



## Wind Energy on Farms Farmer Presentation Outline

The intent of this lesson is to provide information and skills to the attendees who have an interest in wind energy applications as a means to reduce farm energy costs.

Slide 1: Title.

Slides 2 and 3: Introduction. The presenter introduces self and points out that wind applications are necessarily technical in nature. Slide X enumerates the objectives of the module.

Slide 4: Introduces the Wind Rose, a graphic often used in evaluating potential wind generation locations.

Slide 5: Instruments used to collect wind data. Unfortunately, this illustration shows the instruments improperly installed. The instruments should be installed at the elevation being considered for the wind turbine and away from trees and buildings that would negatively impact a wind turbine installation.

Slides 6 and 7: Data collected from a potential wind turbine site. Slide X shows the graph of the data for a year. Slide 6 summarizes this data into buckets of how many hours the wind speed reaches specific speeds in m/s during the year.

Slide 8: Wind map for Pennsylvania at 80 m (about 250 ft) above the ground. Note two things: 1) 80 meters is pretty high and 2) even at 80 meters, there are few locations where the 5 m/s (minimum) wind speed occurs. Clearly the ridge(s) and the region adjacent to Lake Erie are the best choices for wind turbines in Pennsylvania.

Slide 9: Illustrates a large scale wind turbine so the student can visualize the components employed in producing electricity from the wind.

Slide 10: Limits to how much energy can be produced by each turbine. Turbines are designed to shut down during high wind conditions that are beyond the equipment's design capacity for safety and equipment protection.

Slides 11 through 13: The efficiency of converting wind energy into electricity. These slides define capacity factor, efficiency aspects, and describe the difference between average output and peak output. It is important to keep in mind that a wind turbine does NOT produce its rated output all the time.

Slides 14 through 18: The effect of the height of the wind turbine above the ground. Since the average production is estimated assuming a 5 m/s average wind speed, determining average wind speed at a particular location (and height) is an essential factor in producing an economic analysis for a wind turbine installation.

Slides 19 through 21: Photographs of various wind installations: at the office, at the shore and in Minnesota.

Slides 22 through 24: Energy estimation based on manufacturer's ratings and expected wind conditions on site, including a revisit to the 30 m wind map.

Slides 25 and 26: The development of a simple payback calculation for a small wind turbine installation.

Slides 27 and 28: A basic wind calculator that may be used to produce a rough cost benefit estimate for a small wind installation. Slide 27 provides the URL for the calculator.

Slide 29: A place holder for questions.

This project supported by the Northeast Sustainable Agriculture Research and Education (SARE) program. SARE is a program of the National Institute of Food and Agriculture, U.S. Department of Agriculture. Significant efforts have been made to ensure the accuracy of the material in this report, but errors do occasionally occur, and variations in system performance are to be expected from location to location and from year to year.

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