical equipment, and any climbing apparatus.

Appearance, Color, and Finish
By defining the appearance, color, and finish of turbines in WECS, local governments can limit aesthetic displeasure and ensure design uniformity.

Clearance
Normally measured from the lowest point of the arc created by rotating blades to the ground, a defined clearance height aids in addressing safety concerns.

Electrical
In order to ensure normal land usage, electrical standards may be put in place. These standards define whether electrical wires must be buried or if and when they are allowed overhead.

Equipment
Equipment standards typically further define the electrical standards by ensuring that any electrical equipment associated with a wind energy system is located in a specified area, usually under the swept area of the blade assembly.

Height
Height is usually measured from the base of the tower to the tip of the blade at its highest point. General town/county zoning ordinances often already define height allowances. An exception to allow greater heights for WECS may be necessary. The ordinance regulating the development of WECS should define this height.

Lighting
Lighting must comply with minimum Federal Aviation Administration regulations but can also be regulated to ensure minimal impact on neighboring properties.

Noise Standards
Noise standards create a standard maximum level of allowed noise due to the operation of WECS. These standards often include a defined method of measuring noise level.

Permits
The permitting process is utilized so local governments can review and allow for wind energy developments. Permits are usually granted in accordance to the provisions of the ordinance regulating the development of WECS.

Restoration Requirements
Restoration requirements ensure that restoration standards are defined to the extent desired by the local government and community, typically to the level of restoring the area(s) where the wind turbines are located to their original condition at the end of the project life or facility abandonment. Restoration requirements sometimes include the posting of a performance bond or other financial instrument to ensure the disposal of WECS.

Set Backs
These standards are defined to create space between areas of concern and the WECS. Common areas of concern include property lines, inhabited structures, public roads, as well as communication and electrical lines.

Shadow Flicker
Shadow flicker is addressed within ordinances regulating the development of commercial WECS to prevent, mitigate, and eliminate shadow flicker on any roadway or any occupied structure on a non-participating property. (Shadow flicker is the term used to describe shadows on the ground and surrounding structures that may emanate from the rotating blades of a wind turbine.)

Signage
Defining specific sign standards ensures that WECS will not be used to advertise or promote any product or service. It also can guarantee the proper placement of warning signs and the identification of the owner and/or manufacturer.

Signal Interference Standards
Signal interference standards ensure that the construction and operation of WECS will not interfere with television, microwave, navigational, or radio reception in any neighboring areas.

Spacing and Density
Spacing and density standards address aesthetic concerns and safety issues by ensuring that individual wind turbines will not be sited so closely as to create a cluster.

Zoning Areas
Zoning area standards limit wind energy development to certain parts of the town/county where the overall impact will be minimal or in some cases to where the wind resource is best.

Current State Wind Energy Ordinances

Illinois

Henry County, Illinois

Zoning Areas Where Turbines are Allowed	1) May be located in areas zoned AG1 Agriculture or M-1 Manufacturing with special use and building permits 2) Shall be located 1000 feet or more from an occupied structure on an adjoining property and 1.1 times total tower height or more from an occupied structure on subject property, measured from wind tower base
Set Backs	1) 1.1 times total tower height from any and all public/private right-of-way lines (measured from the wind tower base, unless a variance is approved by the board) 2) 100 feet from all other property lines (measured from the tip of the blade when located parallel with the ground), unless a variance is approved by the board
Spacing and Density	A wind energy system shall be separated from any other wind energy system by a minimum of 200 feet (measured from the tips of the blades when the blades are parallel with the ground).
Height	Total height shall be 500 feet or less
Clearance	The vertical distance from ground level to the tip of a wind turbine blade when the blade is at its lowest point must be at least 25 feet.
Access	Any wind tower located in a wind energy system, including any climbing aids, shall be secured against unauthorized access by means of a locked barrier or security fence.
Electrical Wires	All electrical wires associated with a wind energy system, other than wires necessary to connect the wind turbine to its base and to overhead collection lines, shall be located underground unless a variance is approved by the board.
Lighting	As required by the Federal Aviation Administration. Required lighting must comply with Federal Aviation Administration minimum requirements and, whenever possible, be at the lowest intensity allowed using red lights at night. If more than one lighting alternative is available, the alternative that causes the least visual disturbance must be used.
Equipment	Unless located underground, any electrical equipment associated with a wind energy system shall be located under the sweep area of a blade assembly unless the board approves a variance.
Appearance, Color, and Finish	The exterior of any visible components of a wind energy system must be a non-reflective, neutral color. Wind towers and turbines in an established wind farm system that are located within 1,000 feet of each other must be of uniform design, including tower type, color, number of blades, and direction of blade rotation unless a variance is approved by the board.
Signs	No wind turbine, tower building, or other structure associated with a wind energy system may be used to advertise or promote any product or service. No word or graphic representation, other than appropriate

	warning signs and owner identification, may be placed on a wind turbine, tower, building, or other structure associated with a wind energy system so as to be visible from any public road.
Permits Required	1) Special Use Permit, which can expire if the wind energy system is not installed and functioning within 5 years from the date the permit is issued or if the wind energy system is out of service or otherwise unused for a continuous 12-month period 2) Building Permit
Restoration Requirement	Within 8 months of receipt of Notice of Abandonment or within 8 months of providing Notice of Termination of Operations, the owner of a wind energy system must: 1) Remove all wind turbines, aboveground improvements, and outdoor storage 2) Remove all foundations, pads, and underground electrical wires to a depth of 4 feet below the ground surface 3) Remove all hazardous material from the property and dispose of the hazardous material in accordance with federal and state law
Signal Interference	The owner of a wind energy system must take such reasonable steps as are necessary to prevent, eliminate, or mitigate any interference with cellular, radio, or television signals caused by the wind energy system.
Noise	No noise standards
Shadow Flicker	No shadow flicker standards
Link	http://www.henrycty.com/codepartments/zoning/Forms/windzoningordinance.pdf

Rock Island County, Illinois

Zoning Areas Where Turbines are Allowed	AG-1 Agricultural Preservation District, AG-2 General Agricultural District, I-1 Light Industrial District, or I-2 General Industrial District
Set Backs	A large wind system shall be located: 1) 1,000 feet or more from an occupied structure on an adjoining property 2) 1.1 times the total tower height or more from an occupied structure on subject property, measured from the wind tower base 3) 1.1 times the total tower height from any and all public/private right-of-way lines, measured from the wind tower base 4) 100 feet from all other property lines, measured from the tip of the blade when located parallel with the ground
Spacing and Density	A wind energy system shall be separated from any other wind energy system by a minimum of 200 feet, measured from the tip of the blades when the blades are parallel with the ground.
Height	The total height of a wind energy system shall be 500 feet or less.
Clearance	The vertical distance from ground level to the tip of a wind turbine blade when the blade is at its lowest point must be at least 25 feet.
Access	All wind towers located in a wind energy system, including any climbing aids, shall be secured against unauthorized access by means of a locked barrier or security fence 6 feet in height.
Electrical Wires	All electrical wires associated with a wind energy system, other than wires necessary to connect the wind turbine to its base and to overhead collection lines, shall be located underground. The board may vary this requirement upon proof of hardship.
Lighting	Required lighting must comply with Federal Aviation Administration minimum requirements and, whenever possible, be at the lowest intensity allowed using red lights at night. If more than one lighting alternative is available, the alternative that causes the least visual disturbance must be used.
Equipment	Unless located underground, any electrical equipment associated with a wind energy system shall be located under the sweep area of a blade assembly to the extent practicable.
Appearance, Color, and Finish	The exterior surface of any visible components of a wind energy system must be a non-reflective, neutral color. Wind towers and turbines in an established wind farm system that are located within 1,000 feet of each other must be of uniform design, including tower type, color, number of blades, and direction of blade rotation to the extent practicable.
Signs	No wind turbine, tower, building, or other structure associated with a wind energy system may be used to advertise or promote any product or service. No word or graphic representation, other than appropriate warning signs and owner identification, may be placed on a wind turbine, tower, building, or other structure associated with a wind energy system so as to be visible from any public road.
Permits Required	Special Use Permit, Building Permits

Restoration Requirement	1) Remove all wind turbines, aboveground improvements, and outdoor storage 2) Remove all foundations, pads, and underground electrical wires to a depth of 4 feet below the ground surface 3) Remove all hazardous materials from the property and dispose of the hazardous material in accordance with federal and state law 4) Failure to comply with any of the conditions or restrictions imposed on a special use permit shall be deemed a violation of the Zoning Ordinance.
Signal Interference	The owner of a wind energy system must take such reasonable steps as are necessary to prevent, eliminate, or mitigate any interference with cellular, radio, or television signals caused by the wind energy system.
Noise	No noise standards
Shadow Flicker	No shadow flicker standards
Link	http://www.co.rock-island.il.us/uploadedFiles/ZB/RICounty-WindEnergyOrd.pdf

Kansas

Riley County, Kansas

Zoning Areas Where Turbines are Allowed	General Agricultural District
Set Backs	1) Individual wind turbines shall be set back from all property lines coincident with or outside of the project boundary a distance equal to 1.5 times the turbine height. 2) Individual wind turbines shall be set back from all public roads a distance equal to at least 1.5 times the turbine height.
Spacing and Density	1) To avoid objectionable density, there should be adequate spacing between turbines. 2) Distinct groupings or clusters of machines shall be limited to no more than 12 machines per cluster. A cluster shall be defined as a grouping of machines that are greater than 1,320 feet from another grouping.
Height	The maximum height of the turbines shall be 355 feet. Greater height, but not in excess of 400 feet, may be considered on a case-by-case basis if the applicant can sufficiently demonstrate that the increased height will result in increased energy efficiencies, thereby reducing the overall number of turbines in the project. However, in all cases, due consideration shall be given to the scale of the turbines in relation to the surrounding landscape.
Clearance	No clearance standards
Access	No access standards
Electrical Wires	1) To avoid visual clutter, intra-project power lines having a voltage of 34,500 volts or less should be buried unless the applicant can sufficiently demonstrate that burying the lines will violate other guidelines/standards, violate applicable law, render the project economically infeasible, or be hidden from public view. 2) To avoid cluttering the skyline, transformers and other electric equipment should be hidden from view or otherwise constructed in harmony with the surrounding landscape.
Lighting	Individual wind turbine heights and markings shall comply with Federal Aviation Administration regulations. If lighting of turbines or other structures is required, “daytime white-nighttime red” shall be the only type of lighting allowed unless prohibited by law.
Equipment	No equipment standards
Appearance, Color, and Finish	1) A WECS project should maintain visual unity among clusters of turbines. 2) To promote visual uniformity, the rotors, nacelles, and towers of all turbines in an array should appear similar. 3) To provide visual order to a WECS project, all turbines shall have the same number of rotor blades and all rotor blades shall spin in the same direction in relation to the wind. 4) To promote visual uniformity, all turbines at a similar ground elevation shall have the same height from blade tip to the ground.

	5) All turbines and towers shall be a shade of white in color.
Signs	No billboards, logos, and advertising signs of any kind shall be located on the turbines.
Permits Required	Special Use Permit, Building Permit
Restoration Requirement	Standards outlining decommissioning include a "security" that ensures the turbines will be removed and restoration will be completed no matter who owns the facility. All underground equipment and foundation systems of WECS shall be removed to a depth of at least 3 feet to allow for cultivation of crops or restoration of pasture.
Signal Interference	No signal interference standards
Noise	1) The noise level caused by the operation of the project, measured at 5 feet above ground level at the property line coincident with or outside the project boundary, shall not exceed 65 decibels (A-weighted) and shall not exceed 50 decibels (C-weighted) if it is determined that a pure tone noise is generated by the project. 2) Upon receipt by the Riley County Planning and Development Department of a complaint regarding noise from an existing WECS project that the Department determines to be reasonable, the project owner shall be required, at the owner's expense, to have prepared, by an independent acoustical consultant, approved by the Planning and Development Department, an acoustical study that shall demonstrate compliance with the above noise standard on the basis of equivalent sound pressure levels. "Equivalent sound pressure levels" means the steady sound level that, over 10-minute measurement periods, would produce the same energy equivalence as the fluctuating sound level actually occurring. 3) Low-frequency noise criteria: WECS that are not designed "in accordance with proven good engineering practices" shall be prohibited. WECS designed with the following characteristics shall be deemed in "accordance with proven good engineering practices:" a) At least three blades b) Upwind rotor c) No furling (where "furling" means that the wind turbine is designed to limit its power output in high winds by changing the rotor's plane of rotation to a plane that is not perpendicular to the prevailing wind direction) d) Tapered and twisting blades e) Well-designed braking system
Shadow Flicker	No shadow flicker standards
Link	http://www.rileycountyks.gov/documents/Planning%20and%20Development/Zoning%20Regulations/y%29%20Section%2022%20-%20Special%20Uses.pdf

