

FAQ's for Small Wind Energy Systems Using Wind to Power Your Home or Business

Why should I choose wind?

An on-site or small wind power energy system can provide consumers in windy locations with a cushion against electric power price increases. Depending on your wind resource, a small wind energy system can lower your electricity bill by 50%-90%, help you avoid the high costs of having utility lines extended to remote locations. Wind energy systems not only help customers reduce their electricity purchases from utilities, they also help reduce U.S. dependence on fossil fuels, and they are non-polluting. Over its life, a small residential turbine can offset approximately 1.2 tons of air pollutants and 200 tons of greenhouse gases.

Is wind energy practical for me?

A small wind energy system can provide you with a practical and economical source of electricity if:

- Your property has a good wind resource.
- Your home or business is located in a rural area.
- You are able to provide adequate distance between the turbine and buildings, roads, and property lines; a minimum distance equal to the total wind structure height is generally recommended.
- Your zoning codes or covenants allow for wind turbines.
- Your average electricity bills are \$150 per month or more or your property is in a remote location that does not have easy access to utility lines.
- You are comfortable living with long-term investments.

How can I find a wind turbine installer?

The list of wind installers who are eligible to participate in NYSERDA's wind incentive programs is available at www.PowerNaturally.org. It is important to select a wind installer like you would any other home improvement contractor. Call at least three eligible installers for price quotes on comparable systems, ask how many systems they have installed, ask whether they have had hands-on training to install wind systems, ask for customer references and check their references, and ask about their insurance coverage. Be sure you are familiar with the program features summarized below so that you better understand the program steps and timing considerations.

Is there enough wind on my site?

The amount of wind at your site is critical as it determines the amount of energy your turbine will produce. For example, a 10kW turbine at a site with an average annual wind speed of 10 miles per hour (4.47 meters per second) produces about 6,300 kWh per year. The same turbine produces about 9,300 kWh per year at a site with an average annual wind speed of 12 miles per hour (5.36 meters per second). But with an average annual wind speed of only 8 miles per hour (3.58 meters per second) the same turbine will only produce about 3,200 kWh per year. An increase from 8 to 10 mph almost doubles the output of the system. Turbulence at the site must also be considered.

The wind resource can vary significantly over an area of just a few miles because of local terrain influences on the wind flow. There are resources that can be used to help determine the wind resources in your area:

- Wind resource maps (see <http://nyswe.awstruewind.com/>) can be used to estimate the wind resource in your area
- The observation of an area's vegetation is an indicator of the wind resources in an area, for example trees can be permanently deformed by strong winds
- The most accurate measurement is done through direct monitoring by a wind resource measurement system; however, this can be very expensive.

How do I choose the best site for my wind turbine?

You can have varied wind resources within the same property. In addition to obtain average wind speeds, you need to know about prevailing directions of the wind at your site. If you live in complex terrain, take care in selecting the installation site. If you site your wind turbine on the top of or on the windy side of a hill, for example, you will have more access to prevailing winds than you will in a gully or on the sheltered side of a hill. You also need to consider existing obstacles such as trees, houses and sheds, and you need to plan for future obstructions such as new buildings or trees that have not reached their full height. Your turbine needs to be sited upwind of buildings, and it needs to be 30 feet above anything within 500 feet. You also need enough room to install and maintain the turbine, and if your tower is guyed, you must allow room for the guy wires.

How much will a system cost?

A general rule of thumb is that the installed cost for a small system can range from \$4,000 to \$8,000 per kW. Permitting and site preparation costs can add another 15% or more to the purchase cost. For example, the average installed costs for a 10 kW wind turbine on a 120 foot guyed tower in New York is about \$60,000. Annual operation and maintenance costs and insurance might range between 1- 3% of the initial installation cost. Incentives offered by the New York State Energy Research and Development Authority (NYSERDA) can cut the costs in half (see www.PowerNaturally.org).

How much energy will my system generate?

