

## **176.46 WIND ENERGY CONVERSION SYSTEM.**

1. For use in this section, the following terms are defined:
  - A. “Aggregate project” means those which are developed and operated in a coordinated fashion, but have multiple entities separately owning one or more of the individual WECS within the larger project. These projects are prohibited in this section.
  - B. “Commercial WECS” means a WECS which is intended to produce electricity specifically for sale to a regulated or non regulated utility or for use off site. WECS which have a rated capacity equal to or greater than 100 kW will be considered commercial in this section.
  - C. “Fall zone” means the area, defined as the furthest distance from the tower base, in which a tower will collapse in the event of a structural failure.
  - D. “Feeder line” means any power line that carries electrical power from one or more wind turbines or individual transformers associated with individual wind turbines to the point of interconnection with the electrical grid, in the case of interconnection with the high voltage transmission systems the point of interconnection shall be the substation serving the WECS.
  - E. “Gigawatt” (GW) is equal to 1,000,000,000 Watts.
  - F. “Guyed tower” means a tower that is supported, in whole or in part, by guy wires and ground anchors.
  - G. “Kilowatt” (kW) is equal to 1,000 Watts.
  - H. “Lattice tower” means a self-supporting tower with three or four sides, open, steel framed structure used to support equipment.
  - I. “Megawatt” (MG) is equal to 1,000,000 Watts.
  - J. “Meteorological tower” for the purpose of this Wind Energy Conversion System section, meteorological towers are those towers which are erected primarily to measure wind speed and directions plus other data relevant to siting WECS. Meteorological towers do not include towers and equipment used by airports, the Iowa Department of Transportation, or other similar applications to monitor weather conditions.
  - K. “Monopole tower” means a tower consisting of a single pole, constructed without guy wires and ground anchors.
  - L. “Non-Commercial WECS” means a WECS which has a rated capacity of up to 100 kW which is incidental and subordinate to a permitted use on the same parcel and which is intended to produce electricity

primarily for use on site. Such system may be connected to the electrical grid when a parcel on which the system is installed also receives electrical power supplied by a utility company. Excess electrical power generated and not presently needed for on-site use may be used by the utility company in accordance with Section 199, Chapter 15.11(5) of the Iowa Administrative Code.

M. “Residential WECS” consists of a wind turbine, tower, and associated control or conversion electronics, which has a rated capacity of not more than 10 kW and which is intended to primarily reduce on-site consumption of utility power. A system is considered a residential wind energy system only if it supplies electrical power solely for onsite use, except that when a parcel on which the system is installed also receives electrical power supplied by a utility company, excess electrical power generated and not presently needed for onsite use may be used by the utility company.

N. “Rotor diameter” means the diameter of the circle described by the moving rotor blades.

O. “Total system height” means the height above grade of the system, including the generating unit and attached blades or rotors.

P. “Tower” means the vertical component of a WECS that elevates the wind turbine generator and attached blades/rotors above the ground.

Q. “Tower height” means the height above grade of the fixed portion of the tower, excluding the generation unit and attached blades or rotors.

R. “Watt” (W) is the International System of Units' standard unit of power, the equivalent of one joule per second.

S. “WECS - Wind Energy Conversion System” means an electrical generating facility comprised of one or more wind turbines and accessory facilities, including but not limited to: power lines, transformers, substations, and meteorological towers that operate by converting the kinetic energy of wind into electrical energy. The energy may be used on-site or distributed into the electrical grid.

T. “Wind turbine generator” means the component of a wind energy conversion system that transforms mechanical energy from the wind into electrical energy.

2. Permitted Uses.

• District	• Residential WECS (Up to 10 kW)	• Non-Commercial WECS (	• Commercial WECS (Over to 100 kW)
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			Up to 100 kW)				
•	A-1	•	C	•	X	•	X
•	R-1	•	X	•	X	•	X
•	R-2	•	X	•	X	•	X
•	R-3	•	X	•	X	•	X
•	R-4	•	X	•	X	•	X
•	R-5	•	X	•	X	•	X
•	R-6	•	X	•	X	•	X
•	R-6A	•	X	•	X	•	X
•	R-M	•	X	•	X	•	X
•	RT-1	•	X	•	X	•	X
•	O-1	•	X	•	X	•	X
•	O-2	•	X	•	X	•	X
•	C-1	•	X	•	X	•	X
•	C-2	•	X	•	X	•	X
•	C-3	•	C	•	C	•	X
•	C-3P	•	C	•	C	•	X
•	C-4	•	C	•	C	•	X
•	I-1	•	C	•	C	•	X
•	I-2	•	C	•	C	•	X
•		•	C = Conditional Use	•	X = Not Permitted	•	P = Permitted Use

3. Regulations.

A. Accessory Use. All WECS shall be considered accessory uses.

B. Clearance of Blades. No portion of any WECS rotor blades shall extend within 30 feet of the ground. No blades may extend over parking areas, driveways, or sidewalks.

C. Set-back. No part of the WECS structure, including any guy wire anchors, may extend closer than ten feet to the property boundaries of the installation site. The system tower may be no closer to the property line than 1.1 times the total system height, provided that it also complies with any applicable fire setback requirements. Any non-commercial WECS shall meet a minimum setback of three hundred (300) feet from the nearest residential zoning district line.

D. Fall-Zone Clearance. No existing or proposed dwelling unit shall be located within the fall zone of any WECS. Other accessory structures may be located within 75% of the designated fall zone of the WECS.

E. Automatic Over Speed Controls. All WECS shall be equipped with manual (electronic or mechanical) and automatic over speed controls to limit the blade rotation speed within the design limits of the specific system.