Michigan

Banks County, Michigan

Zoning Areas Where Turbines are Allowed	No zoning areas specified
Set Backs	A wind turbine generator or anemometer tower shall, in all cases, be set back at least a distance equal to the height of the tower from the closest location in which an off-premise residential structure could be located, based on the required setbacks for the given zoning district.
Spacing and Density	No spacing or density standards
Height	400 feet, but the planning commission may approve an increased height if it will not result in increased intensity on lighting of the tower due to Federal Aviation Administration regulations
Clearance	The lowest point of the arc created by rotating wind vanes or blades on a wind generator shall be no less than 15 feet above the ground.
Access	No access standards
Electrical Wires	The electrical transmission lines connecting the wind turbine generator to the public utility electricity distribution system shall be located underground, unless the Planning Commission finds that it is technologically infeasible or finds that the cost of placing those electrical transmission lines underground is unreasonably burdensome. If the Planning Commission allows overhead electrical transmission lines to connect the wind turbine generator to the public utility electricity distribution system, then those electrical transmission lines shall be placed at a height consistent with industry standards to ensure public safety.
Lighting	Each wind turbine generator or anemometer tower shall not be artificially lighted, unless required by the Federal Aviation Administration or other applicable governmental authority. If lighting is required, the lighting alternatives and design chosen: 1) Shall be the lowest intensity allowable under Federal Aviation Administration regulations 2) Shall not be strobe lighting or other intermittent white lighting fixtures, unless expressly required by the Federal Aviation Administration. Such intermittent lighting shall be alternated with steady red lights at night if acceptable to the Federal Aviation Administration 3) May be a red top light that does not pulsate or blink 4) Shall be shielded to the extent possible and acceptable to the Federal Aviation Administration to reduce glare and visibility from the ground
Equipment	No standards
Appearance, Color, and Finish	1) Each wind turbine generator shall either maintain a galvanized steel finish or, subject to any Federal Aviation Administration standards, be painted a neutral color so as to reduce visual obtrusiveness. 2) Each wind turbine generator, including all accessory structures, shall,

	to the extent possible, use materials, and colors that will blend them into the natural setting and surrounding buildings. A medium grey shade is the preferred color for any wind generator; however, the Planning Commission may approve an alternate color if the facility is suspected to be located within an avian migratory route or if an alternate color would otherwise benefit the community.
Signs	A sign no more than 4 feet square in area displaying an address and telephone number for emergency calls and informational inquiries shall be posted at the proposed wind turbine generator or anemometer tower erected prior to a wind turbine generator. No wind turbine generator tower or anemometer tower or site shall include any advertising sign.
Permits Required	Special Use Permit
Restoration Requirement	In addition to removing the wind turbine generator or anemometer tower, the owner shall restore the site of the wind turbine generator or anemometer to its original condition prior to location of the wind turbine generator or anemometer tower, subject to reasonable wear and tear. Any foundation associated with a wind generator or anemometer tower shall be removed to a minimum depth 3 feet below the final grade, and site vegetation shall be restored.
Signal Interference	Any wind turbine generators shall be constructed and operated so that they do not interfere with television, microwave, navigational, or radio reception to neighboring areas.
Noise	Any proposed wind turbine generator shall not result in sound levels in excess of 60 decibels as measured on the dB(A) scale at the property lines of the site in question.
Shadow Flicker	Landscaping shall be designed to counter the effects of shadow flicker on any neighboring residences or roadways caused by the rotor rotation in the sunlight.
Link	http://www.bankstownship.net/article8.pdf

Huron County, Michigan

Zoning Areas Where Turbines are Allowed	WECS may be constructed on land that is zoned Agricultural and within an area designated as a WECS Overlay District on the official zoning map for the County, subject to provisions and standards of Section 5 Wind Energy Conversion Systems Site Plan Review of this Article.
Set Backs	1) Inhabited structures: Each wind turbine shall be set back from the nearest residence, school, hospital, church, or library a distance no less than the greater of (a) two times the hub height or (b) 1,000 feet. 2) Property lines: Along the border of the Wind Energy Conversion Systems Overlay District, there shall be a setback distance equal to two times the hub height of the wind turbine. 3) Public roads: Each wind turbine shall be set back from the nearest public road a distance no less than 400 ft or 1.5 times the hub height, whichever is greater. 4) Communication and electrical lines: 400 feet or 1.5 times hub height
Spacing and Density	Tower separation: At a minimum, separation between towers must be at least three times the turbine diameter.
Height	275 feet, but can be modified
Clearance	The blade tip of any wind turbine shall have ground clearance of no less than 75 feet
Access	1) Wind turbines shall not be climbable on the exterior. 2) All access doors to wind turbine towers and electrical equipment shall be lockable.
Electrical Wires	The electrical collection system shall be placed underground within the interior of each parcel at a depth designed to accommodate the existing agricultural land use to the maximum extent practicable. The collection system may be placed overhead adjacent to county roadways, near substations or points of interconnection to the electric grid, or in other areas as necessary
Lighting	WECS shall not be artificially lighted, except to the extent required by the Federal Aviation Administration or other applicable authority, or otherwise necessary for the reasonable safety and security thereof.
Equipment	No standards
Appearance, Color, and Finish	Wind turbines shall be mounted on tubular towers and painted a non-reflective, non-obtrusive color. The appearance of turbines, towers, and buildings shall be maintained throughout the life of the WECS pursuant to industry standards.
Signs	Wind turbines shall not be used for displaying any advertising except for reasonable identification of the manufacturer or operator of the WECS. Appropriate warning signs shall be placed on wind turbine towers, electrical equipment, and WECS entrances.
Permits Required	WECS Permit
Restoration Requirement	The applicant shall submit a plan describing the intended disposition of the WECS at the end of their useful life and shall describe any agreement with the landowner regarding equipment removal upon lease termination. A performance bond or equivalent financial instrument

	shall be posted in an amount determined by the county [to be utilized in the event the decommissioning plan needs to be enforced with respect to tower removal, site restoration, etc.]. The bond shall be in favor of Huron County and may be provided jointly as a single instrument for multiple townships within a single wind farm, provided that any such single instrument shall be in an amount of at least $1 million and shall contain a replenishment obligation.
Signal Interference	No large-scale WECS shall be installed in any location where its proximity with existing fixed broadcast, retransmission, or reception antennas for radio, television, or wireless phone or other personal communication system would produce electromagnetic interference with signal transmission or reception. No large-scale WECS shall be installed in any location along the major axis of an existing microwave communications link where its operation is likely to produce electromagnetic interference in the links operation.
Noise	1) Audible noise or the sound pressure from the operation of the WECS shall not exceed 50 dBA, or the ambient sound pressure level plus 5 dBA, whichever is greater, for more than 10% of any hour, measured at any residence, school, hospital, church, or public library existing on the date of approval of any WECS site permit. The applicant shall be able to provide sound-pressure-level measurements from a reasonable number of sampled locations at the perimeter and in the interior of the WECS to demonstrate compliance with this standard. 2) In the event audible noise from the operation of the WECS contains a pure tone, the standards for audible noise set forth in subparagraph a) of this subsection shall be reduced by 5 dBA. A pure tone is defined to exist if the 1/3 octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two contiguous 1/3 octave bands by 5 dBA for center frequencies of 500 Hz and above, by 8 dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz. 3) The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is exceeded for more than 5 minutes per hour. Ambient noise levels shall be measured at potentially affected residences, schools, hospitals, churches, and public libraries. Ambient-noise-level measurement techniques shall employ all practical means of reducing the effect of wind-generated noise at the microphone. Ambient-noise-level measurements may be performed when wind velocities at the proposed project site are sufficient to allow wind turbine operations, provided that the wind velocity does not exceed 30 mph at the ambient-noise-measurement location. a) Any noise falling between two whole decibels shall be the lower of the two. b) In the event the noise levels resulting from the WECS exceed the criteria listed above, a waiver to said levels may be approved,

	provided that the following has been accomplished: • Written consent from the affected property owners has been obtained stating that they are aware of the WECS and the noise limitations imposed by this Article, and that consent is granted to allow noise levels to exceed the maximum limits otherwise allowed; and • If the applicant wishes the waiver to apply to succeeding owners of the property, a permanent noise impact easement must be recorded in the Huron County Register of Deeds office that describes the benefited and burdened properties and that advises all subsequent owners of the burdened property that noise levels in excess of those otherwise permitted by the ordinance may exist on or at the burdened property.
Shadow Flicker	No shadow flicker standards
Link	http://www.deq.state.mi.us/documents/deq-ess-p2-agp2-ArticleIII(Revised).pdf

Lodi, Michigan

Zoning Areas Where Turbines are Allowed	No Zoning Area Standards
Set Backs	All private and commercial WECS projects must be set back from property lines at a distance equal to or greater than 150% of the height of the structure, measured from the base of the structure to the highest reach of its blade.
Spacing and Density	No spacing or density standards
Height	Commercial WECS projects shall be exempt from the height requirements of this Ordinance, subject to the provisions of Special Uses, Article 50.0, and compliance with FAA regulations.
Clearance	No Clearance Standards
Access	1) Fences with locking portals at least 6 feet high 2) Anti-climbing devices 12 feet from pole base
Electrical Wires	All electrical compartments, storage facilities, wire conduit, and interconnections with utility companies will conform to national and local electrical codes.
Lighting	No standards
Equipment	No standards
Appearance, Color, and Finish	Towers and blades shall be painted any neutral color that is acceptable to Lodi Township or otherwise required by law.
Signs	A visible warning sign of "High Voltage" may be required at the base of all commercial Wind Energy Conversion Systems projects. The sign must have at a minimum six-inch letters with ¾-inch stroke. Such signs shall be located a maximum of 300 feet apart and at all points of site ingress and egress.
Permits Required	Special Use Permit
Restoration Requirement	Decommissioning shall include removal of all structures (including transmission equipment and fencing) and debris to a depth of 4 feet, restoration of the soil, and restoration of vegetation within 6 months of the end of the project life or facility abandonment.
Signal Interference	It shall be the responsibility of the person in charge of the private or commercial WECS to submit acceptable documentation as part of the conditional use permit to determine if the WECS project would in any way cause interference with microwave transmissions, residential television reception, or radio reception.
Noise	The noise level measured at the property line of the property on which the private or commercial WECS project has been installed shall not exceed 55 decibels.
Shadow Flicker	No shadow flicker standards
Link	http://twp-lodi.org/services/Lodi%20Township%20Zoning%20Ordinance/Article%2055.0%20-%20Supplemental%20Regulations%20and%20Standards

Long Lake Township, Michigan

Zoning Areas Where Turbines are Allowed	No Zoning Area Standards
Set Backs	1) Large WECS shall maintain a minimum setback from any property line of two times the combined height of the tower and blade. 2) Large WECS shall maintain a minimum setback from the right-of-way line of any public road or highway of at least five times the combined height of the tower and blade. 3) In all cases, the large WECS shall maintain a minimum distance of at least 1.25 times the tower and blade height from any habitable structure. 4) In no case shall large WECS be located within any required setback area nor in any front yard.
Spacing and Density	One additional large Wind Energy Conversion System may be permitted for each additional land area of not less than 2 1/2 acres.
Height	A large Wind Energy Conversion System shall not exceed a total tower and blade height of 150 feet unless the parcel on which the large Wind Energy Conversion System is to be located is 10 acres or larger (in which case the maximum total tower and blade height may be 300 feet).
Clearance	In all cases, the minimum height of the lowest position of the large Wind Energy Conversion System blade shall be at least 30 feet above the ground.
Access	Any large Wind Energy Conversion System shall be equipped with anti-climbing devices. Tower-climbing apparatus shall not be located within 12 feet of the ground. Where a tower is capable of being climbed, a locked, protective fence at least 6 feet high shall enclose the tower.
Electrical Wires	No electrical wire standards
Lighting	Large WECS shall be equipped with air traffic warning lights or other marking lights only if required by the Federal Aviation Administration; such light should be positioned or shielded to avoid undue visual impact on neighboring properties.
Equipment	No standards
Appearance, Color, and Finish	Colors and surface treatments of the large WECS and supporting structures shall, to the greatest extent feasible, minimize disruption of the natural characteristics of the site and shall include no advertising of any kind.
Signs	Large WECS shall include no sign or advertising of any kind, except for one sign (not to exceed 2 square feet) posted at the base of the tower; said sign shall contain the following information: a) "Warning: High Voltage" b) Manufacturer's name c) Operator's name d) Emergency phone number e) Emergency shutdown procedure
Permits Required	Conditional Land Use Permit

Restoration Requirement	If any large WECS remain non-functional or inoperative for a continuous period of 1 year, the permittee shall remove said system at their expense. Removal of the system shall mean the entire structure, including foundations, transmission equipment, and fencing, from the property. If removal of towers and appurtenant facilities is required and the permit holder or successors fails to remove the towers and appurtenant facilities from the property within 30 days from the date of notification by the Zoning Administrator, Long Lake Township may proceed to remove the towers and appurtenant facilities; in which case, the salvage becomes property of the Township; and costs of removing the facilities will remain the burden of the permit holder. To ensure removal of an obsolete, inoperable, or abandoned facility, the Township may require of the applicant a financial guarantee as provided in Section 24.8.
Signal Interference	Large WECS shall be designed and constructed so as not to cause radio and television interference.
Noise	Large WECS shall be designed and placed in such a manner to minimize, to the greatest extent feasible, adverse visual and noise impacts on neighboring areas. Noise shall be limited to no more than 10 decibels above the original ambient baseline sound level beyond the property line, as reported in the noise study as required under 14.35.1.a above.
Shadow Flicker	During the impact analysis of the large WECS, written documentation shall be provided projecting 1) the shadow flicker on any existing structures located off the property on which the large system will be constructed, and 2) the extent and duration of the shadow flickers on these existing structures.
Link	http://www.longlaketownship.com/planning/June%2008/wind-turbine-ordinance.pdf