Most U.S. manufacturers rate their turbines by the amount of power they can safely produce at a particular wind speed, usually chosen between 24 mph and 36 mph. The New York State Small windExplorer provides estimated production based on rotor diameter. A wind turbine installer (see www.PowerNaturally.org) can help you more precisely estimate the energy production you can expect.

What permits and approvals are needed?

You should speak with local representatives to determine any building permits, electrical permits, approvals, and certification that is needed prior to installing a wind system. This is a critical phase and it is vital that you have all approvals in place before beginning any installation or ordering your equipment. Your installer should have experience helping you secure the necessary permits. For turbines that will receive incentive funding from NYSERDA, the project must undergo a review under the State Environmental Quality Review Act (SEQRA). Your installer should be familiar with SEQRA requirements and forms.

In addition, for wind turbines that are connected to the electric grid, you will need to enter into an interconnection agreement with your local utility. It is essential that you work closely with your installer and local utility to ensure that you comply with all rules and regulations and receive all necessary approvals before your system is connected.

How complicated and expensive is it to connect your wind turbine to the electric grid?

You'll need to be connected to the local electric grid in order to reduce your purchase of electricity. Find out what is involved in connecting your system to your specific utility since rules and regulations vary. Also, consider how close your turbine will be from a connection point because the farther away it is, the more it will cost to run an electrical line.

Can I go "off-grid"?

Off-grid hybrid wind energy systems can be appropriate for homes, farms or entire communities that are far away from the nearest utility lines. According to many renewable energy experts, a "hybrid" system that combines wind and photovoltaic (PV) technologies offers several advantages over either single system.

How do wind turbines work?

Wind is created by unequal heating of the Earth's surface by the sun. Wind turbines convert the kinetic energy in wind into mechanical power that runs a generator to produce clean, nonpolluting electricity. The wind turns the blades, which spin a shaft connected to a generator that makes electricity.

What are the basic parts of a small wind electric system?

Home wind energy systems generally comprise a rotor, a generator mounted on a frame, a tower, wiring, and the "balance of system" components: controllers, inverters, and/or batteries.

What is the impact on neighboring properties?

Think about how close your turbine might be to any building, neighboring property lines and any environmentally-sensitive areas such as bird habitats, wetlands, and historical preservation areas. Your neighbors may be concerned about the visual impact of the tower and turbine so you should discuss this with them before proceeding. People are often concerned about the potential noise of the system but a wind turbine generally creates no more noise than the average home refrigerator. Neighbors are usually much more accepting of a wind turbine if you tell them that you are thinking about installing a wind turbine and describe the project early on. Projects applying for incentive funding from NYSERDA must supply letters of acceptance from neighbors or be approved at a public hearing.

Where can I find more information on wind turbines?

The following is a partial list of wind-related organizations:

[American Wind Energy Association](http://www.awea.org) is a national trade organization that promotes the use of wind energy. The site includes contact information for developers, consultants, equipment suppliers, and other members. It also provides details on large and small wind technology, policy initiatives, locations of installed wind projects, and links to other information. <http://www.awea.org>

[National Renewable Energy Laboratory/National Wind Technology Center](http://www.nrel.gov/wind) is part of the U.S. Department of Energy and this laboratory focuses on wind energy research and development. The site includes extensive information on the technology and associated research activities, as well as publications, photos, and links to other wind energy related sites. <http://www.nrel.gov/wind>

Small Wind Certification Council is an independent certification body that certifies small wind turbines as to if they meet or exceed the performance, durability, and safety requirements of the Small Wind Turbine Performance and Safety Standard. This certification will provide a common North American standard for reporting turbine energy and sound performance, and help small wind technology gain mainstream acceptance. <http://www.smallwindcertification.org/index.html>

Windustry is a non-profit organization that promotes wind energy through outreach, educational materials, and technical assistance to rural landowners, local communities and utilities, and state, regional, and nonprofit collaborations. The site contains links to help the rural landowner to understand wind energy opportunities. <http://www.windustry.org>