



BIOMASS



SOLAR



WIND

The wind has helped power Midwestern farms for many years. Windmills pumped water for irrigation and livestock and generated electricity where there was no utility power. As the government-funded electrical grid spread to rural areas, farmers became as dependent as town dwellers on the electricity from fossil-fueled generation plants. Wind-generated electricity seemed to be a thing of the past.

But that was then. Today, wind turbines have become an important technology in the search for renewable, non-polluting ways to generate power. All across the Midwest, wind turbines are appearing not only on farms, but at factories and in schoolyards as well. Today's wind turbines are efficient and reliable—the result of years of research and experience.

THE BENEFITS OF WIND ENERGY

- The wind is free. As an energy source, it doesn't have to be purchased, mined, refined, or transported.
- Wind energy is clean, non-polluting, and non-depletable. It does not produce smog, acid rain, or greenhouse gases, nor does it release mercury or particulates.
- Like other renewable energy systems, wind turbines support the electric utility infrastructure by providing energy exactly where it is needed. When connected to the grid, these systems help prevent costly line upgrades and postpone the building of new power plants.
- Installing a wind turbine is a productive way of making a commitment to the community and the environment. Whether installed at a school or elsewhere, a wind turbine can demonstrate to everyone the promise of a clean energy future.

CHOOSING A WIND SYSTEM

Wind systems are designed around three basic approaches:

Grid-connected, non-battery system. This system provides the benefits of wind energy and the consistency of the utility. If more electricity is needed, the grid supplies it; if extra is produced, it may be stored on the utility grid as a credit, and used when more electricity is needed.

Grid-connected, battery-backed system. This system, which consists of a grid-connected turbine and a set of batteries, can supply power, protect sensitive electrical equipment, and power critical needs during power outages. This configuration is most practical when an uninterruptible power supply is required for sensitive electronics such as computers.



A combined solar electric and wind turbine system at TDL Electronics near Racine, Wisconsin. The 10-kilowatt wind turbine and the solar electric system powers TDL's office and facility.

“Off-grid” independent system. This system has no connection to utility lines, and is most practical in isolated locations. A set of batteries stores the electricity and an inverter provides AC power. Alternatively, DC designed appliances can be run directly from the batteries. Independent systems frequently make use of more than one renewable resource, especially photovoltaics (PV), to take full advantage of seasonably variable weather conditions and seasonal variations in wind and solar resources. Focus on Energy does not co-fund off-grid systems.

OTHER CONSIDERATIONS

While there are many benefits to owning a wind energy system, there are also a number of considerations to take into account:

- Not all locations are suitable for a wind system. The quantity and quality of the wind resource at a site must be carefully evaluated by a wind assessor—including wind speed, terrain, and proximity of buildings, trees and other obstacles. A rule of thumb in Wisconsin is that home-sized wind turbines should be installed to operate 30 feet above the trees and buildings located within 500 feet of the turbine, including the area's treeline. This means that most towers for Wisconsin will be in the 80 to 120-foot range, or taller.
- Wind turbines generate the most energy on high, open land where the winds are unimpeded by trees and buildings.
- Focus discourages wind installations on towers shorter than 80 feet, or roof-mounted wind systems, as they are ineffective and generate little, if any, electricity.

For more information, call **800.762.7077** or visit focusonenergy.com.



focus on energy™

The power is within you.

“Typical” prices and outputs for installed systems (April, 2010)

Turbine Make and Model	Rotor Diameter (feet)	Manufacturer Rated Output	Rated Output @ 25 mph	“Typical” tower	“Typical” Installed cost	kWh/year @ 10 mph	kWh/year @ 12 mph
Proven 7	11.5	2.5 kW	2.2 kW	106’ G	\$28,000	2,701	4,054
ARE 110	11.8	2.5 kW	2.5 kW	100’ G	\$29,000	2,553	4,052
Skystream	12.0	2.4 kW	1.8 kW	105’ T	\$17,000	1,617	2,714
Proven 11	18.0	6 kW	6.0 kW	120’ G	\$62,000	6,767	10,429
Endurance S-343	21.0	5 kW	5 kW	126’ T	\$51,000	5,057	8,538
Ventura	22.0	10 kW	7.1 kW	130’ F	\$62,000	6,121	10,419
Aerostar 6	22.0	10 kW	7.5 kW	120’ G	\$63,000	7,310	12,459
Excel-S	23.0	10 kW	8 kW	120’ G	\$69,000	7,673	12,713
ARE 442	23.6	10 kW	10.3 kW	120’ G	\$80,000	11,779	18,494
Proven 35	29.5	15 kW	12.8 kW	120’ F	\$120,000	13,669	22,157
Jacobs 31-20	31.0	20 kW	17 kW	120’ F	\$85,000	12,565	21,813
Gaia 133-11	42.6	11 kW	13.9 kW	120’ F	\$130,000	19,498	30,030
Vestas V-15 1ph	49.2	35 kW	33.6 kW	110’ F	\$180,000	39,452	63,897
Vestas V-15 3ph	49.2	35 kW	35.4 kW	110’ F	\$180,000	48,907	74,767
Vestas V-17 3p	55.8	90 kW	63.7 kW	132’ F	\$220,000	63,716	104,256
Endurance E-3120 3 ph	63.0	50 kW	55.4 kW	140’ F	\$350,000	73,679	113,678
NW 100	68.9	100 kW	80.7 kW	120’ M	\$550,000	91,290	145,061