Minnesota

Big Stone County, Minnesota

Zoning Areas Where Turbines are Allowed	Commercial wind turbines may be located with a conditional use permit in the following areas: District A-1, A-2, Commercial/Industrial
Set Backs	1) Property lines: 1.1 times the total height 2) Neighboring dwellings: 750 feet 3) Road rights-of-way: 1.1 times the total height or 150 feet to the center of the abutting road, whichever is greater 4) Other rights-of-way: 1.1 times the total height 5) Public conservation land: 600 feet 6) Wetlands: 600 feet 7) Other structures: 1.1 times the total height 8) Existing WECS: To be considered based on relative size of the existing and proposed systems and the alignment of the systems relative to the predominant winds 9) Big Stone Lake and Minnesota River Bluff: 1/4 mile minimum; per setbacks in Conditional Use Permit
Spacing and Density	No spacing and density standards
Height	No height standard for commercial WECS (Non-Commercial must be less than 200 feet)
Clearance	Rotor blades or airfoils must maintain at least 12 feet of clearance between their lowest point and the ground.
Access	No access standards
Electrical Wires	All communication and feeder lines, equal to or less than 34.5 kV in capacity, installed as part of WECS shall be buried where reasonably feasible. Feeder lines installed as part of WECS shall not be considered an essential service. This standard applies to all feeder lines subject to Big Stone County authority.
Lighting	Lighting, including lighting intensity and strobe frequency, shall adhere to but not exceed requirements established by FAA permits and regulations. Red strobe lights are preferred for nighttime illumination to reduce impacts on migrating birds. Red pulsating incandescent lights should be avoided. Exception may be made for meteorological towers, where concerns exist relative to aerial spray applicators.
Equipment	No standards
Appearance, Color, and Finish	All commercial wind turbines shall be white, grey, or another non-obtrusive color. Blades may be black to facilitate de-icing. Finishes shall be matte or non-reflective. Exception may be made for meteorological towers, where concerns exist relative to aerial spray applicators.
Signs	All signage on site shall comply with Section 8 of the Big Stone County Land and Related Resource Management Ordinance. The manufacturers or owner's company name and/or logo must be placed on the nacelle.

Permits Required	Land Use Permit, Conditional Use Permit, no fee listed. Also, according to Minnesota statute 216F.04, the Public Utilities Commission must issue a site permit.
Restoration Requirement	Commercial WECS shall have a decommissioning plan outlining the anticipated means and cost of removing WECS at the end of their serviceable life or upon becoming discontinued. The cost estimates shall be provided by a competent party, such as a professional engineer, a contractor capable of decommissioning, or a person with suitable expertise or experience with decommissioning. The plan shall also identify the financial resources that will be available to pay for the decommissioning and removal of WECS and accessory facilities.
Signal Interference	The applicant shall minimize or mitigate interference with electromagnetic communications, such as radio, telephone, microwaves, or television signals caused by WECS. The applicant shall notify all communication tower operators within 2 miles of proposed WECS upon application to the county for permits. No WECS shall be constructed so as to interfere with County or Minnesota Department of Transportation microwave transmissions.
Noise	All WECS shall comply with Minnesota Rules 7030 governing noise.
Shadow Flicker	No shadow flicker standards
Link	http://www.bigstonecounty.org/BSCWindPowerOrdinance.pdf

Brown County, Minnesota

Zoning Areas Where Turbines are Allowed	Agriculture/ Shoreland Protection (A-1)
Set Backs	1) Property lines: 1.5 times the total height 2) Neighboring dwellings: 750 feet 3) Road rights-of-way: 1.5 times the total height 4) Other rights-of-way (railroad, power line, etc.): 1.5 times the total height 5) River bluffs: 750 feet
Spacing and Density	No spacing and density standards.
Height	200 feet
Clearance	Rotor blades or airfoils must maintain at least 12 feet of clearance between their lowest point and the ground.
Access	No access standards
Electrical Wires	All communication and feeder lines, equal to or less than 34.5 kV in capacity, installed as part of WECS shall be buried (where reasonably feasible). Feeder lines installed as part of WECS shall not be considered an essential service. This standard applies to all feeder lines subject to Brown County authority.
Lighting	Lighting, including lighting intensity and strobe frequency, shall adhere to but not exceed requirements established by Federal Aviation Administration permits and regulations. Red strobe lights are preferred for nighttime illumination to reduce impacts on migrating birds. Red pulsating incandescent lights should be avoided.
Equipment	
Appearance, Color, and Finish	All wind turbines and towers that are part of commercial WECS shall be white, grey, or another unobtrusive color. Blades may be black to facilitate de-icing. Finishes shall be matte or non-reflective. The exception is made for meteorological towers, where concerns exist relative to aerial spray applicators.
Signs	1) For all commercial WECS, a sign or signs shall be posted on the tower, transformer, and substation warning of high voltage. Signs with emergency contact information shall also be posted on the turbine or at another suitable point. 2) All signage on site shall comply with Section 727 Sign Regulations of the Brown County Ordinance. The manufacturer's or owner's company name and/or logo may be placed on the nacelles of the WECS.
Permits Required	Conditional Use Permit
Restoration Requirement	All WECS and accessory facilities shall be removed to 4 feet below ground level within 90 days of the discontinuation of use. WECS also need a decommissioning plan.
Signal Interference	The applicant shall minimize or mitigate interference with electromagnetic communications, such as radio, telephone, microwaves, or television signals caused by WECS. The applicant shall notify all

	communication tower operators within 5 miles of the proposed WECS location upon application to the county for permits. No WECS shall be constructed so as to interfere with County or Minnesota Department of Transportation microwave transmissions.
Noise	All WECS shall comply with Minnesota Rule 7030 governing noise.
Shadow Flicker	No shadow flicker standards
Link	http://www.co.brown.mn.us/departments/Crthouse/PlanZone/zoningordinance.pdf

Fillmore County, Minnesota

Zoning Areas Where Turbines are Allowed	A-1, B-1, I-1
Set Backs	1) All wind turbines and meteorological towers shall be set back 1.1 times their height from all property lines and road rights of way. 2) The construction of all new turbines and meteorological towers must be at least 750 feet from a dwelling unless the dwelling owner and turbine/tower owner are the same. 3) All new dwellings must be set back 750 feet from any wind turbine or meteorological tower unless the dwelling owner and turbine/tower owner are the same.
Spacing and Density	No spacing and density standards
Height	Non-commercial WECS shall have a total height of less than 200 feet; no standards for commercial
Clearance	Rotor blades or airfoils must maintain at least 12 feet of clearance between their lowest point and the ground.
Access	No access standards
Electrical Wires	1) Feeder lines: All communication and feeder lines equal to or less than 34.5 kV in capacity, installed as part of WECS shall be buried (where reasonably feasible). Feeder lines installed as part of WECS shall not be considered an essential service. This standard applies to all feeder lines subject to Fillmore County authority. 2) All WECS and accessory equipment and facilities shall comply with the National Electric Code and other applicable standards.
Lighting	Lighting, including lighting intensity and strobe frequency, shall adhere to but not exceed requirements established by Federal Aviation Administration permits and regulations. Red strobe lights are preferred for nighttime illumination to reduce impacts on migrating birds. Red pulsating incandescent lights are discouraged.
Equipment	No equipment standards
Appearance, Color, and Finish	All commercial wind turbines and meteorological towers that are part of commercial WECS shall be white, grey, or another unobtrusive color. Blades may be black to facilitate de-icing. Finishes may be matte or non-reflective. The Zoning Administrator may make exceptions for meteorological towers, where concerns exist relative to aerial spray applicators.
Signs	1) For commercial WECS. a sign or signs shall be posted on the tower, transformer, and substation warning of high voltage. Signs with emergency contact information shall also be posted on the turbine or at another suitable point. 2) All signage on the site shall comply with Section 726 of the Fillmore County Zoning Ordinance. The manufacturer's or owner's company name and/or logo may be placed on the nacelle compartment containing the electrical generator.

Permits Required	Land Use Permit, Conditional Use Permit
Restoration Requirement	1) All WECS and accessory facilities shall be removed 4 feet below ground level within 90 days of the discontinuation of use. 2) Commercial WECS shall have decommissioning plans outlining the anticipated means and cost of removing WECS at the end of their serviceable life or upon becoming discontinued. The cost estimates shall be provided by a competent party; such as a professional engineer, a contractor capable of decommissioning, or a person with suitable expertise or experience with decommissioning. The plan shall also identify the financial resources that will be available to pay for the decommissioning and removal of the WECS and accessory facilities.
Signal Interference	The applicant shall minimize or mitigate interference with electromagnetic communications, such as radio, telephone, microwaves, or television signals caused by WECS. The applicant shall notify all communication tower operators within 2 miles of the proposed WECS location upon application to the county for permits. No WECS shall be constructed as to interfere with County or Minnesota Department or Transportation microwave transmissions.
Noise	All WECS shall comply with Minnesota Rules 7030, as amended, governing noise.
Shadow Flicker	No shadow flicker standards
Link	http://www.co.fillmore.mn.us/zoning/documents/2008wind_energy_conversion_systems_ord.pdf

Lyon County, Minnesota

Zoning Areas Where Turbines are Allowed	Conditionally permitted in the following districts: agricultural, urban expansion, highway commercial, rural residential
Set Backs	1) 1.1 times total tower height from property lines 2) 1,000 feet from neighboring dwellings 3) 600 feet from public conservation lands managed as grasslands 4) 600 feet from wetlands, USFW types III, IV, and V 5) Roads: 1 times the total height; may be reduced for minimum maintenance roads or a road with an average daily traffic count of less than 10
Spacing and Density	To be considered based on relative size of the existing and proposed WECS, alignment of the WECS relative to the predominant winds, topography, extent of wake interference impact on existing WECS, property line setback of existing WECS
Height	Non-commercial WECS shall have a total height of less than 200 feet. No remarks for commercial WECS
Clearance	Rotor blades or airfoils must maintain at least 30 feet of clearance between their lowest point and the ground.
Access	No access standards
Electrical Wires	All feeder lines equal to or less than 34.5 kV in capacity shall be buried.
Lighting	Lighting, including lighting intensity and strobe frequency, shall adhere to but not exceed requirements established by FAA permits and regulations. Red strobe lights are preferred for nighttime illumination to reduce impacts on migrating birds. Red pulsating incandescent lights should be avoided.
Equipment	No equipment standards
Appearance, Color, and Finish	All wind turbines and towers that are part of commercial WECS shall be white, grey, or another non-obtrusive color. Blades may be black to facilitate de-icing. Finishes shall be matte or non-reflective.
Signs	All signage on site shall comply with Article 17 of the Lyon County Zoning Ordinance. The manufacturer's or owner's company and/or logo may be placed on the nacelles of the WECS.
Permits Required	Land Use Permit, Conditional Use Permit. Also, according to Minnesota Statute 216F.04, the Public Utilities Commission must issue a site permit.
Restoration Requirement	WECS shall be considered a discontinued use after 1 year without energy production. All WECS and accessory facilities shall be removed 4 feet below ground level within 90 days of the discontinuation of use.
Signal Interference	The applicant shall minimize or mitigate interference with electromagnetic communications, such as radio, telephone, microwaves, or television signals caused by WECS. The applicant shall notify all communication tower operators within 2 miles of the proposed WECS location upon application to the county for permits.
Noise	All WECS shall comply with Minnesota Rules 7030, as amended, governing noise.

Shadow Flicker	No shadow flicker standards
Link	http://www.lyonco.org/depts/publicworks/pz/windordinancechanges.pdf

Martin County, Minnesota

Zoning Areas Where Turbines are Allowed	Agricultural District, Business and Industry Districts
Set Backs	1) Rights-of-way: All WECS must be set back from roads rights-of-way a distance that is equal to or greater than the height of the WECS as measured from the ground level to the top of the tower, the top of the rotor, or blade, whichever is higher. (The setback may be reduced to a distance agreed upon by the County if the applicant furnishes a registered engineer's certification that the WECS are designed to collapse, fall, curl, or bend within a distance or zone shorter than the height of the WECS.) 2) Property lines: All WECS must be set back from property lines a distance equal to or greater than the height of the WECS as measured from the ground level to the top of the tower, the top of the rotor, or blade, whichever is higher. (The setback may be reduced to a distance agreed upon by the County if the applicant furnishes a registered engineer's certification that the WECS is designed to collapse, fall, curl, or bend within a distance or zone shorter than the height of the WECS. The setback may be reduced to a distance agreed upon by the County if there are no structures within the fall zone and if an easement is obtained from the adjacent landowner or landowners. The easement must describe all lands that could be impacted if the tower fell and must be in effect as long as the WECS are in place.) 3) Dwellings: All commercial WECS shall be set back 750 feet from dwellings other than the applicant's dwelling.
Spacing and Density	No spacing and density standards
Height	No height standards
Clearance	WECS blades must be a minimum of 30 feet above ground level.
Access	The WECS must be guarded against unauthorized climbing. It shall either have the climbing apparatus not closer than 12 feet to the ground or be un-climbable by design for the first 12 feet.
Electrical Wires	The WECS electrical equipment must adhere to all state, federal, and power company rules, regulations, and standards.
Lighting	WECS may not be illuminated unless required by a state or federal agency.
Equipment	No equipment standards
Appearance, Color, and Finish	Towers and blades shall be painted white, grey, or another non-reflective, unobtrusive color.
Signs	Signs must be posted at the base of each tower that specifies the following information: "Warning High Voltage," manufacturer's name, emergency shutdown procedures, and emergency phone numbers. No permitted sign may exceed 3 square feet in area. Signs other than warning signs, equipment labels, emergency information, or owner identification are prohibited on WECS.