F. Sound. All WECS shall conform to Chapter 53 of the Marion Code of Ordinances.

G. Approved WECS. All wind energy conversion systems must be approved under an Emerging Technology program recognized by the American Wind Energy Association (AWEA) or the U.S. Department of Energy. Non-certified residential wind turbines must submit a description of the safety features of the turbine, prepared by a registered mechanical engineer.

H. Compliance with the Building Code. Building permit applications for all WECS shall be accompanied by standard drawings of the wind turbine structure, including the tower, base, and footings. An engineering analysis of the tower showing compliance with the Building Code and certified by a licensed professional engineer shall also be submitted.

I. Compliance with Federal Aviation Administration (FAA) Regulations. All WECS must comply with applicable FAA regulations, including any necessary approvals for installations close to airports.

J. Compliance with the National Electric Code. Building permits for WECS shall be accompanied by a line drawing of the electrical components in sufficient detail to allow for a determination that the manner of the installation conforms to the National Electric Code.

K. Utility Notification. No WECS shall be installed until evidence has been given that the utility company has been informed of the customer's intent to install an interconnected customer-owner generator.

L. Tower Configuration. Any WECS tower under fifty (50) feet in total system height may have a monopole, guyed wire, or lattice design for the support of wind generation equipment. All WECS towers with a total system height of more than fifty (50) feet shall only be allowed a monopole design.

M. Total System Height. Residential WECS shall have a total system height of no greater than 50 feet, or twenty (20) feet above the tree canopy, with a maximum total system height of 70 feet. Non-commercial WECS shall have a maximum total system height of one hundred (100) feet.

N. Color and Finish. All WECS shall be white or grey in color. All finishes shall be matt or non-reflective.

O. Lighting. Lighting, including lighting intensity and frequency of strobe, shall adhere to but not exceed requirements established by the FAA permits and regulations. Red strobe lights are preferred for night-time illumination to reduce impacts on migrating birds. Red pulsating incandescent lights should be avoided.

P. Signage. One sign, limited to 4 square feet, shall be posted at the base of the tower. The sign shall include a notice of no trespassing, a warning of high voltage, and the phone number of the owner/operator to call in case of emergency.

Q. Climbing Apparatus. All climbing apparatus shall be located at least 12 feet above the ground, and the tower must be designed to prevent climbing within the first 12 feet.

R. Fencing. To limit access to the tower, an opaque fence 6 feet high with smooth side to the outside with a locking portal shall be placed around the WECS. Residential WECS shall be exempt from these regulations.

S. Landscaping. All landscaping requirements shall comply with Section 176.43 of the Marion Zoning Ordinance. Residential WECS shall be exempt from these regulations.

T. Maintenance. Structures and facilities shall be well maintained in an operational condition that poses no potential safety hazard.

U. Insurance. The owner/operator of a WECS must demonstrate adequate liability insurance.

V. Removal. If the WECS remains nonfunctional or inoperative for a continuous period of 1 year, the system shall be deemed discontinued and shall constitute a public nuisance. The owner/operator shall remove the abandoned system at their expense. Removal of the system includes the entire structure, including foundations, transmission equipment, and fencing from the property. Nonfunctioning or lack of operation may be proven by reports from the interconnected utility. If removal of towers and appurtenant facilities is required, the Zoning Administrator shall notify the owner/operator. Each WECS shall have a Decommissioning Plan outlining the anticipated means and cost of removing the WECS at the end of its serviceable life or upon becoming a discontinued use. The cost estimates shall be made by a competent party; such as a professional engineer, a contractor capable of decommissioning or 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.

W. Lot Size. No residential WECS shall be constructed on a parcel measuring less than 5 acres and no non-commercial WECS shall be constructed on a parcel measuring less than 10 acres.

4. Submittal Requirements.

A. Application. An applicant for a WECS permit shall submit at least 9 full copies of a site plan, prepared by a professional engineer licensed to practice in the State of Iowa. The professional engineer shall certify, in writing, that the site plan meets all engineering requirements of the City of Marion Code of Ordinances. Site plan requirements shall include:

- (1) A site plan drawn to scale no greater than 1 inch equals 50 feet, based on a certified instrument survey by a surveyor licensed in the State of Iowa.
- (2) Location of the WECS on the site and total height of the system, including blades, rotor diameter, and ground clearance. The area of the base of each tower and depths shall be indicated.
- (3) Utility lines, telephone lines and any other lines, both above and below ground, within a radius of 2,000 feet. Information presented shall contain details as how the power will be delivered to the grid, including the route and size of poles and towers to be used.
- (4) Property lot lines, land uses and the location and dimensions of all existing structures and uses on and off site within 2,000 feet of each WECS.
- (5) Dimensional representation of the various structural components of the wind tower construction, including the base and footing.
- (6) Design data indicating the basis of design, including manufacturer's dimensional drawings and installation and operation instructions.
- (7) Certification that the tower design is sufficient to withstand wind-load requirements for structures as established by the Marion Fire Prevention and Building Code.
- (8) Certification that the electrical system design is in compliance with accepted engineering practices and with the appropriate provisions of the National Electric Code.
- (9) Certification that the rotor over speed control system is in compliance with accepted engineering practices.

(10) The applicant shall provide a shadow flicker and blade glint zone model for any proposed WECS as requested by staff. The model shall:

a. Model and describe the zones where shadow flicker and blade glint will likely be present within the project boundary and a 2 mile radius beyond the project boundary. Include the topography, existing residences, wind speeds and directions, and existing vegetation and roadways. The model shall represent the most probable scenarios of wind consistency, sunshine constancy, and wind directions and speeds.

b. Calculate the locations of shadow flicker and blade glint caused by the proposed project; the expected durations of the flicker and glint at these locations and the total number of possible hours per year of flicker and glint at all locations.

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