



BIOMASS



SOLAR



WIND

The wind has helped to 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 into 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.

Contact Focus on Energy to learn about renewable energy options for your home, business or organization. Full program details, applications for awards and eligibility requirements are available from the Renewable Energy Information Center. Call 800.762.7077 or visit focusonenergy.com.



focus on energy[™]

The power is within you.

Typical Prices and Typical Outputs for Installed Systems (January 2009)

Model	Swept Area	'Rated output'	Typical Tower	Turnkey Installed Cost	kWh/year @ 10 mph	kWh/year @ 12 mph
Proven 2.5	97	2.5 kW	105' T	\$36,000	2,730	4,080
ARE 110	110	2.5 kW	105' T	\$30,000	2,580	4,080
Skystream	115	2.4 kW	84' T	\$19,000	1,640	2,730
Whisper 500	175	3 kW	105' T	\$32,000	2,470	3,940
Endurance	254	5 kW	126' T	\$45,000	3,670	6,530
Proven 6.0	254	6 kW	120' G	\$68,000	6,840	10,490
Ventura	380	10 kW	110' G	\$55,000	6,200	10,500
BWC XL-S	415	10 kW	120' G	\$62,000	6,550	10,750
ARE 442	442	10 kW	120' G	\$71,000	11,220	17,520
Jacobs 31-20	754	20 kW	120' F	\$80,000	12,750	21,990
Gaia-3Ø	1,425	11 kW	120' F	\$85,000	19,700	30,210
Entegrity EW 15	1,902	50 kW	120' F	\$230,000	47,800	85,120
V-15 35-1Ø	1,964	35 kW	110' F	\$185,000	40,000	64,320
V-17 90-3Ø	2,462	90 kW	132' F	\$230,000	64,590	105,000
PGE 20/35-1Ø	3,120	35 kW	120' F	\$290,000	58,760	83,350
PGE 20/35-3Ø	3,120	50 kW	120' F	\$300,000	66,860	94,760
NW 100-3Ø	3,727	100 kW	120' F	\$435,000	87,030	137,450

The prices above, as well as price estimates from a wind site assessment, do not necessarily represent the actual installed system costs for your site. Such price quotes can only come from a full-service installer. ©2009 Mick Sagrillo

The table above shows the cost of wind energy systems, including installation. These prices are for “turnkey” systems, where all equipment is new and the wind energy contractor performs all labor. The last two columns show the kilowatt-hours per year produced by each system where the average wind speed is 10 mph and 12 mph. Note the tremendous increase in power that is produced by the increase of only two miles per hour in wind speed.

T stands for tilt-up tower, G stands for guyed tower and F stands for freestanding tower. The tower listed with each turbine is usually the most cost effective tower option available, along with a “typical” tower height for that machine. For example, the Skystream may be mounted on the 84' tower listed in the table at one site, while another site might require a 120' tower. This table is not meant to replace a site assessment, but only to provide a relative cost for any given “typical” system. Among other benefits, a wind site assessment provides a more elaborate table with tower and turbine options suitable for the specific homeowner.

- 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 remember that 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. Cash-Back Rewards and Implementation grants are available for the installation of a wind system. 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. Beginning January 1, 2009 there will be no maximum credit limit. The credit is available for equipment installed between January 1, 2009 and December 31, 2016. At the writing of this fact sheet, the IRS has not yet published rules for the grants in lieu of tax credits. 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. We Energies offers net metering for wind systems of 100 kW and less.

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

Focus on Energy offers site assessments to determine whether a wind system is suitable for your site and if it can help you meet your energy needs. Visit focusonenergy.com/siteassessments for more information. A wind site assessment is required in order to apply for a Focus on Energy wind incentive.

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.