Permits Required	Conditional Use Permit
Restoration Requirement	The permit application must contain a decommissioning plan to ensure that the project is properly decommissioned upon facility abandonment. At a minimum, the decommissioning plan shall include: 1) Provisions for the removal of all structures, debris, and above-ground cabling within 180 days after facility abandonment 2) Provisions for the restoration of the soil and vegetation within 270 days after facility abandonment
Signal Interference	No WECS shall be permitted that cause any interference with commercial or private use and enjoyment of other legally operating telecommunication devices including but not limited to radios, television, telephones, personal communication devices, and other electronic equipment and devices.
Noise	The WECS must be operated and maintained so that they comply with the noise pollution standards of the Minnesota Pollution Control Agency.
Shadow Flicker	No shadow flicker standards
Link	http://www.co.martin.mn.us/Plan&Zone/Docs/WIND%20ENERGY.pdf

Nicollet County, Minnesota

Zoning Areas Where Turbines are Allowed	Agriculture, Conservancy, General Business, Limited Industry
Set Backs	1) Property lines: 1.1 times the total height 2) Neighboring dwellings: 750 feet 3) Road rights-of-way: 1.1 times the total height 4) Other rights-of-way (railroads, power lines, etc.): 1.1 times the total height 5) Public conservation lands: 600 feet 6) Wetlands, USFW Types III, IV, V: 600 feet 7) Minnesota River Valley: ½ mile 8) Other existing WECS: to be based on: a) Relative size of the existing and proposed WECS b) Alignment of the WECS relative to the predominant winds c) Topography d) Extent of the wake interference on existing WECS e) Property line setbacks of existing WECS f) Other setbacks required
Spacing and Density	No spacing and density standards
Height	Non-commercial WECS shall have a total height of less than 200 feet; no standard for commercial WECS
Clearance	Rotor blades and airfoils must maintain at least 12 feet of clearance between their lowest points and the ground
Access	No access standards
Electrical Wires	All communications and feeder lines equal to or less than 34.5 kV in capacity installed as part of WECS shall be buried, where reasonably feasible. This standard applies to all feeder lines subject to Nicollet County authority.
Lighting	Lighting, including lighting intensity and strobe frequency, shall adhere to but not exceed requirements established by Federal Aviation Administration permits and regulations. Red strobe lights are required for nighttime illumination to reduce impacts on migrating birds.
Equipment	No equipment standards
Appearance, Color, and Finish	All wind turbines and towers that are part of commercial WECS shall be white, grey, or another non-obtrusive color. Blades may be black to facilitate de-icing. Finishes shall be matte or non-reflective. Exceptions may be made for meteorological towers, where concerns exist relative to aerial spray applicators.
Signs	1) For all commercial WECS, a sign or signs shall be posted on the tower, transformer, and substation warning of high voltage. Signs with emergency contact information shall also be posted on the turbine or at another suitable point. 2) All signage on site shall comply with Section 7 of the Nicollet County Zoning Ordinance. The manufacturer's or owner's name and/or

	logo may be placed on the nacelles of the WECS.
Permits Required	Conditional Use Permit, Zoning Permit
Restoration Requirement	All WECS and accessory facilities shall be removed to 4 feet below ground level within 90 days of the discontinuation of use. Decommissioning plan also needed
Signal Interference	The applicant shall minimize interference with existing electromagnetic communications such as radio, telephone, microwaves, or television signals caused by WECS. The applicant shall notify all communication tower operators within 5 miles of the proposed WECS location upon application to the county for permits.
Noise	All WECS shall comply with Minnesota Rules 7030 governing noise.
Shadow Flicker	No shadow flicker standards
Link	http://www.co.nicollet.mn.us/File.aspx?Id=FD792355-907D-4233-8AFB-E67DA3F7907C

Swift County, Minnesota

Zoning Areas Where Turbines are Allowed	Agricultural Preservation District # 1, Agricultural Preservation District # 2, Agricultural Preservation District # 3, Agricultural Preservation District # 4, Urban Development District
Set Backs	1) Property lines: 1.1 times the total height 2) Neighboring dwellings: 750 feet 3) Road rights-of-way: 1 times the height; may be reduced for minimum maintenance roads or a road with an average daily traffic count of less than 10 4) Other rights-of-way (railroads, power lines, etc.): to be considered by the planning commission 5) Public conservation lands managed as grasslands: 600 feet 6) Wetlands, USFW Types III, IV, and V: 600 feet 7) Other structures: to be considered 8) Other existing WECS: N/A
Spacing and Density	No spacing and density standards
Height	Small-scale WECS shall have a total height of less than 200 feet. No standards for large WECS
Clearance	Rotor blades or airfoils must maintain at least 12 feet of clearance between their lowest points and the ground.
Access	No access standards
Electrical Wires	All communication and feeder lines equal to or less than 34.5 kV in capacity installed as part of WECS shall be buried where reasonably feasible. Feeder lines installed as part of WECS shall not be considered an essential service. This standard applies to all feeder lines subject to Swift County authority.
Lighting	Lighting, including lighting intensity and strobe frequency, shall adhere to but not exceed requirements established by Federal Aviation Administration permits and regulations. Red strobe lights are preferred for nighttime illumination to reduce impacts on migrating birds. Red pulsating incandescent lights should be avoided.
Equipment	No equipment standards
Appearance, Color, and Finish	All wind turbines and towers that are part of large WECS shall be white, grey, or another non-obtrusive color. Blades may be black to facilitate de-icing. Finishes shall be matte or non-reflective. International blade markings are accepted.
Signs	1) For all large WECS, a sign or signs shall be posted on the tower, transformer, and substation warning of high voltage. (Signs with emergency contact information shall also be posted on the turbine or at another suitable point.) 2) The manufacturer's or owner's company name and/or logo may be placed on the nacelles of the WECS.
Permits Required	Land Use Permit, Conditional Use Permit

Restoration Requirement	All WECS and accessory facilities shall be removed to 4 feet below ground level within 90 days of the discontinuation of use. WECS also require a decommissioning plan.
Signal Interference	The applicant shall minimize or mitigate interference with electromagnetic communications such as radio, telephone, microwaves, or television signals caused by WECS. The applicant shall notify all communication tower operators within 5 miles of the proposed WECS location upon application to the county for permits. No WECS shall be constructed as to interfere with County or Minnesota Department of Transportation microwave transmissions.
Noise	All WECS shall comply with Minnesota Rules 7030 governing noise.
Shadow Flicker	No shadow flicker standards
Link	http://www.swiftcounty.com/vertical/Sites/%7BCB23E7E9-8CD6-437F-AE42-22084996955A%7D/uploads/%7B316C62D9-5A0C-436F-BECE-6B8A6B7CA644%7D.PDF

New York

Hamlin, New York

Zoning Areas Where Turbines are Allowed	Wind Energy Overlay District 1) A Wind Energy Overlay District may be created in the Residential-Very Low zoning district only. 2) Initial requests for Wind Energy Overlay Districts shall be submitted with applications for WECS Special Use Permits. No Wind Energy Overlay District may be initially created without specific requests for WECS. 3) Once a Wind Energy Overlay District has been created, new WECS or accessory structures or facilities may be added in that district by grant of a Special Use Permit pursuant to the requirements of this section.
Set Backs	WECS shall be set back from site boundaries, measured from the center of the WECS, a minimum distance of: 1) 600 feet from the nearest site boundary property line, except the setback shall be 500 feet where the boundary is with state, county, town, or village-owned property 2) 600 feet from the nearest public road 3) 1,200 feet from the nearest off-site residence existing at the time of application, measured from the exterior of such residence 4) 100 feet from state-identified wetlands. This distance may be adjusted to be greater or lesser at the discretion of the reviewing body, based on topography, land cover, land uses, and other factors that influence the flight patterns of resident birds. Other WECS structures and improvements shall comply with the underlying zoning district regulations.
Spacing and Density	No spacing and density standards
Height	The maximum total height of any turbine shall be 400 feet.
Clearance	The minimum distance between the ground and any part of the rotor or blade system shall be 20 feet.
Access	1) If the property owner submits a written request that fencing be required, a 6-foot fence with a locking portal shall be required to enclose each tower or group of towers. The color and type of fencing for each WECS installation shall be determined on the basis of individual applications as safety needs dictate. 2) No climbing pegs or tower ladders shall be located closer than 12 feet to the ground level at the base of the structure for freestanding single poles. 3) WECS shall be designed to prevent unauthorized external access to electrical and mechanical components and shall have access doors that are kept securely locked. 4) All access roads shall be gated and locked.
Electrical Wires	All power transmission lines from the tower to any other building or other structure shall be located underground to the maximum extent practical.

Lighting	No tower shall be lit except to comply with Federal Aviation Administration requirements. Minimum-security lighting for ground-level facilities shall be allowed as approved on the site plan. Security lighting shall be designed to minimize light pollution, including the use of light hoods, low-glare fixtures, and directing lights at the ground.
Equipment	No equipment standards
Appearance, Color, and Finish	All structures in a project shall be finished in a single, non-reflective, matte color or a camouflage scheme. Individual WECS within a wind energy overlay zone shall be constructed using wind turbines whose appearance, with respect to one another, is similar within and throughout the zone to provide reasonable uniformity in overall size, geometry, and rotational speeds.
Signs	1) No advertising signs are allowed on any part of the WECS, including fencing and support structures. 2) No lettering, company insignia, advertising, or graphics shall be on any part of the tower, hub, or blades. 3) Appropriate warning signs shall be posted. At least one sign shall be posted at the base of the tower warning of electrical shock or high voltage. A sign shall be posted on the entry area of the fence around each tower or group of towers and any building (or on the tower or building if there is no fence) containing emergency contact information, including a local telephone number with 24-hour, 7-days-a-week coverage. The town board may require additional signs based on safety needs.
Permits Required	Special Use Permit
Restoration Requirement	The applicant or successors shall continuously maintain an irrevocable letter of credit payable to the town for the removal of non-functional towers of the appurtenant facilities in an amount to be determined by the town for the period of the life of the facility. This fund shall consist of an irrevocable letter of credit from a State of New York-licensed financial institution. All costs of the financial security shall be borne by the applicant.
Signal Interference	No WECS shall be installed in any location where its proximity with existing fixed broadcast, retransmission, or reception antenna for radio, television, or wireless phone or other personal communication systems would produce electromagnetic interference with signal transmission or reception. No WECS shall be installed in any location along the major axis of an existing microwave communications link where its operation is likely to produce electromagnetic interference in the link's operation. If it is determined that WECS are causing electromagnetic interference, the operator shall take the necessary corrective action to eliminate this interference, including relocation or removal of the facilities, or resolution of the issue with the impacted parties. Failure to remedy electromagnetic interference is grounds for revocation of the Special Use Permit for the specific WECS or WECS causing the interference.

