

# West Central Wind Power Project

## Frequently Asked Questions (FAQ's)

### Turbine Specifications

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| <b>Maximum Power Output</b>          | 900 kW. This means at full capacity 900 kWh can be generated each hour  |
| <b>Cut-in Wind Speed</b>             | 3 meters/second (6.7 mph). This is when the blades begin to turn and produce electricity.   |
| <b>Cut-out Wind Speed</b>            | 25 meters/second (56 mph). This is when the turbine feathers completely out of the wind and locks itself down to prevent damage to the turbine. |
| <b>Tower Height</b>                  | 71 meters (233 feet)  |
| <b>Blade Length</b>                  | 27.1 meters (88.9 feet)   |
| <b>Total Height</b>                  | 325 feet from base of tower to blade straight up.   |
| <b>Rotor Speed</b>                   | 6-28 rpm  |
| <b>Operational Temperature Range</b> | -20 to 45 Celsius (-4 to 113 Fahrenheit)  |
| <b>Tower Material</b>                | Steel   |
| <b>Nacelle (Hub) Material</b>        | Glass fiber reinforced plastic  |
| <b>Rotor Material</b>                | Glass fiber reinforced plastic  |
| <b>Control System</b>                | PowerWind SCADA System  |

### Due Diligence

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| <b>Was a wind study completed for West Central School Corporation?</b>         | Yes, a 13 year data set was purchased specifically for our site. It provides hourly data on wind speed, temperature and air density. Performance Services, our design builder, then used the professional wind energy software, called WindPro, to determine expected annual output. |
| <b>What is the average annual wind speed at WCSC?</b>                          | 6.86 meters/second (15.34 mph)   |
| <b>How much energy will the turbine produce annually?</b>                      | Based upon the wind resource WCSC expects to produce more than 2.4 million kWh's annually. This is almost 100% of energy required to power our entire school campus.   |
| <b>How does the wind turbine impact birds, bats or wildlife?</b>               | According to the environmental study completed the turbine poses no threat to animals or wildlife.   |
| <b>Is the turbine noisy?</b>   | No, a sound study completed determined decibels are at or below 45 dBa; this is slightly louder than a refrigerator.   |
| <b>Does the turbine create shadows when the sun shines through the blades?</b> | Yes, but a shadow-flicker study was conducted to ensure that any possible shadows would not impact surrounding homeowners or students at school.   |

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| <b>Is the turbine safe to be around?</b>   | Yes, in most conditions. However, the turbine has been installed in an agricultural field to protect people from ice that may build up and fall off the blades. Tours of the turbine will not be conducted when it is snowing or after an icing event. |
| <b>Were there any height restrictions?</b> | No, an application was submitted to the Federal Aviation Administration (FAA) and approval was received.   |

## Installation

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| <b>Where is the turbine manufactured?</b>                | Tower: Chattanooga, Tennessee<br>Blades, Nacelle and other components: Germany   |
| <b>What size crane is needed for installation?</b>       | Typically two cranes are needed: a 100 ton helper crane and a 300 ton main assembly crane.   |
| <b>How long does the installation take?</b>              | 2-3 days for vertical installation.  |
| <b>How big is the foundation?</b>                        | The foundation octagonal and is 50 feet in diameter. The foundation is about 8 feet deep.  |
| <b>How much concrete is in the foundation?</b>           | 300 cubic yards. This requires 30 cement trucks.   |
| <b>How much steel is in the foundation?</b>              | 25 tons  |
| <b>How much does the tower weigh?</b>                    | 102 tons   |
| <b>How much does the nacelle weigh?</b>                  | 31 tons  |
| <b>How much does the hub and blades weigh?</b>           | 19 tons  |
| <b>How do you reach the nacelle on top of the tower?</b> | There is a ladder on the inside of the tower. Only personnel who has been trained and wearing approved climbing apparatus can climb. |

## Operations and Maintenance

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| <b>Is there a warranty on the turbine?</b>                              | Yes, a two year warranty for parts and labor is in place. PowerWind, the manufacturer, will resolve any issues during this time period at no cost to WCSC.                 |
| <b>How often does the turbine need service?</b>                         | Preventative maintenance is performed twice a year.  |
| <b>Does WCSC need to employ a WCSC employee to service the turbine?</b> | No, a service contract will be in place and this cost is already included in the financial model the school board reviewed.  |
| <b>How are unexpected costs addressed?</b>                              | There are several means to address this concern. First is the two year warranty, second is mechanical failure insurance and third is a repair reserve fund set up by WCSC. |

## General Questions

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| <p><b>How is the electricity produced by the WCSC wind turbine used?</b></p> | <p>The wind turbine is directly connected to the West Central facilities. As electricity is produced by the turbine it is delivered to each building and reduces the amount of electricity that would have been purchased from the utility company. If the turbine is not operational (no wind) the school receives electricity from the utility company as usual. However, if the power is out due to a storm or other incident the wind turbine is also shut down for safety reasons while the utility company works on restoring power.</p> <p>The specific program West Central is using is called "Net Metering". Essentially this means every kilowatt hour produced by the turbine will offset a kilowatt hour of consumption by the school at the retail rate. Turbine generation and consumption are reconciled by the utility company each month and any excess power is carried over to be used in future months.</p> |
| <p><b>What is the life expectancy of a turbine?</b></p>                      | <p>25-30 years with proper maintenance.</p>  |
| <p><b>What type of weather conditions can shut down a turbine?</b></p>       | <p>When weather conditions occur outside of normal operational conditions the turbine will shut down to protect itself. Several examples of why the turbine might shut down would be: High gusts of wind or wildly changing wind directions, wind speeds over 56 mph, icing conditions, temperatures above 113 or below -4 Fahrenheit.</p>   |
| <p><b>What is the "tip speed" of the blade at full production?</b></p>       | <p>81.5 meters/second (182 mph)</p>  |
| <p><b>How is production data tracked?</b></p>                                | <p>Two ways. First, the turbine control system tracks all production. Second, meters from the utility company are installed to track delivered energy. These two sources are reconciled to ensure accurate tracking.</p>   |
| <p><b>How can I view current and historical production information?</b></p>  | <p>WCSC has access to a "Wind Dashboard" that all community members are welcome to view. Please stop by the administration office for more information.</p>  |
| <p><b>Can the wind turbine be used for educational use?</b></p>              | <p>k-12 renewable energy curriculum was provided as part of the project. Teachers have access to pre-approved lesson plans that will utilize data and information from the WCSC turbine. Further, WCSC will be offering classes on renewable energy that are dual credited with Ivy Tech.</p>  |