



Top 10 things to know about wind energy

A Quick Q & A

1) How do wind turbines work?

The wind blows across tall turbines and turns huge blades that spin generators to produce electricity. Wind speeds determine how much electricity a turbine actually produces, and to take full advantage of available winds, the hub of a turbine will rotate and the blades will tilt to optimize its position. Turbines can also rotate and tilt blades away from winds to shut down.

2) How do we know when the wind will blow?

Wind forecasting enables us to more accurately predict wind energy days in advance. Xcel Energy helped develop Wind WX with Global Weather Corp., an affiliate company of the National Center for Atmospheric Research. This highly detailed wind forecasting system uses real-time, turbine-level operating data and applies sophisticated algorithms to forecast the amount of wind power that will be produced. Forecasts are provided for a 168-hour period every 15 minutes. With more accurate forecasts, we can turn down and even shut down fossil power plants when steady winds are predicted.

3) How tall are wind turbines and how much land do they need?

Most of our turbine towers are 275 feet high. By comparison the Statue of Liberty is 305 feet tall. Blades add another 216 feet, bringing the total height to 491 feet. That's more than 1 1/2 football fields. Each turbine uses less than 1.5 acres, which means 95 percent of a wind farm's acreage can be used for agriculture or other purposes.

4) Is there ever too little or too much wind for a turbine?

Wind turbines require certain wind speeds to operate. These are known as cut-in (7 MPH) and cut-out speeds (50+ MPH). Strong steady winds are ideal for energy production.

5) How much of Xcel Energy's energy comes from wind power?

Wind power supplied 19 percent of the energy on Xcel Energy's system companywide in 2016, with more than 6,600 megawatts of wind capacity. The company plans to increase this to 34 percent of its energy supply by 2021, with more than 10,000 megawatts of capacity.

6) How much do wind turbines cost and how much do they save?

Most of the company's commercial-scale turbines cost roughly \$3-\$4 million each installed. Wind energy is currently very competitive with other new energy sources, such as natural gas, and can save customers money in the long run. With historic low wind prices and current tax credits, the cost to build a wind farm is more than offset by the future fuel savings.



7) How do wind turbines affect the local economy?

Wind farm owners pay property taxes that help fund schools and other local services. Landowners also receive lease payments for the use of their property. Construction employment on a typical 100-turbine wind farm creates about 200 jobs, and construction workers do business with local stores and restaurants. Plus 70 percent of construction materials and services are typically supplied locally and 6-10 full-time jobs are created.

8) What are the environmental benefits of wind energy?

Operating wind turbines produce zero waste or air emissions, and they don't use water, like other forms of power generation. In addition, wind is a renewable fuel, with no mining or transportation involved.

9) Are birds affected?

Overall, the environmental benefits of wind energy do more to support wildlife conservation than the potential impact. Today wind farms are highly regulated and lots of work takes place upfront to make sure turbines are appropriately located to avoid and minimize impact. According to the American Wind Wildlife Institute, less than 1 percent of birds perish from collisions due to wind turbines. That's fewer bird deaths than caused by house cats, cell towers or buildings.

10) Are wind farms noisy?

Blade design has been refined over the years and three-blades are optimal for harnessing the wind. Newer design elements, which mimic the wing of an owl, are able to slice through the air with less noise than ever before.