Noise	1) The statistical sound-pressure level generated by WECS shall not exceed a 6dBA increase over ambient measured at the closest exterior wall of any residence existing at the time of completing the SEQRA review of the application. Independent certification shall be provided before and after construction demonstrating compliance with this requirement. 2) In the event audible noise due to WECS operations contains a steady pure tone, such as a whine, screech, or hum, the standards for audible noise set forth in subparagraph 1) of this subsection shall be reduced by 5 dBA. A pure tone is defined to exist if one-third octave band sound pressure level in the band, including the tone, exceed the arithmetic average of the sound pressure levels of the two contiguous one third octave bands by 5 dBA for center frequencies of 500 Hz and above, by 8 dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz. 3) The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is exceeded for more than 5 minutes per hour. Ambient noise levels shall be measured at the exterior of potentially affected existing residences. Ambient noise level measurement techniques shall employ all practical means of reducing the effect of wind-generated noise at the microphone. Ambient-noise-level measurements may be performed when wind velocities at the proposed project site are sufficient to allow wind turbine operation, provided that the wind velocity does not exceed 30 mph at the ambient noise measurement location. 4) Any noise falling between two whole decibels shall be the lower of the two.
Shadow Flicker	No shadow flicker standards
Link	http://www.hamlinny.org/pdf/wind-tower/Wind_Energy_LL-2008.pdf

Pennsylvania

Antis Township, Pennsylvania

Zoning Areas Where Turbines are Allowed	No specified zoning areas
Set Backs	1) Civil structures: Each wind turbine generator shall be set back from the nearest existing (at the time of the building permit issuance) school, hospital, church, or public library a distance of no less than 2,500 feet. 2) Participating residences: For existing (at the time of the notice from the building code enforcement officer that no building permit is required) participating primary occupied residences, the setback distance from a wind turbine generator shall be at least 1,000 feet. In the event a lesser distance is desired, the developer/permitee shall request a waiver to this provision pursuant to the requirements of this ordinance. In no event shall the setback distance be less than 1.1 times the total height of the wind turbine generator. 3) Non-participating residences: For existing (at the time of the building permit issuance or notice from the building code enforcement officer that no building permit is required) non-participating primary occupied residences, the setback distance from a wind turbine generator shall be at least 2,500 feet. 4) Property lines: Each wind turbine generator shall be set back from the nearest property line a distance of no less than 1,000 feet. 5) Public roads: Each wind turbine generator shall be set back from the nearest public road a distance of no less than 1,000 feet, determined at the nearest boundary of the right-of-way for such public road. Unless conclusive evidence exists to the contrary, the public road right-of-way is presumed to be 66 feet. 6) Communication and electric lines: Each wind turbine generator shall be set back from the nearest above-ground public electric power line or public telephone line a distance of no less than 1,000 feet. 7) Natural resources and historical sites and structures: Each wind turbine generator shall be set back a distance of no less than 2,500 feet from the nearest existing critical and irreplaceable natural and cultural resource areas of the township.
Spacing and Density	No spacing and density standards
Height	No height standards, but "Developer/permitee shall install wind turbine generators of 2 megawatts nameplate capacity each unless otherwise agreed to by the parties, which comply with all terms and provisions in this agreement."
Clearance	No clearance standards
Access	1) The outside of the wind turbine generator towers shall not be climbable. 2) All access doors to the towers and electrical equipment shall be locked.

Electrical Wires	All wiring between the wind turbine generators and the substation shall be underground to the extent practicable.
Lighting	The wind turbine generators shall not be artificially illuminated except as required by the Federal Aviation Administration or any other applicable authority. If lighting is required, the lighting alternatives and design will seek to minimize the disturbance to the surrounding views.
Equipment	No equipment standards
Appearance, Color, and Finish	The towers and generators of the wind turbine generators shall have a non-reflective, painted steel finish in a neutral color, subject to any applicable standards of the Federal Aviation Administration or other regulatory requirements. The blades of the wind turbine generators are not covered by this section.
Signs	1) No advertising material or signage other than warning, equipment information, or indicia of ownership shall be allowed on the wind turbine generators. This prohibition shall include the attachment of any flag, decorative sign, streamers, pennants, ribbons, spinners, or waving, fluttering, or revolving devices, but not including weather devices. 2) Appropriate and clearly visible warning signage shall be placed on each tower, all electrical equipment, and all entrances.
Permits Required	Building Permit: fee is $1,500 per proposed MW for each wind turbine generator
Restoration Requirement	Restoration requirements focus on decommissioning bond
Signal Interference	No signal interference standards
Noise	1) Developer/permitee shall make a good-faith effort to maintain a noise level attributable to the wind turbine generators of not more than 45dbC with a reasonable margin of error as measured form the property line of existing non-participating residences. 2) The parties acknowledge that the project's construction will be the source of intermittent noise. Developer/permitee shall require all contractors to incorporate reasonable noise-reduction measures to mitigate the amount of noise generated during the construction phase.
Shadow Flicker	The facility owner and operator shall make every reasonable effort to minimize shadow flicker to any occupied building on a non-participating landowner's property.
Link	http://www.antistownship.org/antis/lib/antis/2006_wind_turbine_ordinance.pdf

South Dakota

Brookings County, South Dakota

Zoning Areas Where Turbines are Allowed	No zoning standards
Set Backs	1) Distance from existing off-site residences, business, and public buildings shall be 1,000 feet. Distance from on-site or lessor's residence shall be 1,000 feet. 2) Distance from right-of-way of public roads shall be 500 feet or 1.1 times the height of the wind turbines (depending on which is greater), measured from the ground surface to the tip of the blade when in a fully vertical position. 3) Distance from any property line shall be 500 feet or 1.1 times the height of the wind turbine (depending on which is greater), measured from the ground surface to the tip of the blade in a fully vertical position unless a wind easement has been obtained from the adjoining property owner.
Spacing and Density	The turbines shall be spaced no closer than three rotor diameters measurement of blades tip to tip. If required during final micrositing of the turbines to account for topographic conditions, up to 10% of the towers may be sited closer than the above spacing, but the permittees shall minimize the need to site the turbines closer.
Height	No specified height standards
Clearance	The minimum height of blade tips, measured from ground surface when a blade is in fully vertical position, shall be 25 feet.
Access	No access standards
Electrical Wires	1) Electrical cables: The permittees shall place electrical lines, known as collectors, and communication cables underground when located on private property. Collectors and cables shall also be placed within or immediately adjacent to the land necessary for turbine access roads unless otherwise negotiated with the affected landowner. 2) Feeder lines: The permittees shall place overhead electric lines, known as feeders, on public right-of-way if a public right-of-way exists. Route changes may be made as long as feeders remain on public rights-of-way and approval has been obtained from the government unit responsible for the affected right-of-way. If no public right-of-way exists, the permittees may place feeders on private property. When placing feeders on private property, the permittees shall place the feeder in accordance with the easement negotiated with the affected landowner. The permittees shall submit the site plan and engineering drawings for the feeder lines before commencing construction.
Lighting	Towers shall be marked as required by the Federal Aviation Administration. There shall be no lights on the tower other than what is required by the FAA. This restriction shall not apply to infrared heating devices used to protect the monitoring equipment.
Equipment	No equipment standards

Appearance, Color, and Finish	The finish of the exterior surface shall be non-reflective and non-gloss.
Signs	No sign standards
Permits Required	Permit required (type not specified)
Restoration Requirement	Upon expiration of this permit, or upon earlier termination of systems operation, the permittees shall have the obligation to dismantle and remove from the site all towers, turbine generators, transformers, overhead and underground cables, foundations, building, and ancillary equipment to a depth of 4 feet. To the extent possible, the permittees shall restore and reclaim the site to its pre-project topography and topsoil quality. All access roads shall be removed unless written approval is given by the affected landowner requesting that one or more roads, or portions thereof, be retained. Any agreement for removal to a lesser depth or for no removal shall be recorded with the County Zoning Office and shall show the locations of all such foundations. All such agreements between the permittees and the affected landowner shall be submitted to the County Zoning Office prior to completion of restoration activities. The site shall be restored in accordance with the requirements of this condition within 18 months after expiration.
Signal Interference	The permittees shall not operate the WECS so as to cause microwave, television, radio, or navigation interference contrary to Federal Communication Commission regulations or other law. In the event such interference is caused by the WECS or its operations, the permittees shall take measures necessary to correct the problem.
Noise	Noise level shall not exceed 50 dBA, including constructive interference at existing off-site residences, businesses, and public buildings.
Shadow Flicker	No shadow flicker standards
Link	http://www.brookingscountysd.gov/zoning/Completed%20Zoning%20Ordinance-11-27-07_w_%202008-04update.pdf

Wisconsin

Buffalo County, Wisconsin

Zoning Areas Where Turbines are Allowed	Agricultural
Set Backs	1) Blufflines: Each wind turbine shall be set back from all blufflines. 2) Habitable structures: Each wind turbine shall be set back from a habitable structure a distance of 50 feet, plus the height of the turbine from ground level to the tip of the blade at maximum height. 3) Property lines: Each wind turbine shall be set back from the nearest public road right-of-way a distance of 50 feet, plus the height of the wind turbine from ground level to the tip of the blade at maximum height. 4) Communication and electrical power lines: Each wind turbine shall be set back from the nearest above-ground electric power line or telephone line a distance of 50 feet, plus the height of the tower as determined from the existing line unless appropriate easements are obtained from the power or telephone company whose lines would be affected and recorded at Buffalo County Register of Deeds.
Spacing and Density	No spacing and density standards
Height	No height standards
Clearance	50 feet
Access	1) Wind turbine towers shall not be climbable up to 15 feet above ground level. 2) All access doors to wind turbine towers and electrical equipment shall be lockable.
Electrical Wires	1) All wiring between wind turbines and the WECS substation shall be underground. 2) Electrical controls and control wiring and power lines shall be wireless or not above ground except where wind farm collector wiring is brought together for connection to the transmission or distribution network, adjacent to that network.
Lighting	WECS shall not be artificially lit, except to the extent required by the Federal Aviation Administration or other applicable authority.
Equipment	No equipment standards
Appearance, Color, and Finish	1) Wind turbines shall be painted a non-reflective, non-obtrusive color. 2) At WECS sites, the design of the buildings and related structures shall, to the extent reasonably possible, use materials, colors, textures, screening, and landscaping that will blend the WECS into the natural setting and the existing environment.
Signs	1) Wind turbines shall not be used to display any advertising except for reasonable identification for the manufacturer or operator of the WECS. 2) Appropriate warning signs shall be placed on wind turbine towers, electrical equipment, and WECS entrances.

Permits Required	Conditional Use Permit, Wind Energy Conversion System Zoning Permit
Restoration Requirement	No restoration requirements, but a plan for abandonment must accompany the application for a conditional use permit.
Signal Interference	The applicant shall take reasonable steps to minimize interference with electromagnetic communications, such as radio, telephone, or television signals caused by WECS.
Noise	1) Audible noise due to WECS operations shall not exceed 50 dBA for any period of time, when measured at any inhabited structure. 2) In the event the audible noise due to WECS operations contains a steady pure tone, such as a whine, screech, or hum, the standards for audible noise set forth in subparagraph (1) of this subsection shall be reduced by 5 dBA. A pure tone is defined to exist if 1/3 octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two contiguous 1/3 octave bands by 5 dBA for center frequencies of 500 Hz and above, by 8 dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz. 3) In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level. The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is succeeded for more than 5 minutes per hour. Ambient noise levels shall be measured at the exterior of potentially affected existing residences, schools, hospitals, churches, and public libraries. Ambient noise level measurement techniques shall employ all practical means of reducing the effect of wind-generated noise at the microphone. Ambient noise level measurements may be performed when wind velocities at the proposed project site are sufficient to allow wind turbine operation, provided that the wind velocity does not exceed 30 mph at the ambient noise measurement location. 4) Any noise falling between 2 decibels shall be the lower of the two. 5) In the event the noise levels resulting from the WECS exceed the criteria listed above, a waiver to said levels may be granted by the Board of Adjustment provided that the following has been accomplished: a) Written consent from the affected property owners has been obtained stating that they are aware of the WECS and the noise limitations imposed by this ordinance and that consent is granted to allow noise levels to exceed the maximum limits otherwise allowed. b) If the applicant wishes the waiver to apply to succeeding owners of the property, a permanent noise impact easement is recorded in the Buffalo County Register of Deeds that describes the

	benefited and burdened properties and that advises all subsequent owners of the burdened properties that noise levels in excess of those permitted by this ordinance may exist on or at the burdened property.
Shadow Flicker	No shadow flicker standards, but a "document including an accompanying aerial photo if necessary, showing the shadow flicker projection" must accompany the application for a conditional use permit.
Link	http://www.buffalocounty.com/County%20Board/Ordinances/Full%20Wind%20Energy%20Facility%20Ordinance.pdf

Door County, Wisconsin

Zoning Areas Where Turbines are Allowed	WECS may only be constructed in areas that are designated as Exclusive Agricultural, Prime Agricultural, General Agricultural, Countryside and Heartland-10
Set Backs	1) Inhabited structures: WECS shall be set back from the nearest residence, school, hospital, church, public library, and/or places of frequent public gathering a distance of no less than the greater of (A) two times its total height or (B) 1,000 feet. 2) Property lines: WECS shall be set back from the nearest property line the distance of the fall zone, as certified by a professional engineer, plus 10% of its total height, or a distance no less than 1.1 times its total height, whichever is greater. 3) Public and private roads: WECS shall be set back from the nearest public or private road or other right of way the distance of the fall zone as certified by a professional engineer plus 10% of its total height, or no less than 1.1 times its total height, whichever is greater. This setback shall be measured from the nearest boundary of the underlying right-of-way. 4) Telephone and electrical lines: WECS shall be set back from above-ground electrical power lines, telephone lines, or unimproved easements for the same distance of the fall zone, as certified by a professional engineer, plus 10% of its total height, or a distance no less than 1.1 times its total height, whichever is greater. Setbacks from existing power or telephone lines shall be measured from the lines. If no power line or telephone line exists within a utility easement, the setback shall be measured from the nearest utility easement right-of-way boundary. 5) Critical Communications Systems: a) WECS shall be set back a distance no less than 1/2 mile to existing critical communication structures, unless the applicant/permit holder/owner has submitted a plan to provide a replacement signal that would restore reception to at least the level present before operation of the wind energy system in the event of signal interference; and b) WECS shall be set back a distance no less than 500 feet from either side of the line of sight of an existing critical microwave communications link, unless the applicant/permit holder/owner has submitted a plan to provide a replacement signal that would restore reception to at least the level present before operation of the wind energy system in the event of signal interference.
Spacing and Density	No spacing or density standards
Height	No height restrictions
Clearance	The blade tip of any wind turbine shall, at its lowest point, have ground clearance of no less than 75 feet.
Access	Any wind turbine and/or accessory structure shall not be climbable up to 15 feet above ground level. WECS sites shall be secure (e.g., fence, locked gate, and locked doors to any wind turbine and/or accessory structure).

