



866-WNDPWRD
sales@acgreenenergy.com

Small Wind Energy Systems Frequently Asked Questions

Buying a Small Wind System

- [Who should consider buying a wind turbine?](#)
- [Can I put a small wind turbine on my roof?](#)
- [How would I have a wind turbine installed at my home?](#)
- [What size turbine do I need for my home?](#)
- [How much does a wind system cost?](#)
- [How does the cost of a small wind system compare to that of other technologies?](#)
- [Will a small wind turbine save me money?](#)
- [Are there any rebate or incentive programs available where I live?](#)
- [How do wind turbines perform as an investment?](#)
- [Don't I have to take wind measurements for a year or more?](#)
- [What about towers?](#)
- [What policies can help grow the market for small wind turbines?](#)
- [How many turbines are needed to power a household or farm?](#)
- [Is there anything I should watch out for when buying a small wind turbine?](#)
- [What is a "Vertical-Axis" wind turbine, or "VAWT"?](#)
- [How reliable are wind turbines? Will I have to perform much maintenance?](#)
- [Will a small wind turbine damage neighboring property values?](#)
- [Will my utility allow me to hook up a wind generator?](#)
- [Will my local government allow me to install a wind turbine?](#)
- [Will I have to change any of the wiring in my house?](#)
- [How can I find out more about the experiences of people who own small wind systems?](#)
- [What companies make small wind electric systems?](#)
- [What companies make water pumping wind turbines?](#)

Who should consider buying a wind turbine?

A residential wind turbine can be a relatively large device, needs to be high above nearby buildings and mature tree lines, and often must abide by zoning laws. This means small wind systems are very seldom, if ever, suitable for urban or small-lot suburban applications. Except for very small wind turbines (i.e., with rotors one meter or less in diameter) on very small towers, a property size of one acre or more is desirable.

The economics of a wind system are very sensitive to the average wind speed in the area, and to a lesser extent, the cost of purchasing electricity. As a general rule of thumb, if economics are a concern, a turbine owner should have at least a 10-mph average wind speed and be paying at least 10 cents/kWh for electricity.

Residential wind turbines have been installed in all 50 states, but the majority have been installed in the West, Northeast, and Midwest where good wind resources often combine with good state incentive programs.

[TOP](#)

Can I put a small wind turbine on my roof?

See: [Wisconsin's Focus on Energy fact sheet on rooftop turbines.](#)

How would I have a wind turbine installed at my home?

Most dealers offer either complete turnkey (ready-to-operate) installations or the option for customers to purchase directly from the factory and install the system themselves. The first option offers more customer support from the company.

Self-installation offers significant savings and a hands-on understanding of the turbine. Prospective owners can discuss the options available with manufacturers to decide which method best suits their budget and technical skills.

Approach buying the equipment as you would any major purchase. You will need to weigh costs and various degrees of

approach buying the equipment as you would any major purchase. You will need to weigh costs and various degrees of ruggedness/durability of designs. Obtain and review the product literature from several manufacturers, and research those you want to pursue to ensure they are recognized businesses and their parts and service will be available when you need them. Find out how long the warranty lasts and what it includes, and ask for references of customers with installations similar to the one you are considering. Ask system owners about performance, reliability, maintenance and repair requirements, and whether the system is meeting their expectations.

What size turbine do I need for my home?

Homes use approximately 10,000 kilowatt-hours (kWh) of electricity per year (about 830 kWh per month), though this amount can vary considerably. An air-conditioned home in Arizona, for example, will use more electricity than a non-air - conditioned home in Vermont. Depending upon the average wind speed in the area, a wind turbine rated in the range of 5 to 10 kilowatts would be required to make a significant contribution to meet this demand.

[NREL Calculator](#)

[TOP](#)

How much does a wind system cost?

Small wind energy systems cost from \$3,000 to \$6,000 for every kilowatt of generating capacity, or about \$40,000 for a system (installed) large enough to power most of a home.

This is much cheaper than solar systems, but the payback period can still be lengthy – as little as 6 but up to 30 years. That's why it's important to take advantage of rebates or tax credits available for small wind system installations. Well-sited small wind turbines can usually pay for themselves within 15 years, about half their serviceable lifetimes, if the right incentives are applied.

How does the cost of a small wind system compare to that of other technologies?

Small wind turbines (with generating capacities of 100 kilowatts and under) are often the least expensive way to generate clean, on-site electricity.

