



E³A: Small Wind Energy Applications for the Home, Farm or Ranch

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Siting and permitting

Siting a wind turbine is the process of locating the system so the turbine can have unobstructed access to the highest possible wind speed.

Site the turbine with the bottom edge of the rotor blades at least 30 feet above the tallest obstacle within 500 feet. Some experts recommend the bottom edge of the blade should pass three times above the tallest upwind barrier. Some barriers, such as growing trees, change over time. The site's topography can also interfere with the wind resource.

The challenge for many small wind system owners is applying basic rules to a site. Here are some general guidelines.

Tower height — The most common error in turbine siting is placing the wind turbine on a tower that is too short. The decision to buy a short tower is often made because the local installer did not offer an adequate tower height. The terrain and wind resource should determine tower height.

Optimize the wind resource — Site the turbine upwind of obstacles to avoid ground clutter. The highest point on the property benefits from wind shear and reduced turbulence. Topography and other factors may make the highest point a less than ideal site, but that point still generally has the best access to the wind.

Soil testing — Different soils have varying capacities to support weight. Weak soils with a strength of less than 1,000 pounds per square foot may not be well suited to supporting a wind turbine or may require additional support. The presence of rocks in your planned site may increase the total cost of preparing the site.

Communicate with neighbors early in the process — Notify your neighbors as a courtesy to help identify and prevent problems early in the process. Your neighbors' concerns can affect your purchasing or siting decisions.

Noise — Sound carries differently if the turbine is near metal buildings or bodies of water, and the amount and type of noise varies by turbine and site. Some small wind turbine owners report almost no sound from their turbines, but their neighbors may have a different experience. Some permits or zoning ordinances limit noise levels as measured from the closest neighboring residence. If you are concerned about noise, visit an installed turbine similar to the one you are considering to hear the sound of the turbine first-hand.

Visual impact — Neighbors in densely populated areas might have concerns or questions about the visual impact of a turbine.

Property values — There are no comprehensive studies documenting small wind turbine effects on property value, but industry experts say there are no known instances of small wind turbine installations negatively affecting property values. In some markets, small wind systems may increase property values.

Interference with telecommunications — Turbines are not known to interfere with telecommunications signals. The rotor diameter is small and the blades, which are made of fiberglass or other composites, do not affect signals. There were turbine tests conducted decades ago in which metal blades interfered with television signals, but there is no evidence of interference from turbines using modern composite materials.

Safety — In some areas, the permitting process requires significant documentation and safety precautions. Safety standards may be lax or nonexistent in rural areas. There are several key safety concerns to keep in mind when considering a small wind system:

- There may be permitting or county and city zoning requirements regarding safety.
- Your insurance company may have standards for qualifying for coverage.
- Fencing and signage around the turbine may be appropriate for your site.
- Your utility may have specific guidelines for connecting a system to the grid.

Neighboring turbines — Site the turbine at least 10 rotor diameters away from the nearest turbine.

Birds — Small wind turbine advocates state that birds hit turbines no more often than other objects. Birds may collide with your turbine if your site is in a flyway. Contact your local wildlife management agency to discuss the migratory behaviors and flight heights of species in your area.

Lighting — Unless lighting is required local ordinances, you probably don't have to illuminate your turbine. The Federal Aviation Administration (FAA) does not require lighting on structures under 200 feet unless they are adjacent to an airport.

Air traffic — You will probably not have air traffic requirements unless you are near an airport or military post. If crop dusting is common in your area, check local air traffic safety standards and notify local crop dusters of your turbine installation. Check with the Department of Defense to determine whether your turbine site is near a missile silo.

Permitting

Permitting requirements vary, so contact your city or county permitting agency to check the requirements in your area. There are several common issues you may run into with local ordinances.

Documents — Some permits require signed plans from an engineer. If this is not required, verify with your manufacturer that your warranty will be valid if you do not have an engineered site plan, especially if you plan to install the turbine yourself.

Parcel size — Your permit may require you to have a minimum parcel size, or land area, for a system. Minimums tend to be one acre, if they are specified.

Allowable tower height — Restrictions on structure heights are common in zoning. Ensure there are no maximum structure height ordinances that would affect your project.

Setback — Setbacks refer to the distance you must site your turbine away from public areas or property lines. Setbacks usually refer to all parts of the system, including guy-wires for guyed towers.

Noise levels — Noise levels are typically measured in decibels and may need to be measured from the closest neighboring residence.

Equipment — Some permits restrict the types of equipment you can use. Be aware of any such restrictions before purchasing a system.

Building code compliance — Permits may require your structure to comply with local building codes, which may require signed drawings and a site plan analysis from a certified engineer.

Electrical code compliance — You may be asked to supply drawings of the system's electrical components and demonstrate compliance with electrical code standards. If electrical code compliance is not required for a permit, it may be required by your utility for grid-connected systems.

Compliance with FAA regulations — If your site is near an airport or military facility, you may have to comply with FAA regulations. Your local planning department should be able to help you determine whether FAA regulations need to be addressed.

Utility notification — Some permits require documentation that the utility is aware of your plans to install a small wind turbine. However, off-grid systems may be exempt from such a requirement.

As you research the permitting process in your area, be aware that fees may apply. If permits are not required in your area, you may wish to find permitting guidelines from other areas or best practices recommended from your manufacturer to ensure your turbine is installed properly.

References

- American Wind Energy Association. (2008). *In the Public Interest: How and Why to Permit for Small Wind Systems*. Washington DC: AWEA.
- California Energy Commission. (2003). *Permitting Small Wind Turbines: A Handbook*. Washington DC: American Wind Energy Association.
- National Renewable Energy Laboratory. (2008). *Webinar: Zoning for Small Wind: The Importance of Tower Height*. Golden, CO.
- Sagrillo, M. (2007). Planning Your Wind System series. *Small Wind Toolbox*. Retrieved April 14, 2011, from RenewWisconsin.org: <http://www.renewwisconsin.org/wind/windtoolbox.htm>

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