Manufacturers rate equipment at different wind speeds, typically between 23 and 37 mph. For a common wind speed output rating, refer to the Rated Output @ 25 mph column.

L = Freestanding Lattice
G = Guyed
M = Monopole
T = Tilt-up

Calculations of kWh/year include a 15% derate, representing a site relatively free of obstacles. All kWh/year calculations were done on the Focus on Energy output calculator based on information supplied by the manufacturer. Specific project performance will vary.

- Zoning can be a significant barrier to the installation of wind turbines. Turbines are easiest to permit in rural areas.
- Wind turbines must receive regular maintenance to function reliably, and someone has to climb the tower to do this. Most installers offer maintenance services.
- Wind turbines are quiet but not all are silent. Educating neighbors and zoning officials about wind energy systems may be necessary, along with obtaining a building permit for the tower.
- Batteries are not environmentally benign and must be replaced every four to seven years. Although recycling helps mitigate their harmful effects, the trade-offs between a wind turbine using batteries and connecting to the grid should be carefully considered.

To learn more about planning and installing a small wind turbine, visit focusonenergy.com/retoolbox and click on *Small Wind Toolbox* at the bottom of the page.

INCENTIVES FOR WIND TURBINES

Focus on Energy incentives. Financial incentives are available for the installation of wind systems. Contact Focus on Energy to learn more about these incentives and to determine your eligibility.

Federal tax incentives. An eligible Wisconsin resident, farm, or business can claim a 30 percent federal tax credit on the installed price of qualifying small wind systems with a nameplate capacity of 100 kilowatts (kW) or less. The credit is available for equipment installed between January 1, 2009 and December 31, 2016, with no maximum credit limit. Accelerated depreciation may also be available for businesses. Contact a trusted tax professional to determine your eligibility.

Net metering. With a system connected to the utility grid, excess energy goes back into the grid and the system owner receives credit. If a wind system is rated at 20 kilowatts (kW) or less, most utilities will credit at retail rates for this excess. Contact your local utility for details.

Property taxes. Wisconsin law exempts wind energy equipment from property taxes (Wisconsin State Statute 70.111).

Regulation. Local jurisdictions can only regulate wind turbines if it is in the interest of “public health and safety” (Wisconsin State Statute 66.0401).

SITE ASSESSMENTS

A site assessment is your opportunity to find out whether your home or business can benefit from a wind system. A certified site assessor will visit your property to analyze its wind resource, answer your questions, and provide a report containing detailed recommendations, including type of system, system placement, and a general cost estimate. A site assessment is required prior to applying for a wind energy installation incentive and Focus provides incentives to help offset the cost of the assessment. For more information and to find a site assessor, visit focusonenergy.com/siteassessments.

FOR MORE INFORMATION

focusonenergy.com/renewable/wind

renewwisconsin.org/wind/windtoolbox.html

Look for the *Small Wind Toolbox*. This site offers many fact sheets you’ll find helpful when applying for a wind turbine building permit, including information on zoning, utility interconnection and more.

Focus on Energy works with eligible Wisconsin residents and businesses to install cost effective energy efficiency and renewable energy projects. Focus information, resources and financial incentives help to implement projects that otherwise would not be completed, or to complete projects sooner than scheduled. Its efforts help Wisconsin residents and businesses manage rising energy costs, promote in-state economic development, protect our environment and control the state’s growing demand for electricity and natural gas. For more information, call **800.762.7077** or visit focusonenergy.com.