A study by the Congressional Office of Technology Assessment found wind to be cheaper for meeting remote loads (loads not connected to a utility system) than diesel generators, solar photovoltaics, or utility transmission line extensions. (Micro-hydro also was found to be less expensive in many locations.)

Hybrid systems of wind/photovoltaic, wind/diesel, and other combinations can often provide the most efficient and cost-effective option for rural electrification. Solar Photovoltaic (PV) cells, which convert sunlight directly into electricity, are often used to supplement wind power since PV tends to operate best in seasons when the wind is more calm. Diesel generators or batteries can be used for backup power and to maintain power production during low wind seasons.

One study of an Arctic community with annual average wind speeds of 15 mph compared the cost of a 500-kW diesel system to that of a 200-kW diesel generator and four mid-sized wind turbines. It found that the wind/diesel combination cost considerably more to install (\$378,000 versus \$125,000), but would deliver fuel savings of \$90,000 per year, paying for itself in less than three years.

[TOP](#)

Will a small wind turbine save me money?

A wind turbine typically lowers a household electricity bill by 50% to 90%. It is not uncommon for wind turbine owners with total-electric homes to have monthly utility bills of only \$8 to \$15 for nine months of the year. Depending on the turbine size and the installation site, a turbine could supply more than 100% of a home's energy needs, sometimes resulting in a "negative" electric utility bill. In northern parts of the U.S. where less air conditioning is used, electricity bills can be very low year-round. The amount of money a small wind turbine saves you in the long run will depend upon its cost, the amount of electricity you use, the average wind speed at your site, and other factors.

Since energy conservation is usually less expensive than energy production, making your house or farm more energy-efficient first will likely reduce the amount of investment in a wind system to meet your needs. Most wind system purchasers have done all the reasonable efficiency measures first.

[TOP](#)

Are there any rebate or incentive programs available where I live?

For the most up-to-date listing of incentives, policies, and regulations at the state and federal levels, see the Database of State Incentives for Renewables & Efficiency at <http://dsireusa.org>

How do wind turbines perform as an investment?

The wind system will usually recoup its investment through utility savings within six to 15 years and after that the electricity it produces will be virtually free. Over the long term, a wind turbine is a good investment because a well-sited wind system increases property value, similar to any other home improvement. Many people buy wind systems in preparation for their retirement because they don't want to be subject to unpredictable increases in utility rates.

[TOP](#)

Don't I have to take wind measurements for a year or more?

For most residential systems the cost of taking wind measurements is not justified. Wind resource data published by the U.S. Department of Energy is sufficient for an experienced evaluator to predict wind turbine performance. There are also other inexpensive or free resources available to the public that can help you evaluate your wind resource. In very hilly or mountainous areas, however, it may be best to collect wind data before purchasing a system to ensure that your site is not in a sheltered area.

What about towers?

The taller the tower, the better. An 80- to 120-foot tower is usually supplied along with the wind turbine. Towers this tall are necessary to raise the wind turbine above turbulence generated by obstacles on the ground and trees. Wind speed increases with height above ground, and increasing speed increases wind power exponentially. Thus, relatively small investments in increased tower height can yield very high rates of return in power production. For instance, installing a 10-kW generator on a 100-foot tower rather than a 60-foot tower involves a 10% increase in overall system cost but can result in 29% more power.

Taller towers also raise blades above air turbulence, allowing the turbines to produce more power. A rule of thumb for proper and efficient operation of a wind turbine is that the bottom of the turbine's blades should be at least 30 feet above the top of anything within 500 feet.

Also be aware of any height restrictions your local zoning rules may impose. Occasionally local rules prohibit structures higher than 30 feet or so.

Several different types of towers are available, depending upon which manufacturer you select. Each type has its advantages; the most economical type of tower is the guyed lattice tower, but a hinged tower can be easier for you to install yourself and provides easier access for maintenance.

[TOP](#)

What policies can help grow the market for small wind turbines?

A substantial up-front tax credit or rebate for consumers is the single most effective policy that states have used to help homeowners and small businesses purchase small wind systems. Demand for small turbines is high, but costs are often prohibitive. Such incentive programs are often funded by a very small "system benefits charge" on every kilowatt-hour of electricity that is delivered by utilities in a state (funding from the charge is usually used for a variety of measures to promote energy efficiency and the use of renewable energy sources).

On October 3, 2008 the federal government enacted an investment (up-front) tax credit, available through December 31, 2016, to help consumers purchase small wind systems. See www.awea.org/legislative or <http://dsireusa.org> for details

Other policies that can help Small Wind are: streamlined zoning and permitting processes, net metering policies, standardized grid-interconnection regulations, and the (upcoming) formation of a certification process to verify the performance, safety, and durability of small wind systems.

