

# Landowner Guide

## ➤ Wind Energy Construction Process and Timeline



### Our mission

Windustry promotes progressive renewable energy solutions and empowers communities to develop and own wind energy as an environmentally sustainable asset. Through member supported outreach, education and advocacy we work to remove the barriers to broad community ownership of wind energy.

### Do you have questions about community wind energy?

Call our Wind Information Hotline:

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### Wind Turbine Construction

Wind energy can be harvested by many different designs and sizes of wind turbines. There are small turbines, designed for home and farm-scale usage; midsize machines suitable for schools, municipalities or small rural communities; and utility-scale machines designed to generate electricity for hundreds of consumers.

**Despite their size, all wind turbines have the same four components which must be carefully constructed and precisely assembled for a turbine to efficiently generate energy:**

*Foundation:* the cement support at the base of the tower that secures the turbine to the ground

*Tower:* supports the moving parts of a turbine and can range in height from 50-meters to 100-meters

*Nacelle:* sits on top of the tower and houses the generator, gearbox and drive train

*Rotor:* the device that captures the wind that is made into electricity and consists of the hub and blades



This guide will help you to understand how the construction process may look on your land, and what you can expect during this phase of the wind farm project. This document assumes that the developer has completed all of the necessary project development and planning and is ready to begin construction

### Wind Farm Construction

The construction of a utility-scale wind farm may take as short as six months or as long as a few years. The actual timeline depends on the size of the project, the terrain of the site, and the local weather conditions. Wind farms are large industrial projects that use heavy equipment and machinery to not only install wind turbines, but also construct roads, bury cables, and install transformers. Because of the height of the towers, utility-scale wind turbines also require a large-capacity crane to install the nacelle and rotors on top of the tower.

Task	Subtask	Duration*
Site Preparation	Building Access Roads	2-8 months
	Pouring Concrete Foundations	
	Substation/Grid Interconnection	
	Build Operations and Maintenance Facilities	
Turbine Installation	Tower Erection & Assembly	2-4 months
	Rotor & Nacelle Installation	
	Bury Collector Cable System	
Project Commissioning	Energize Project Site & Commission Project	1-3 months

*\*Duration is Approximate. Project Construction may vary depending on factors such as the weather and the project size  
Note: Assumes construction of fifteen 1.5 MW turbines on 80-meter towers*

# Construction Timeline for a Commercial Scale Wind Project

## SITE PREPARATION

### Road Construction

There are three important considerations:

**Grading** – prepares the land for construction. Road shoulders should have a maximum 2% side slope for crane travel.

**Drainage** – install culverts at drainage areas. The road profile is slightly above natural grade to promote drainage.

**Install base materials** – including geo-fabric and gravel.



### Pouring Concrete Foundations

Typically wind turbine foundations are 4 ft. deep and 50-80 ft. in diameter. The majority of the foundation will be covered with backfilled native soil. After construction you will see a 16-20 ft. diameter foundation.

## TURBINE INSTALLATION

### Rotor and Nacelle Installation

The nacelle is assembled with all the generating components on the ground. Once the tower is completed, the nacelle is raised up and bolted to the top of the tower. Lastly, the rotor is carefully attached to the front of the installed nacelle. The rotor consists of the hub and blades and is assembled flat on the ground.



### Building Operations & Maintenance Facilities

These are typically built on-site for each wind farm. In general the operations and maintenance building and facilities will be built on land the developer has purchased. Construction of these structures will happen concurrently with the rest of the wind farm construction.



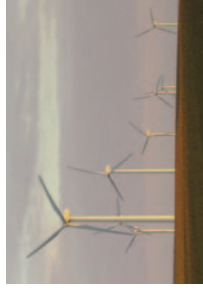
### Collector Cable System

The collector system consists of buried cables that connect the wind turbines to one another and to transmission lines. A ditch of approximately 4 ft. will be dug to place the lines in, and native soil will be backfilled once the cables are placed so the land can be returned to its original condition.



### Project Commissioning

The wind farm project is powered and the turbines are commissioned. This is the point at which the wind turbines are generating clean, renewable energy.



## Did you know?

### Direct economic impact of a new 1,000 MW project in Michigan

Payments to Landowners	\$2.7 million/year
Local Property Tax Revenue	\$18.6 million/year
Construction Phase	1,426 new jobs \$188.5 million to local economy
Operational Phase	230 new long-term jobs \$21.2 million/year to local economy

Construction Phase = 1-2 years

Operational Phase = 1-20 years



### Tower Erection and Assembly

A typical 80-meter tower is composed for four cylindrical steel sections. Each section can weigh between 35-50 tons. Special cranes over 300 ft. tall are needed to lift the sections up and secure them on top of one another.

Source: [www.windpoweringamerica.gov/pdfs/economic\\_development/2008/mi\\_wind\\_benefits\\_factsheet.pdf](http://www.windpoweringamerica.gov/pdfs/economic_development/2008/mi_wind_benefits_factsheet.pdf)