Electrical Wires	Electrical controls and control wiring shall be wireless or below ground. WECS collector wiring connected to the transmission or distribution network, adjacent to that network, may be above ground.
Lighting	WECS shall not be artificially lighted, except to the minimum extent required by the Federal Aviation Administration or other applicable authority.
Equipment	No equipment standards
Appearance, Color, and Finish	Wind turbines shall be painted a non-reflective, non-obtrusive color.
Signs	Wind turbines shall not be used to display any advertising except for reasonable identification of the manufacturer or operator of the WECS and the utility procuring the power.
Permits Required	WECS Siting Permit
Restoration Requirement	1) All WECS components shall be removed from the property. 2) All items in outdoor storage will be removed from the property. 3) All building foundations, tower pads, and buried electrical improvements shall be removed to a depth of 4 feet below the ground surface. 4) All excavated areas shall be filled in and made level with ground surface surrounding the excavated area with unconsolidated soil material, at least the top 4 inches of which shall be screened topsoil. 5) A post-decommissioning storm water runoff plan shall be implemented.
Signal Interference	The applicant/permit holder/owner shall conduct a study on critical communications per s.3.02(2)(c). Not sooner than 12 months and not later than 18 months of the date when the project becomes fully operational, or at any time upon receipt of a verified complaint of signal interference, the applicant/permit holder/owner shall also submit to the Zoning Administrator a critical communications systems interference study prepared by a registered professional engineer (qualified by training, education, and experience to conduct such a study) certifying that the WECS do not and will not interfere with critical communications. If it is determined at any time that the WECS interfere with critical communications, the applicant/permit holder/owner shall implement and maintain any corrective measure needed to insure that the WECS will not interfere with critical communications.
Noise	1) Audible sound due to WECS operations shall not exceed (50) dBA for any period of time when measured at the property line of any residence, school, hospital, church public library, or place of frequent public gathering existing on the date of issuance of any WECS Siting Permit, or any proposed structure which meets requirements of s. 3.04(1)(b). 2) Audible sound due to WECS operations shall not exceed 45 dBA inside any occupied structure existing on the date of issuance of any WECS Siting Permit.

	3) In the event audible sound due to operations contains a steady pure tone, such as a whine, screech, or hum, such sound shall not exceed 45 dBA for any period of time when measured at the property line of any residence, school, hospital, church, public library, or place of frequent public gathering existing on the date of issuance of any WECS Siting Permit, or any proposed structure which meets requirements of s. 3.04(1)(b). 4) If the ambient sound level causes WECS that would otherwise be compliant to exceed the applicable standards given above, the applicable standards shall be adjusted to the ambient sound level. 5) In the event audible sound due to operations shall exceed the audible sound standards listed above, a waiver to said standards may be granted provided that the following has been accomplished: a) Written consent from the affected property owners has been obtained stating that they are aware of the WECS and the audible sound standards imposed by this ordinance, and that consent is granted to allow sound levels to exceed the audible sound standards otherwise allowed; and b) The applicant/permit holder/owner shall record a permanent sound impact easement with the Door County Register of Deeds, which describes the burdened properties and which advises all subsequent owners of the burdened property that sound levels in excess of audible sound standards permitted by this ordinance may exist on or at the burdened property. 6) The applicant/permit holder/owner shall submit to the Zoning Administrator a sound study prepared by a registered professional engineer (qualified by training, education, and experience to conduct such a study) certifying compliance with the sound regulations set forth herein no sooner than 12 months and no later than 18 months of the date when the project becomes fully operational, or at any time upon receipt of a verified sound complaint. If at any time it is determined that the maximum sound levels set forth herein are exceeded, the applicant/permit holder/owner shall immediately implement any and all measures necessary to permanently reduce sound levels to compliant levels.
Shadow Flicker	The applicant/permit holder/owner shall conduct a study on shadow flicker and blade glint per s. 3.02 (2)(b). Not sooner than 12 months and not later than 18 months of the date when the project becomes fully operational, or at anytime upon receipt of a verified complaint of shadow flicker and/or blade glint, the applicant/permit holder/owner shall also submit to the Zoning Administrator a shadow flicker and blade glint study prepared by a registered professional engineer (qualified by training, education, and experience to conduct such a study) certifying that shadow flicker and blade glint present no deleterious effects for any occupied structure located within a 1-mile radius of any wind turbine. If it is determined that shadow flicker and/or

	blade glint exists at any occupied structures, the applicant/permit holder/owner shall implement and maintain all necessary remedial measures.
Link	http://www.co.door.wi.gov/county/app/docs/door/20080612084449388068.pdf

Manitowoc, Wisconsin

Zoning Areas Where Turbines are Allowed	May be located in areas that are zoned A-3 Agriculture or PA-Prime Agricultural. May not be located within ¼-mile of any area that is zoned C1-Conservancy or NA-Natural Area or within ¼-mile of any state or county forest, hunting area, lake access, natural area, or park.
Set Backs	1) At least 1.1 times the total height of the large wind system from the property line of a participating property 2) At least 1,000 feet from the property line of a nonparticipating property unless the owner of the nonparticipating property grants an easement for a lesser setback. The easement must be recorded with the Register of Deeds and may not provide for a setback that is less than 1.1 times the total height of the large wind system. 3) At least 1.1 times the total height of the large wind system or 500 feet, whichever is greater, from any public road or power line right-of-way
Spacing and Density	A wind tower must be separated from every other wind tower by a sufficient distance so that it does not interfere with the other wind tower.
Height	The total height of a wind energy system must be 500 feet or less.
Clearance	The vertical distance from ground level to the tip of a wind turbine blade when the blade is at its lowest point must be at least 75 feet.
Access	A wind tower, including any climbing aids, must be secured against unauthorized access by means of a locked barrier or security fence.
Electrical Wires	All electrical wires associated with a wind energy system, other than wires necessary to connect the wind turbine to its base and to overhead collection lines, must be located underground.
Lighting	A wind tower and turbine may not be artificially lighted unless such lighting is required by the Federal Aviation Administration. If lighting is required, the lighting must comply with FAA minimum requirements and, whenever possible, be at the lowest intensity allowed, avoid the use of strobe or other intermittent white lights, and use steady red lights. If more than one lighting alternative is available, the alternative that causes the least visual disturbance must be used.
Equipment	Any electrical equipment associated with a wind energy system must be located under the sweep area of a blade assembly.
Appearance, Color, and Finish	The exterior surface of any visible components of a wind energy system must be a non-reflective, neutral color. Wind towers and turbines in a wind farm system that are located within 1 mile of each other must be of uniform design, including tower type, color, number of blades, and direction of blade rotation.
Signs	No wind turbine, tower building, or other structure associated with a wind energy system may be used to advertise or promote any product or service. No word or graphic representation, other than appropriate warning signs and owner identification, may be placed on a wind turbine, tower, building, or other structure associated with a wind energy system so as to be visible from any public road.

Permits Required	Zoning Permit and Conditional Use Permit. Fees are required for both, including a $100 processing fee under the conditional use permit for each large wind system included in the wind farm system.
Restoration Requirement	A large wind system, met tower, or wind farm system that is out of service for a continuous 12-month period will be deemed to have been abandoned and must be removed within 3 months of receipt of Notice of Abandonment unless the Administrator withdraws the notice or within 6 months of providing notice of termination of operations. The owner must: 1) Remove all turbines, above-ground improvements, and outdoor storage 2) Remove all foundations, pads, and underground electrical wires and reclaim the site to a depth of 4 feet below the surface of the ground 3) Remove all hazardous material in accordance with federal and state law
Signal Interference	1) The owner of a large wind energy system, met tower, or wind farm system must take reasonable steps to prevent and eliminate any interference with the transmission and reception of electromagnetic communications, such as microwave, radio, telephone, or television systems. 2) A large wind energy system or met tower may not be located within an emergency communication corridor, which is defined as the area within 500 feet of a line connecting a specific pair of communication towers. (See link to ordinance for specific details.)
Noise	1) The noise generated by the operation of a large wind energy system may not exceed the ambient noise level by more than 5dB as measured at any point on property adjacent to the parcel on which the large wind energy system is located. The noise level generated by the operation of a large wind energy system will be determined during the investigation of a noise complaint by comparing the sound level measured when the wind generator blades are rotating to the sound level measured when the wind generator blades are stopped. 2) Each wind tower must have a placard posted in plain view and easily readable by a person on the ground. The placard must provide a telephone number for law enforcement or other county officials to call for purposes of noise complaint investigation, sound level measurement, or administration of this ordinance. A person must be reachable through that telephone number at all times, and the owner must be able to promptly control the operation of the large wind energy system as necessary to permit noise complaint investigation and sound level management.
Shadow Flicker	The owner of a large wind system must take such reasonable steps as are necessary to prevent, mitigate, and eliminate shadow flicker on any occupied structure on a nonparticipating property.
Link	http://www.manitowoccounty.com/Upload/8/Chapter%2024%20Current%20-%202007-1030.pdf

Mitchell, Wisconsin

Zoning Areas Where Turbines are Allowed	No zoning area standards
Set Backs	1) Inhabited structures: Each wind turbine shall be set back from the nearest residence, school, hospital, church, or public library a distance of no less than 1.1 times its total height. 2) Property lines: Each wind turbine shall be set back from the nearest property line a distance of no less than 1.1 times its total height, unless appropriate easements are secured from adjacent property owners, or other acceptable mitigation is approved by the Commission. 3) Public roads: Each wind turbine shall be set back from the nearest public road a distance no less than 1.1 times its total height, determined at the nearest boundary of the underlying right-of-way for such public road. 4) Communication and electrical lines: Each wind turbine shall be set back from the nearest above-ground public electric power line or telephone line a distance of no less than 1.1 times its total height, determined from the existing power line or telephone line.
Spacing and Density	No spacing or density standards
Height	No height standard
Clearance	The blade tip of any wind turbine shall, at its lowest point, have ground clearance of no less than 2/3 the height of the tower to the hub or 14 feet, whichever is greater.
Access	1) Wind turbine towers shall not be climbable up to 14 feet above ground level. 2) All access doors to wind turbine towers and electrical equipment shall be lockable.
Electrical Wires	1) All wiring between wind turbines and WECS substations shall be underground. 2) Electrical controls and control wiring and power lines shall be wireless or not above ground except for where wind farm collector wiring is brought together for connection to the transmission or distribution network, adjacent to that network.
Lighting	WECS shall not be artificially lighted, except to the extent required by the Federal Aviation Administration or other applicable authority.
Equipment	No equipment standards
Appearance, Color, and Finish	Wind turbines shall be painted a non-reflective, non-obtrusive color.
Signs	Wind turbines shall not be used to display advertising except for reasonable identification of the manufacturer or operator of the WECS. Appropriate warning signage shall be placed on wind turbine towers, electrical equipment, and WECS entrances.
Permits Required	Conditional Use Permit Wind Energy Siting Permit

Restoration Requirement	No decommissioning standards
Signal Interference	The applicant shall minimize or mitigate interference with electromagnetic communications, such as radio, telephone, microwaves, or television signals caused by any WECS.
Noise	1) Audible noise due to WECS operations shall not exceed 50 dBA for any period of time, when measured at any residence, school, hospital, church, or public library existing on the date of approval of any wind energy siting permit. 2) In the event audible noise due to WECS operations contain a steady pure tone, such as a whine, screech, or hum, the standards for audible noise set forth in subparagraph 1) of this subsection shall be reduced by 5 dBA. A pure tone is defined to exist if one-third octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dBA for center frequencies of 5 Hz or by 15 dBA for center frequencies less than or equal to 125 Hz, measuring noise from the property line. 3) In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level. The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is succeeded for more than 5 minutes per hour. Ambient noise levels shall be measured at the exterior of potentially affected existing residences, schools, hospitals, churches, and public libraries. Ambient noise level measurement techniques shall employ all practical means of reducing the effect of wind-generated noise at the microphone. Ambient noise level measurements may be performed when wind velocities at the proposed project are sufficient to allow wind turbine operations, provided that wind velocity does not exceed 30 mph at the ambient noise measurement location. 4) Any noise level falling between two whole decibels shall be the lower of the two. 5) In the event the noise levels resulting from the WECS exceed the criteria listed above, a waiver to said levels may be granted by the town provided that the following have been accomplished: a) Written consent from the affected property owners has been obtained stating that they are aware of the WECS and the noise limitations imposed by this ordinance and that consent is granted to allow noise levels to exceed the maximum limits otherwise allowed; and b) If the applicant wishes the waiver to apply to succeeding owners of the property, a permanent noise impact easement has been recorded in the [Office of the Town/County Register of Deeds]

	that describes the benefited and burdened properties and that advises all subsequent owners of the burdened property that noise levels in excess of those permitted by this ordinance may exist on or at the burdened property.
Shadow Flicker	No shadow flicker standards
Link	http://www.townofmitchell.com/ordinances/windturbines.pdf

