

# Frequently Asked Questions

NW100 FAQ 0509

## Why Wind?

Never before have there been so many exciting and compelling reasons to invest in wind energy. The reality of a changing energy landscape has created the impetus to start thinking strategically and sustainably about our energy future. Now is the time to make long-term capital investments and buffer ourselves against rising fuel costs and an uncertain energy future. Not only has wind technology evolved to such a point to make wind turbines an accessible piece of equipment that a school, community or business can purchase and install but the political will exists to help create a renewable energy infrastructure with robust state and federal incentive programs to support your wind project. By investing in wind power, you can realize cost savings, support energy independence and help stimulate a “green” economy.

## What makes a good wind site?

A community-sized turbine fits into almost any type of landscape, whether it be a farm, suburban environment or a dense business complex, nevertheless you still need to make sure your site has ample wind and a pocket of space around the turbine.

- **WIND:** We optimized performance of our Northwind 100 for low wind speeds so that you can begin making power at wind speeds as low as 3.5 meters per second (7.8 mph). The turbine will continue to make power at increasing levels as the wind increases, but will automatically shut down when wind speeds get too high—25 meters per second (56 mph). Unobstructed areas make for better quality wind sites.
- **SPACE:** Depending on site conditions, a Northwind 100 installation needs at least 140 feet of clearance around it and a recommended 500 feet. The site must be accessible by crane. An electrical transmission infrastructure, if not already in existence, will need to be developed by your installer.

## Is wind power the right choice for my application?

Wind power is an excellent choice for a variety of different applications: grocery stores, universities, light manufacturing facilities, farms, resorts, and private businesses. Once you determine that your site has a viable wind resource you may want to reflect on the reasons you are considering a wind turbine in the first place: environmental commitment, energy independence, educational opportunities or cost savings. Most people fall somewhere in between but if you are primarily concerned with a specific payback period on your capital investment, it is important to review the retail costs of your current energy source as well as any state and federal incentives that are available to you such as grants, tax credits and net metering laws. That information will help you more specifically determine your return on investment (ROI) or payback period.



### Why a 100kW wind turbine?

A 100kW wind turbine produces enough energy to power 25-30 homes. This is not a residential turbine but a community-sized wind turbine that produces the right amount of power for school and university campuses, residential developments, farms, municipalities, and a variety of businesses ranging from candy factories to greenhouses. It has also been used for years in remote village applications, where diesel power systems supply electricity for a small grid.

### Why the Northwind 100 wind turbine?

The Northwind 100 is a technological masterpiece with its innovative gearless design and best-in-class reliability. What this means for your application is more energy and less maintenance. What's more is this turbine has been created specifically to meet the needs of community applications:

- **Right Amount of Power**

For many community applications such as schools and businesses, one 100kW turbine or a cluster of two or three meets all their energy needs

- **Right Design**

The low-height profile, elegant design and quiet operation make the Northwind 100 an ideal choice for any community landscape. Aesthetically pleasing, the Northwind 100's are the lighthouses of the 21<sup>st</sup> century.

- **Right Technology**

With over 30 years in the wind industry, Northern Power's stable of engineers designed our turbine for ultimate reliability, so that you don't have to be in the utility business to reap all the benefits of wind power

### How much energy will a 100kW turbine produce?

A 100kW wind turbine will produce different amounts of electricity based on the average wind speed at your site. The Northwind 100 utilizes advanced turbine technology to ensure excellent energy capture for its size. For example, if your site has an average wind resource measuring 4 meters per second (9 mph) and follows a standard distribution (i.e. a "bell curve" of wind speeds), you can expect the Northwind 100 turbine to produce approximately 75,000 kilowatt hours of energy in a year. If your average wind speed is 6 meters per second (13 mph), the Northwind 100 will produce approximately 220,000 kilowatt hours per year.

### What is a power curve?

Every wind turbine has a power curve. A power curve describes the power output at different wind speeds which allows you to see how efficiently the turbine turns wind into energy. The Northwind 100 utilizes a permanent magnet generator and gearless technology as compared to more conventional turbine designs, which makes its power curve very attractive for a 100kW series.

### How much energy do I need to produce for my site?

Although many customers would ideally like to match their load fairly closely (produce only the amount of energy that they will utilize) there are increasingly more net metering laws being adopted across the country and around the world. These net metering laws allow individual sites to average out their annual production and sell back any extra energy that they produced to their local utility.



If one turbine doesn't produce enough energy to match your power use you may want to consider erecting a cluster of turbines. However, in many cases the opportunity to offset any portion of your energy use through wind power is enough to make the investment worthwhile when you consider additional project goals such as offsetting carbon emissions and educational opportunities for students.

### How can I determine my wind resource?

There are a number of websites that can help you determine what your wind resource is. In many cases, the wind maps and modeling technologies that are currently available are extremely accurate:

- [www.nrel.gov/wind](http://www.nrel.gov/wind): NREL (National Renewable Energy Laboratory) has done extensive wind studies across the United States.
- [www.navigator.awstruewind.com](http://www.navigator.awstruewind.com): AWS Truewind has also done extensive work mapping wind resources domestically and internationally.
- [www.firstlook.3tiergroup.com](http://www.firstlook.3tiergroup.com): 3 Tier

You can also install and collect data from an anemometer to determine your wind resource. Some customers choose to install one for 3 months and then project the annual wind resource from that. Others choose to leave an anemometer up for a full year. Please note that an anemometer installed even for a full year will only measure the actual wind resource for that one year. Projecting a long-term wind resource from any data set requires specialized statistical analysis. For this reason, we have determined that enough tools exist for us to help you determine your wind resource for a Northwind 100 project without the added time and expense of an anemometer study.

### What if I have a low wind site?

The Northwind 100 will begin making power with a wind speed of 3-4 meters per second (8-10 mph), although the blades will spin at even lower wind speeds. You will want an annual average wind speed of at least 4 meters per second at hub height for wind power to be a viable option, and even more if you are looking for a competitive Return On Investment (ROI).

### How can I determine my payback or ROI?

At Northern Power Systems, we can help you determine a basic ROI. We take into account the Northwind 100's power curve and assume a wind profile with a typical distribution. To do that, we need three things from you:

1. **COST OF ENERGY:** Our model allows us to input an average cost per kilowatt-hour. You can get this information from your utility bills.
2. **WIND RESOURCE:** The amount of power you can make and your potential payback is a function of how much wind you have at your site. We can either help you estimate this data or you can visit some of the websites mentioned previously in "How Can I Determine My Wind Resource."
3. **INCENTIVES:** There are a growing number of federal and state incentives. We can help you determine what some incentives are in your region or you can visit [www.dsireusa.org](http://www.dsireusa.org), to find out more about what's available in the US.

We will use your input to provide you with a basic payback scenario.



We would also be glad to refer you to consulting companies that we partner with who can help you identify the factors above as well as offer more information on the impact of low interest loans, grants, tax credits and installation variables.

### How do I purchase a Northwind 100 for my site?

Northern Power Systems is prepared to help you determine whether or not the Northwind 100 is a fit for your site once we consider the previously mentioned factors:

- Wind speed
- Utility rate
- Annual energy usage
- Available incentives

If you have trouble locating this information, we will help you through the steps so that you can begin the 6-month process, charted below, from planning to purchasing to installing your turbine and seeing the blades spin. We look forward to connecting you with our partners in the industry to make sure that your planning and construction processes are as smooth and efficient as possible.

Remember, people like you are choosing wind energy every day as our turbines go up at schools in Wisconsin and North Carolina, businesses in Massachusetts, villages in Alaska and grocery stores in Canada. So where are you going to put your Northwind 100?