[TOP](#)

How many turbines are needed to power a household or farm?

For a home or farm, one turbine with a power rating of anywhere from 1kW to 25kW is normally installed. The turbine's size is chosen to meet the energy requirements given the available wind resource. Buying multiple turbines for one application rather than a single larger one is almost always less economical because of the cost of buying two separate towers and installing two separate systems.

For village electrification applications, both single and multiple turbine installations are common, and turbines up to 100 kW in capacity may be used.

Is there anything I should watch out for when buying a small wind turbine?

"If it seems too good to be true, it probably is" are words to keep in mind when shopping for a small wind turbine. Over the years, a steady stream of "breakthrough" wind turbines has promised exceptional performance at an incredibly low price. Sometimes the claimed performance violates the laws of physics, promising more power than the total kinetic energy available in the windstream that is intercepted by the rotor's swept area. These often well-meaning entrepreneurs usually do not have the engineering background to perform proper calculations and tests.

There have also been out-and-out frauds in the wind business where the entrepreneur set out to intentionally defraud the public, particularly from overseas manufacturers. This has been possible, at least in the short term, because most people aren't experts on the physics of wind energy, and they have a hard time sorting out reasonable claims from unreasonable ones. Who wouldn't be tempted to buy a new wind turbine "twice as efficient as anything on the market"?

Most of the popular models of small wind turbines operate at about the same efficiency. The energy production you should expect will be closely related to the swept area of the rotor blades, which is based on the diameter of the rotor. If you are offered a product that promises to run your whole house with a turbine that is much smaller than conventional products, it's time to start asking hard questions. Another way to protect yourself is to make sure that the dealer who sold you the wind turbine can provide references from prior satisfied customers.

[TOP](#)

What is a "Vertical-Axis" wind turbine, or "VAWT"?

The vast majority of wind turbines are three-bladed, "propeller-shaped" devices that spin around an axis that is parallel – or horizontal – to the ground. These are called "horizontal-axis wind turbines," or "HAWTs." An alternative system configuration features a rotor that revolves around an axis that is perpendicular – or vertical – to the ground, similar to a barbershop pole or corkscrew.

How reliable are wind turbines? Will I have to perform much maintenance?

Most small turbines have only 2-3 moving parts and are designed for a long life (20 - 30 years). However, as with any other hard-working machine, parts must be maintained and occasionally repaired. The average residential-sized wind turbine will put on as many "miles" in just four months as the average car does in its 100,000-mile lifetime. No responsible automobile owner would expect their

car to perform for such an extended period of time with no tune-ups or oil changes, let alone without maintenance.

What impact will a small wind turbine have on neighboring property values?

Evidence indicates that the presence of wind turbines increases neighboring property values. No study has ever (as of 1/2009) concluded that wind turbines – neither large nor small – have had a depressing effect on nearby residential property values. A recent survey found that most people are interested in or willing to pay more for homes equipped with solar panels or wind turbines." Furthermore, a May 2003 study by the Renewable Energy Policy Project (REPP), *The Effect of Wind Development on Local Property Values*, finds that "...for the great majority of projects the property values actually rose more quickly in the view shed than they did in the comparable community. Moreover, values increased faster in the view shed after the projects came online than they did before.

Will my utility allow me to hook up a wind generator?

Federal regulations (specifically, the *Public Utility Regulatory Policies Act of 1978*, or PURPA) require utilities to connect with and purchase power from small wind energy systems. A wind turbine manufacturer should be able to help arrange the required utility company approvals.

See the "State-By-State Small Wind Information" section of the American Wind Energy Association Web site at <http://www.awea.org/smallwind> for lists of interconnection requirements for many U.S. states.

[TOP](#)

Will my local government allow me to install a wind turbine?

A wind turbine is a tall structure that normally requires a building permit. Zoning regulations often limit the height, placement, and other characteristics of "appurtenant" structures, so a conditional (special) use permit or variance may be necessary. It's usually best to let your neighbors know about your installation ahead of time. Be prepared to answer questions and clear up common misconceptions with well-documented facts about small wind turbines.

[TOP](#)

Will I have to change any of the wiring in my house?

No. A wind turbine can easily be installed at virtually any existing home without the need to change any wiring or appliances. In most cases, the utility will install a second utility meter to measure how much surplus electricity it is receiving from the turbine owner.

[TOP](#)

Copyright 1999 - 2010 by A&C Green Energy. All Rights Reserved.