Morrison, Wisconsin

Zoning Areas Where Turbines are Allowed	Large Wind Energy Conversion Systems may only be constructed in areas zoned Agriculture.
Set Backs	1) Inhabited structures: Each large wind turbine shall be set back from the nearest inhabited structure a distance of no less than the greater of two times its total height or 1,000 feet. (The Morrison Town Board may grant a waiver to this requirement for a participating and/or non-participating landowner to decrease the setback. In no instance shall the setback be decreased to less than 1.1 times the total height of the wind turbine. This waiver shall be signed by the impacted property owner and recorded with the Brown County Register of Deeds.) 2) Property lines: Each wind turbine shall be set back from the nearest property line 1.1 times its total height. (The Morrison Town Board may grant a waiver to this provision where strict enforcement would not serve the public interest. This waiver shall be signed by the impacted owner and recorded with the Brown County Register of Deeds.) 3) Public roads: Each wind turbine shall be set back from the nearest public road right-of-way a distance no less than 1.1 times its total height. (The Morrison Town Board may grant a waiver to this provision where strict enforcement would not serve the public interest.) 4) Communication and utility lines a) The owner of WECS must meet all utility company setbacks and/or easements. The owner of WECS is responsible for contacting the appropriate utility to determine location of all above-ground and underground utility lines including, but not limited to, electricity, natural gas, petroleum, propane, cable television, and fiber optic. b) Utility line and/or easement locations shall be provided to the Town of Morrison for verification.
Spacing and Density	No spacing and density standards
Height	No specific height standards, although a large wind turbine is defined to be up to 500 feet tall
Clearance	The blade tip of any large wind turbine shall, at its lowest point, have ground clearance of no less than 75 feet.
Access	1) Wind turbine towers shall not be climbable up to 15 feet above ground level and must be located inside of the tower. 2) All access doors to wind turbine towers and electrical equipment shall be locked when unattended. 3) All substations shall be fenced to prevent public access. Chain link fencing shall include vinyl or aluminum slats or other landscaping to create an opaque visual barrier.
Electrical Wires	1) All electrical wires and lines connecting each turbine to the next turbine shall be installed underground. The wires and lines running from the last turbine in a string to any substation connecting to the electric

	utility shall also be run underground, unless the town determines that overhead lines would best serve the intent of the ordinance. 2) Electrical controls, control wiring, and power lines shall be wireless or not above ground except where wind farm collector wiring is brought together for connection to the transmission or distribution network, adjacent to that network.
Lighting	WECS shall not be artificially lighted, except to the extent required by the Federal Aviation Administration.
Equipment	No equipment standards
Appearance, Color, and Finish	1) Wind turbines shall be painted a non-reflective, non-obtrusive color, such as grey, white, or off-white. 2) At large WECS sites, the design of the building and related structures shall, to the extent possible, use materials, colors, textures, screening, and landscaping that will blend the large WECS into the natural setting and existing environment.
Signs	1) No form of advertising shall be allowed on the pole, turbine, blades, or other buildings or facilities associated with the use, except for reasonable identification of the manufacturer or operator of the large WECS. 2) Appropriate warning signage shall be placed on wind turbine towers, electrical equipment, and large WECS entrances.
Permits Required	Building Permit, Conditional Use Permit
Restoration Requirement	1) The site shall be stabilized, graded, and cleared of any debris by the owner of the facility or its assigns. If the site is not to be used for agricultural practices following removal, the site shall be seeded to prevent soil erosion. 2) Any foundation shall be removed to a minimum depth of 8 feet below grade by the owner of the facility or its assigns. (Following removal, the location of any remaining wind turbine foundation shall be identified on a map as such and recorded with the deed to the property with the Brown County Register of Deeds.) 3) Any access roads shall be removed, cleared, and graded by the owner of the large WECS or its assigns, unless the property owner wants to keep the access road. The Town of Morrison will not be assumed to take ownership of any access road unless through official action of the town board.
Signal Interference	The applicant shall mitigate any interference with electromagnetic communications, such as, but not limited to, radio, telephone, or television signals, including any public agency radio systems, caused by any large WECS.
Noise	1) Audible noise due to large WECS operations shall not exceed 50 dBA for 10% of the time over a continuous 24-hour period when measured at any inhibited structure existing on the date of approval of a large WECS building permit. a) If audible noise exceeds 50 dBA for 10% of the time over a continuous 24-hour period, the offending wind turbine must be

	inoperable until repairs are completed or a waiver is obtained from affected property owners. b) The Town of Morrison reserves the right to review the repair plan and evaluate its effectiveness. 2) WECS shall not create an audible steady, pure tone such as a whine, screech, hum, or vibration. 3) In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level. The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is succeeded for more than 5 minutes per hour. Ambient noise level measurement techniques shall employ all practical means of reducing the affect of wind-generated noise at the microphone. Ambient noise level measurements may be performed when wind velocities at the proposed project site are sufficient to allow wind turbine operation, provided that the wind velocity does not exceed 30 mph at the ambient noise level measurement location. 4) Any noise level emanating from WECS falling between two whole decibels shall be the higher of the two. 5) The applicant or wind turbine facility owner shall pay for any noise monitoring or measurements, with need determined by the Morrison Town Board. 6) In the event the noise levels resulting from the WECS exceed the criteria listed above, a waiver to said levels may be granted by the town providing the following has been accomplished: a) Written consent from the affected property owners has been obtained stating that they are aware of the large WECS and noise limitations imposed by this ordinance and that consent is granted to allow noise levels to exceed the maximum limits otherwise allowed; and, b) A permanent noise impact easement has been recorded in the Brown County Register of Deeds that describes the benefited and burdened properties and that advises all subsequent owners of the burdened property that noise levels in excess of those permitted by this ordinance may exist on or at the burdened property.
Shadow Flicker	The large WECS owner/operator shall make reasonable efforts to minimize or mitigate shadow flicker to any inhabited structure on a non-participating landowner's property.
Link	http://www.townofmorrison.org/OrdinancesZoning/XXIV_Wind_Energy_Facility_Ordinance_final.pdf

Town of Rockland, Wisconsin

Zoning Areas Where Turbines are Allowed	Exclusive Agriculture
Set Backs	1) Inhabited structures: Each wind turbine shall be set back from the nearest residence, school, church, or public library a distance of no less than the greater of two times its total height or 1,000 feet. (The Rockland Town Board may grant a waiver to this requirement for a participating and/or non-participating landowner to decrease the setback. In no instance shall the setback be decreased to less than 1.1 times the total height of the wind turbine. This waiver shall be signed by the impacted property owner and recorded with the Brown County Register of Deeds.) 2) Property lines: Each wind turbine shall be set back from the nearest property line a distance of no less than 1.1 times its total height. (The Rockland Town Board may grant a waiver to this provision where strict enforcement would not serve the public interest. This waiver shall be signed by the impacted property owner and recorded with the property with the Brown County Register of Deeds.) 3) Public roads: Each wind turbine shall be set back from the nearest public road right-of-way a distance of no less than 1.1 times its total height. (The Rockland Town Board may grant a waiver to this provision where strict enforcement would not serve the public interest.) 4) Communication and utility lines: Large WECS must meet all utility company setbacks and/or easements. The owner of the large WECS is responsible for contacting the appropriate utility to determine the location of all above-ground and underground utility lines including, but not limited to, electricity, natural gas, petroleum, propane, cable television, and fiber optic. Utility line and/or easement locations shall be provided to the Town of Rockland for verification. 5) Niagara Escarpment Ledge Face: The Town of Rockland recognizes the limitations imposed on it by Section 66.0401 Wis. Stats to require a setback from the Niagara Escarpment Ledge Face. However, due the significance of the Niagara Escarpment Ledge Face to the character of the town, the karst features (sinkholes, fractured bedrock, etc.) associated with the Niagara Escarpment, the potential for groundwater contamination and impact of nearby wells from blasting, and the potential impact on endangered plants and animals, each wind turbine should be set back a minimum of 1,500 feet from the Niagara Escarpment Ledge Face. A map depicting the recommended setback from the ledge face is on file with the Town of Rockland.
Spacing and Density	No spacing and density standards
Height	170 feet and over is considered a large wind energy system
Clearance	The blade tip of any wind turbine shall, at its lowest point, have ground clearance of no less than 75 feet.

Access	1) Wind turbine towers shall not be climbable up to 15 feet above ground level and must be located inside the tower. 2) All access doors to wind turbine towers and electrical equipment shall be lockable. 3) All substations shall be fenced to prevent public access. Chain link fencing shall include vinyl or aluminum slats or other landscaping to create an opaque visual barrier.
Electrical Wires	1) Electrical controls, control wiring, and power lines shall be wireless or not above ground where wind farm collector wiring is brought together for connection to the transmission or distribution network, adjacent to that network. 2) All electrical components of the large WECS shall conform to relevant and applicable local, state, and national codes, and relevant and applicable international standards. 3) All wiring between wind turbines and the large WECS substations shall be underground.
Lighting	WECS shall not be artificially lighted, except to the extent required by the Federal Aviation Administration.
Equipment	No equipment standards
Appearance, Color, and Finish	1) Wind turbines shall be painted a non-reflective, non-obtrusive color, such as grey, white, or off-white. 2) At large WECS sites, the design of the buildings and related structures shall, to the extent possible, use materials, colors, textures, screening, and landscaping that will blend the large WECS into the natural setting and existing environment.
Signs	1) No form of advertising shall be allowed on the pole, turbine, blades, or other buildings, except for reasonable identification of the manufacturer or operator of the large WECS. 2) Appropriate warning signage shall be placed on wind turbine towers, electrical equipment, and large WECS entrances.
Permits Required	Conditional Use Permit
Restoration Requirement	1) The site shall be stabilized, graded, and cleared of any debris by the owner of the facility or its assigns. If the site is not to be used for agricultural practices following removal, the site shall be seeded to prevent soil erosion. 2) Any foundation shall be removed to a minimum depth of 4 feet below grade, or to the level of bedrock if less than 4 feet below grade, by the owner of the facility or its assigns. (Following removal, the location of any remaining wind turbine foundation shall be identified on a map as such and recorded with the deed to the property with the Brown County Register of Deeds.) 3) Any access roads shall be removed, cleared, and graded by the owner of the facility or its assigns, unless the property owner wants to keep the access road. The Town of Rockland will not be assumed to take ownership of any access road unless through official action of the town board.

	4) Removal shall conform to the contract between property owner and the owner/operator of the large WECS, in addition to the requirements set forth in this ordinance.
Signal Interference	The applicant shall mitigate any interference with electromagnetic communications, such as radio, telephone, or television signals, including any public agency radio systems, caused by any large WECS.
Noise	1) Audible noise due to large WECS operations shall not exceed 50 dBA for 10% of the time over a continuous 24-hour period, when measured at any residence, school, hospital, church, or public library existing on the date of approval of a large WECS building permit. 2) If audible noise exceeds 50 dBA for 10% of the time over a continuous 24-hour period, the offending wind turbine must be inoperable until repairs are completed or a waiver is obtained from affected property owners in accordance with 11.07(F). 3) The Town of Rockland reserves the right to review the repair plan and evaluate its effectiveness. 4) WECS shall not create an audible steady, pure tone such as a whine, screech, hum, or vibration. 5) In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level. The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is succeeded for more than 5 minutes per hour. Ambient noise levels shall be measured at the exterior of potentially affected existing residences, schools, hospitals, churches, and public libraries. Ambient noise level measurement techniques shall employ all practical means of reducing the effect of wind-generated noise at the microphone. Ambient noise-level measurements may be performed when wind velocities at the proposed project site are sufficient to allow wind turbine operation, provided that the wind velocity does not exceed 30 mph at the ambient noise-level measurement location. 6) Any noise level emanating from WECS falling between two whole decibels shall be the higher of the two. 7) Any noise monitoring or measurements, with need determined by the Rockland Town Board, shall be paid for by the applicant or wind turbine facility owner. 8) In the event the noise levels resulting from the WECS exceed the criteria listed above, a waiver to said levels may be granted by the Town provided that the following has been accomplished: • Written consent from the affected property owners has been obtained stating that they are aware of the large WECS and noise limitations imposed by this ordinance, and that consent is granted to allow noise levels to exceed the maximum limits allowed; and,

	• A permanent noise impact easement has been recorded in the Brown County Register of Deeds that describes the benefited and burdened properties and that advises all subsequent owners of the burdened property that noise levels in excess of those permitted by this ordinance may exist on or at the burdened property.
Shadow Flicker	The large WECS owner and/or operator shall make reasonable efforts to minimize or mitigate shadow flicker to any occupied building on non-participating landowner's property.
Link	http://www.townofrockland.org/Documents/Large%20Wind%20Energy%20Facility%20Ordinance.pdf

Shawano County, Wisconsin

Zoning Areas Where Turbines are Allowed	No zone-specific regulations
Set Backs	1) Structure setbacks: Four times the total height of the WECS from all sensitive receptors and livestock facilities, but in no case less than 1,000 feet 2) Property line setbacks: Two times the total height of the WECS from all ownership property lines, but in no case less than 500 feet 3) Public roads and highway setbacks: Four times the total height of the WECS from the right-of-way line of any public road or highway, but in no case less than 1,000 feet 4) Railroad setbacks: 1.5 times the total height of the WECS from all railroad right-of-ways, but in no case less than 500 feet 5) Above-ground transmission lines greater than 12 kV setbacks: 1.5 times the total height of the WECS from the edge of the easement, but in no case less than 500 feet 6) Water bodies setback: Four times the total height of the WECS from the ordinary high-water mark of the water body, but in no case less than 1,000 feet 7) Wetland setbacks: Four times the total height of the WECS from the delineated boundary of the wetland, but in no case less than 1,000 feet 8) Sensitive environmental areas setbacks: WECS shall be located at a minimum of 2 miles from Navarino Wildlife Area or other identified sensitive environmental areas. 9) Historical, cultural and archeological resource setbacks: Four times the total height of the WECS from all historical, cultural, and archeological resources, but in no case less than 1,000 feet 10) Scenic setbacks: No WECS shall be located within 1 mile of any state, county, village or town park or designated recreation area.
Spacing and Density	Minimum distance between turbines shall be two times the total height of WECS
Height	No height limitations, but WECS greater than 125 feet in height are subject to the full extent of the WECS ordinance.
Clearance	The blade tip of WECS shall, at the lowest points, have ground clearance of not less than 75 feet.
Access	1) WECS shall not be climbable up to 15 feet above ground level. 2) All access doors to WECS and electrical equipment shall be lockable and remain locked at all times when operator personnel are not present.
Electrical Wires	1) All electrical conductors, telecommunications, and fiber optic cables associated with the WECS shall be underground. 2) All underground conductors, including neutral conductors, shall be insulated for the applicable voltage and of the same ampacity. 3) Underground installations, regardless of voltage, must comply with all right-of-way requirements and clearances as identified in this ordinance.

