



Harnessing the wind to make electricity and meet at least a portion of your power needs provides immediate and long-term environmental and financial benefits.

BENEFITS OF WIND

The size of a turbine and the speed of the wind determine how much electricity (power) a wind energy system will produce. A small wind energy system has a power output from 400 watts to 100 kilowatts (kW). A typical home uses approximately 10,649 kilowatt-hours (kWh), an average of 877 kWh per month. Depending on the average wind speed in the area, a wind turbine rated in the range of 5 to 15 kW would be required to help power this home.

CONNECTING TO THE GRID

All small wind energy systems that are certified to national codes and standards can be safely connected to the local power grid. This allows electricity from your wind turbine to flow back onto the grid and offset the electricity you are consuming from the grid, a practice known as net metering. A qualified local installer will contact your utility to determine its net metering policy and interconnection requirements.

Consumer Guide to Small Wind Energy Systems



A Bergey Excel 15 wind turbine in Blowing Rock, North Carolina. Photo courtesy Jordan Nelson / Nelson Aerial Productions.

Why Wind?

Wind is one of the great renewable energy resources on the planet because of its unlimited supply. Using wind energy to generate electricity can have environmental benefits because it produces no greenhouse gas emissions or pollutants, and it takes the place of fossil fuels typically used for power.

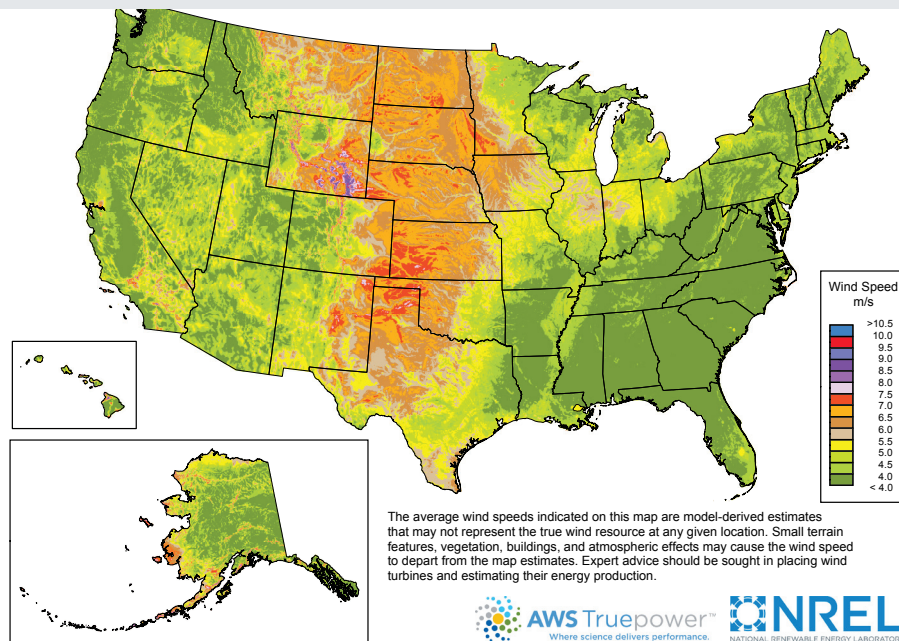
How Small Wind Energy Systems Work

The key feature of a small wind energy system is the wind turbine. The turbine uses the energy of motion (kinetic energy) from the wind to turn a shaft, thus making mechanical energy. This shaft attaches to a generator. The resulting spin within the generator makes electricity.

Am I a Good Candidate for a Small Wind Energy System?

Learning about small wind energy systems is the first step toward ownership. There are many resources available, some of which are listed in Further Reading at the end of this fact sheet. Being an educated consumer will also help when working with wind system installers. Before proceeding with installing a small wind energy system, however, there are several important factors to consider with a qualified local installer. These include property size and local zoning laws, adequate wind resources, cost and price of electricity in your area, and local grid connection and metering rules. These factors are described in further detail below.

United States- Annual Average Wind Speed at 30 m



DETERMINING PAYBACK TIME

Small wind energy systems have an average useful life of 20-years. With routine maintenance and periodic part replacement (e.g., blades or bearings may need replacement), however, some systems have successfully operated for 50 to 60 years. The length of the payback period—the time before the savings resulting from your system equal the cost of the system—depends on the system you choose, the wind resource on your site, electricity costs in your area, and how you use your wind system. Customers should work with qualified local installers to assess the impacts of these variables on payback period.

Factors to Consider

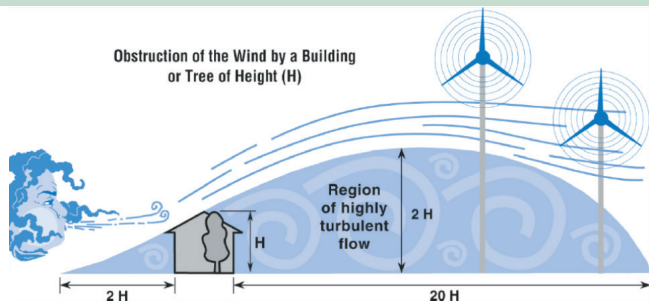
Site Characteristics:

- Enough land to meet local property line setbacks for wind turbines
- Site should maintain an average annual wind speed of at least 9 miles per hour (MPH) (or 4 meters per second) at hub height—the distance from the ground to the rotor hub of the unit.
- Site topography such as hills and valleys, vegetation such as trees, structures such as buildings, and other obstructions that may impact the quality of the local wind resources
- No local zoning laws (e.g., property line setbacks), building codes, or other policies restricting structure heights such as turbine towers, which can range from 90 to 140 feet

Cost

Purchasing and installing a small wind energy system can cost anywhere from \$5,000 to \$10,000 per kW. However, tax incentives, credits, and grants can substantially lower the cost. For example, current federal law allows consumers to claim a percentage of the total cost of a small wind energy system as a tax credit, as long as the system is in place by January 1, 2024.

Siting Your Wind Turbine to Avoid Unwanted Turbulence



Placing a turbine high above and far away from obstacles, such as buildings and trees, results in less turbulence, greater turbine productivity, and a longer turbine lifetime.

FURTHER READING

DOE Small Wind Guidebook
[windexchange.energy.gov/
small-wind-guidebook](https://windexchange.energy.gov/small-wind-guidebook)

Database of State Incentives for Renewable Energy
dsireusa.org

Energy Saver:
Small Wind Electric Systems
[energy.gov/energysaver/
save-electricity-and-fuel/
buying-and-making-electricity/
small-wind-electric-systems](https://energy.gov/energysaver/save-electricity-and-fuel/buying-and-making-electricity/small-wind-electric-systems)

Pacific Northwest National Laboratory Distributed Wind Research (including data from the annual Distributed Wind Market Report)
pnnl.gov/distributed-wind

Financial Incentives

Tax credits, incentives, and rebates may be available in your area. Please visit [dsireusa.org](https://www.energy.gov/eere/wind/articles/us-wind-industry-federal-incentives-funding-and-partnership-opportunities-fact) and [https://www.energy.gov/eere/
wind/articles/us-wind-industry-
federal-incentives-funding-and-
partnership-opportunities-fact](https://www.energy.gov/eere/wind/articles/us-wind-industry-federal-incentives-funding-and-partnership-opportunities-fact) for more information.