

Wind Power Basics

Many of us have seen old windmills and know they somehow provide a service to its owner thanks to the wind. So it is with some of the newer propellers you are seeing out on the horizon. They too are creating wind energy.

Wind turbines operate on a simple principle. The energy in the wind turns two or three propeller-like blades around a rotor. The rotor is connected to the main shaft, which spins a generator to create electricity. Wind turbines are mounted on a tower to capture the most energy. At 100 feet (30 meters) or more above ground, they can take advantage of faster and less turbulent wind.

The blades of the wind turbine are shaped in such a way that wind causes them to rotate, which spins a low speed shaft with a gear at the end which is connected to another smaller gear on a high speed shaft that runs through a generator housing.

The generator creates electricity using much the same principle as the alternator on your car (depending on the turbine type). A magnetic rotor on the high-speed shaft inside the generator housing spins inside loops of copper wire that are wound around an iron core. As the rotor spins around the inside of the core it creates "electromagnetic induction" through the coils that generates an electrical current. That current is then regulated and fed into the grid (or a residential grid connect system) after some modification so that it can be used in our homes or routed into a battery bank for storage. Where a battery bank is used, a regulator prevents overcharging.

In the end, if you have a personal wind turbine, you can produce enough electricity for your home. Companies who own numerous wind turbines use them to provide electricity to numerous people within its grid.

Wind turbines for commercial electricity production usual range from 100 kilowatts to 5 megawatts. A wind turbine for home use has rotors between 8 and 25 feet in diameter and usually has the potential to generate between a few hundred watts and 6 kilowatts of electricity. Some wind turbines can be used in conjunction with a grid connect system.

For every kilowatt-hour of electricity produced by wind energy or other green means, approximately 1.5 pounds of carbon is prevented from going into the atmosphere if that electricity had been sourced from coal fired power plants. Carbon dioxide is a major contributor to global warming induced climate change.

So how much wind is needed to get full use of a wind turbine? A wind turbine usually needs wind speeds of around 10 miles an hour (16kmh) to start generating electricity and optimum wind speed for large turbines is approximately 30 miles per hour; so having them isn't really an option if you're located in an area where winds are usually light and variable. Some models are now being produced that can generate electricity with as little as 5 mile per hour wind speeds - particularly the vertical axis model.

Wind speed usually increases with height and where there are no natural or man-made obstructions. This is why you often see wind turbines on hilltops or in the middle of wheat fields.

The blades of a wind turbine rotate at a rate of between 10 to 50 revolutions per minute. In a situation where wind speeds are excessive, for example if there's a gale, the turbine automatically shuts down to prevent damage.

The lifespan of a modern turbine is pegged at around 120,000 hours or 20-25 years. Despite what some might think, wind turbines aren't overly noisy. You will mostly hear the swoosh of the blades passing the tower. Of course, if you're living close to a large wind farm, it could present some noise issues; but most countries have regulations regarding the placement of wind farms in relation to residential areas.

Turbines used in residential situations are much quieter than their wind farm counterparts, but you'll need to check with your local authorities, as they are still not permitted in some areas. If you do meet resistance with your local council, talk to them about vertical turbine options as these emit lower noise, have a lower profile and are considered to be generally more aesthetically pleasing than their horizontal axis counterparts. As local government tends to be behind the times with technological developments in renewable energy, it doesn't hurt to raise the possibility of that alternative.

Wind turbines for home use vary in price and greatly depend on your electricity needs vs. wind availability, but you can expect to pay around \$12,000 to cater for the average home. However, bear in mind that cost can be greatly offset by renewable energy rebates offered by many governments.

Wind energy is one of the lowest-priced renewable energy technologies available today, costing between 4 and 6 cents per kilowatt-hour, depending upon the wind resource and project financing of the particular project.

No, today's wind turbine is not like your grandfather's windmill. Today's wind turbines are designed and built with a lot of sophistication so as to provide you, the consumer, with the most bang for your buck - or power for your wind.

About the Author

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