	4) Rights-of-way width for distances greater than 100 feet of underground installation in unpaved areas shall be a minimum of 30 feet and a maximum of 50 feet unless otherwise specifically agreed to by the property owner. 5) Rights-of-way width for distances of 100 feet or less of underground installation in unpaved areas shall be a minimum of 20 feet unless otherwise specifically agreed to by the property owner. 6) Wherever practical, easements shall be placed immediately adjacent to the outside edge of road rights-of-way.
Lighting	Shall be lit to Federal Aviation Administration minimal standards only. Where acceptable to the FAA, the Shawano County Planning, Development, and Zoning Committee will approve red lights over white lights, and steady lights over strobed or intermittent lights. Lighting shall be shielded from ground view to FAA maximum standards. Area and security lighting shall not exceed 175 watts and 25 feet height and shall be shielded from neighboring sensitive receptors.
Equipment	No equipment standards
Appearance, Color, and Finish	1) Wind energy conversion units shall be painted a non-obtrusive color (e.g., light environmental color such as white, grey, or beige). 2) The design of WECS buildings and related structures shall, to the extent reasonably possible, use materials; colors, textures, screening, and landscaping that will blend the facility into the natural setting and the existing environment.
Signs	No advertising sign or logo shall be placed or painted on any WECS. A WECS Conditional Use Permit may allow the placement of no more than two advertising signs relating to the development of the project site, but no sign shall exceed 15 square feet in surface area or 8 feet in height.
Permits Required	Conditional Use Permit
Restoration Requirement	The owner/operator shall remove all equipment associated with the WECS and restore the site to its original condition at the end of the permit or when any WECS are deemed inoperable or unsafe. The restoration shall include removal of all materials above and below ground; road repair, if any; and all re-grading and re-vegetation necessary to return the subject property to the condition existing prior to establishment of WECS. The restoration shall reflect the site-specific character including topography, vegetation, drainage, and any unique environmental features and shall be completed within 1 year. The owner/operator shall incur all costs associated with implementing the removal and site restoration plan.
Signal Interference	WECS shall be sited and operated so that they do not interfere with television, telephone (including cellular and digital), microwave, satellite (dish), navigational, or radio reception to neighboring areas. The applicant and/or operator of the facility shall be responsible for the full cost of any remediation necessary to provide equivalent alternate service or correct any problems, including relocation or removal of the

	facility, caused or exacerbated by the operation of such equipment and any and all related transmission lines, transformers, and other components related thereto. The owner/operator of the WECS shall respond within 5 business days to any request for a communications interference investigation by a property owner within the project boundary and a 3-mile radius beyond the project boundary. Testing shall commence within 10 working days of the request. The owner/operator is responsible for mitigating within 10 working days from determination of interference cause attributed to the operation of the WECS.
Noise	1) Noise regulations compliance: WECS shall be considered in violation of the CUP unless the applicant demonstrates that the project complies with all noise level limits. Noise levels in excess of the limits established in this ordinance shall be grounds for the Zoning Enforcement Officer or his/her designee to order immediate shut-down of all non-compliant WECS. 2) Post-construction noise and vibration measurements: Within 12 months of the date when the project is fully operational and within 2 weeks of the anniversary date of the pre-construction background noise measurements, the existing sound and vibration environment measurements taken before the project approval shall be repeated. Post-construction sound level measurements shall be taken with all WECS running and with all WECS off. Post-construction measurements shall be reported to the Shawano County Planning and Development Department (available for public review) using the same format used for the pre-construction sound and vibration studies. 3) Noise setbacks: The Shawano County Planning, Development, and Zoning Committee may impose a noise setback that exceeds the other setbacks set out in this ordinance if it deems that such greater setbacks are necessary to protect the public health, safety, and welfare of the community. 4) Noise standard: The noise due to WECS operations shall not be greater than 5 dBA above the established background noise level for more than 5 minutes out of any 1-hour time period. 5) Low-frequency noise or infrasound noise: No low-frequency noise or infrasound noise from wind turbine operations shall be created that causes the noise level both within the project boundary and a 1-mile radius beyond the project boundary to exceed pre-determined limits. (See URL listed below for complete description of limits.) 6) Pure tone penalty: In the event audible noise due to wind turbine operations contains a steady pure tone, such as a whine, screech, or hum, the standards for audible noise shall be reduced by 5 dB(A). A pure tone is defined to exist when: the one-third octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels on the two contiguous one-third octave bands by 5 dB(A) for center frequencies of 500 Hz and above, and 8 dB(A) for center frequencies between 160 and 400 Hz, and by 15

	dB(A) for center frequencies less than or equal to 125 Hz. 7) Repetitive, impulsive sound penalty: In the event the audible noise due to wind turbine operations contains repetitive, impulsive sounds, the standards for audible noise shall be reduced by 5 dB(A). 8) Pure tone and repetitive, impulsive tone penalty: In the event the audible noise due to wind turbine operations contains both a pure tone and repetitive impulsive sounds, the standards for audible noise shall be reduced by a total of 5 dB(A). 9) Operations – low-frequency noise: WECS that emit impulsive sound below 20 Hz that adversely affects the habitability or use of any existing dwelling unit, hospital, school, library, nursing home, or other sensitive noise receptor shall be deemed unsafe and must be shut down immediately.
Shadow Flicker	The facility shall be designed such that shadow flicker or blade glint will not fall on, or in any existing sensitive receptor. Shadow flicker or blade glint expected to fall on a roadway or a portion of a residential parcel may be acceptable under the following circumstances: 1) The flicker or glint will not exceed 10 hours per year. 2) The flicker or glint will fall more than 100 feet from an existing residence. 3) The traffic volumes are fewer than 500 vehicles per day on the roadway. 4) The flicker or glint will not fall on to an intersection. 5) If shadow flicker or blade glint exceeds any of these conditions, the source WECS shall be shut down until the flicker or glint problem is remedied.
Link	http://www.co.shawano.wi.us/i_shawano/pu/wind_energy_conversion_system_ordinance_.doc

Utah

Lehi City, Utah

Zoning Areas Where Turbines are Allowed	May only be allowed in a Wind Energy Overlay Zone. 1) Overlay Zones may be created only in Industrial and Technical Manufacturing Zones. 2) No Wind Overlay Zone may be initially created without specific requests for WECS. Requests for a Wind Energy Overlay Zone shall be submitted concurrently with an application for Concept Plan for a Wind Energy Conversion System. 3) All other uses listed as permitted or conditional uses in the underlying zoning district of the overlay zone may be allowed subject to the applicable permitted or conditional use approval processes. 4) Once a Wind Overlay Zone has been created, new wind energy structures or facilities may be allowed in that zone as a Conditional Use.
Set Backs	1) Residential zone or public use: Each wind turbine shall be set back from the nearest residential zoning district (including any zone that allows for residential uses) school, church, public park, or public library a distance of 1,000 feet. 2) Property lines: Each wind turbine shall be set back from the nearest property line a distance of no less than 1.1 times its total height, unless appropriate easements are secured from adjacent property owners or other acceptable mitigation is approved by the planning commission. 3) Public roads: Each wind turbine shall be set back a distance of no less than 1.1 times its total height determined at the nearest boundary of the underlying right-of-way for such public road. 4) Communication and electrical lines: Each wind turbine shall be set back from the nearest above-ground public electric power line or telephone line a distance of no less than 1.1 times its total height, determined from the existing power line or telephone line. 5) Wetlands: Each wind turbine shall be set back 500 feet from any wetlands as delineated by the U.S. Army Corp of Engineers. This distance may be adjusted to be greater or lesser at the discretion of the reviewing body, based on topography, land cover, land uses, and other factors that influence the flight patterns of resident birds.
Spacing and Density	No more than one turbine per acre will be allowed.
Height	The total height for a wind turbine shall not exceed 250 feet.
Clearance	The minimum distance between the ground and any part of the rotor or blade system shall be 20 feet.
Access	1) Wind turbine towers shall not be climbable up to 12 feet above ground level. 2) All access doors to wind turbine towers and electrical equipment shall be lockable. 3) A 6-foot high fence with a locking gate shall be required to enclose each tower or group of towers unless otherwise requested by applicant and approved by the planning commission as part of the Conditional

	Use Permit. The color and type of fencing for each WECS installation shall be determined on the basis of individual applications as safety needs dictate.
Electrical Wires	Electrical controls and control wiring and power lines shall be wireless or not above ground except where WECS collector wiring is brought together for connection to the transmission or distribution network, adjacent to that network.
Lighting	WECS shall not be artificially lighted, except to the extent required by the Federal Aviation Administration or other applicable authority.
Equipment	No equipment standards
Appearance, Color, and Finish	1) The design of WECS, including any buildings or related structures, shall to the extent reasonably possible use materials, colors, textures, screening, and landscaping that will help reduce the visual impact of the WECS. 2) WECS shall not project above the top of ridgelines. For the purposes of this section, ridgelines shall consist of prominent ridgelines that are highly visible from any major roadway classified as collector or greater in intensity. A ridgeline shall also include the crest of any ridgeline and the land located within 100 feet horizontally on either side of the crest. 3) Individual WECS within a wind overlay zone shall be constructed using wind turbines whose appearance, with respect to one another, is similar within and throughout the zone to provide reasonable uniformity in overall size, geometry, and rotational speeds. 4) All wind turbines and other structures shall be finished in a single, non-reflective matte finished color or camouflage scheme.
Signs	1) No advertising signs are allowed on any part of the WECS, including fencing, support structures, and wind turbines except for reasonable identification of the manufacturer or operator of the WECS. No lettering, company insignia, advertising, or graphics shall be on any part of the tower, hub, or blades. 2) Appropriate warning signs shall be placed on wind turbine towers, electrical equipment, and WECS entrances. Signage shall include emergency contact information.
Permits Required	Conditional Use permit
Restoration Requirement	The manner in which the WECS will be decommissioned and the site restored shall include removal of all structures and debris to a depth of 3 feet, restoration of the soil, and restoration of the vegetation (consistent and compatible with surrounding vegetation).
Signal Interference	The applicant shall minimize or mitigate any interference with electromagnetic communications, such as radio, telephone, or television signals caused by any WECS.
Noise	Audible noise due to WECS operations shall not exceed 55 dBA for any period of time measured at the WECS site's property line.
Shadow Flicker	No shadow flicker standards
Link	http://www.lehi-ut.gov/planning/files/devcode/Ch19WindEnergyFacility.pdf
Other	Minimal parcel size: WECS must be located on a parcel that is at least 10 acres in size and 1 additional acre per wind turbine.

REPORT DOCUMENTATION PAGE

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PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ORGANIZATION.

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December 2008	Technical Report	

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13. SUPPLEMENTARY NOTES

14. ABSTRACT *(Maximum 200 Words)*

Due to increased energy demand in the United States, rural communities with limited or no experience with wind energy now have the opportunity to become involved in this industry. Communities with good wind resources may be approached by entities with plans to develop the resource.Although these opportunities can create new revenue in the form of construction jobs and land lease payments, they also create a new responsibility on the part of local governments to ensure that ordinances will be established to aid the development of safe facilities that will be embraced by the community.The purpose of this report is to educate and engage state and local governments, as well as policymakers, about existing large wind energy ordinances. These groups will have a collection of examples to utilize when they attempt to draft a new large wind energy ordinance in a town or county without existing ordinances.

15. SUBJECT TERMS
wind energy; wind turbines; wind energy ordinances; model ordinances; existing ordinances; wind regulations; wind policies; shadow flicker; turbine finish; clearance; noise standards; permits; set backs; signal interference standards; zoning; spacing and density

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