



8 Railroad Ave.  
Essex, CT  
06426

7430 State Rt. 11  
Churubusco, NY  
12923

7924 Centerville Rd.  
Bliss, NY  
14024

1387 E. Atwater Rd.  
Udly, MI  
48475

# Building a Windpark



*Wind Power...the natural choice™*



## **Overview**

Noble Environmental Power is committed to the development of windparks that are safe, efficient, and environmentally friendly, which requires rigorous planning and thoughtful interaction with host communities. Our project development methodology is thorough and painstaking, comprising the following key stages.

## **The Development Process**

### **Step 1: Community outreach**

An essential requirement for a successful windpark is addressing the needs and concerns of the host community. Throughout the course of every project, Noble conducts a Community Outreach Program. Our community outreach activities involve meeting with residents, community groups, boards and commissions, and providing accurate, up-to-date information about wind energy and our project activities through local media and our website.

### **Step 2: Wind resource assessment**

The project siting process begins by finding open land with strong, steady winds. To make a viable commercial-scale project, we look for winds that average at least 17 mph (at heights of 80 – 100 meters above the ground) throughout the year. Preliminary indications of wind availability can come from public records or computer generated assessments. These initial indications can then be confirmed by gathering actual wind data with meteorological measuring equipment.

### **Step 3: Environmental assessment**

In order to minimize any impacts on sensitive ecosystems, Noble undertakes a series of surveys of prospective project sites. These include surveys of wetlands, and habitats of threatened and endangered species. We also conduct bat and avian impact assessments, which survey for migratory paths as well as identify sensitive breeding grounds. These studies employ day and nighttime optical and radar equipment, and acoustical bat monitoring equipment that identifies individual species.

### **Step 4: Preliminary site design**

After environmentally sensitive areas are eliminated from consideration, remaining property is surveyed for turbine placement based on sophisticated micro-siting techniques. The criteria for turbine location include observing proper setback from residences and property lines to minimize acoustic aspect and safety effects, while optimizing energy production. At this stage, visual simulations are prepared to illustrate from where turbines might be seen and how they might appear. Preliminary turbine layout also helps identify any potential unwanted shadowing or possible interference with radio signals.



### **Step 5: Plans and permits**

The results of environmental studies help determine final project design. In New York State, each project must comply with the comprehensive environmental requirements of the New York State Environmental Quality Review Act (SEQRA). In addition, project plans and applications are prepared and submitted in compliance with the requirements of all local permitting agencies.

### **The Construction Process**

Building safe, efficient, and environmentally friendly windparks requires careful planning, landowner involvement, and rigorous quality control checks throughout the entire process. Noble is committed to employing “best management practices” during every stage of project construction, as well as to fully complying with applicable construction guidelines of agencies such as the New York State Department of Agriculture & Markets. The following describes tasks at each step in project construction.

#### **Step 1: Transportation plans**

In preparation for each project, Noble consults with the appropriate state, county, and local officials to develop a transportation plan that minimizes construction impacts on traffic and roads. We also enter into agreements to repair and restore local roads in the event that any damage is caused by our construction.

#### **Step 2: Site preparation**

Site preparation involves the following steps:

- a. Marking turbine locations with flags for review.
- b. Laying out and staking access road and electrical collection system routings, connecting the proposed tower locations to facilitate environmental studies and review.
- c. Setting up a fully-equipped construction office.
- d. Developing a full set of erosion and sedimentation control methods in conjunction with local consultants and applicable agencies.

### **Step 3: Excavation**

a. Establish access from the closest public or private roadway.

The first physical step in the construction process is to open an access road from the closest public or private roadway. Depending on the location, this may or may not require installation of a drainage structure (culvert) and temporary construction gate. The latter may be replaced with a permanent gate at a future date, if needed or desired.

b. Clear topsoil and/or unstable soils from roadway.

The second phase of excavation is the initial clearing of topsoil and/or unstable soils from the roadway using large road-building equipment. Topsoil is removed and retained in a controlled, protected soil pile area for reuse. Once road clearing has advanced to the planned tower location, this area also is cleared of topsoil. Unstable soils that cannot be reused are removed to an approved disposal location either on- or off-site, as conditions dictate. In accordance with best management practices, all disturbed areas are isolated from any surface water or other drainage paths. This controls any erosion or risk of silting until final grading, drainage, and ground cover have been established at the end of construction.

c. Compact and fully consolidate subsoil, install drainage ditches.

The next step in road building is to compact and fully consolidate the subsoil using large roller compactors. The goal is to make maximum use of existing in-place materials to establish the proper subgrade, but where required, additional material will be brought in. Roads are designed to be low profile, so that they are compatible with local agricultural practices, and to maintain the existing, natural drainage paths to the greatest extent possible. In accordance with best management practices, additional drainage ditches will be cut, and any new drainage structures crossing under the road will be installed to control any risk of erosion or sedimentation during this phase.

d. Lay gravel to create a stable, all-weather surface.

Road-bed compaction, design, and drainage installation are followed by the placement of gravel to create a stable, all-weather road surface. Once the access road to the tower site is sufficiently completed to allow excavating equipment to move in, the work for the main tower foundation can begin.

e. Remove stockpiled soil.

Soil removed during excavation is stockpiled near the tower location to be used for backfill after the placement of the tower foundation. In keeping with best management practices, this stockpile is placed in a designated storage area to control sedimentation risk. Excess, unusable soil is removed to an on- or off-site storage or disposal location in accordance with the approved plan for the project.

f. Test compaction values.

The bottom of the main excavation is compacted and tested to confirm suitability for the placement of the foundation base. If required, structural grade fill also is imported and used. Compaction is re-tested until minimum design requirements are exceeded. Upon completion of testing and confirmation of compaction values, the excavation is released to the foundation contractor to start the placement of forms.

#### **Step 4: The foundation**

a. Place foundation forms and rebar, supply concrete, and complete first pour.

The foundation forms and rebar are put in position for the pedestal base, which contains approximately 400 cubic yards of concrete and 38 tons of reinforcing steel. This step is followed by placing all the imbeds for the anchors, electrical systems, grounding, etc. The placement of forms, steel, and imbeds are then inspected by a Quality Control Engineer, who signs off on the work when it is ready for the pouring of concrete. After the “release for pour,” the placement of concrete (including a specifically designated haul route for trucks to access the site) is scheduled and planned with local suppliers. Using this volume of concrete involves the simultaneous unloading of up to six concrete trucks from as many as three batch plants in the area. The exact details will be developed with the suppliers early in the construction mobilization process.

b. Pour second phase of foundation – the pedestal.

Once sufficient time has passed for the initial curing of the concrete in the foundation’s base that sits at grade (ground) level, the second phase of the pouring process begins. This is the above-grade pedestal, centered on the base pad, on which the tower will sit. The finished pedestal is several feet tall and contains additional reinforcing and anchor bolts for the steel turbine tower. During the placement and concrete pouring process, the anchor bolts are held in a precision-fabricated steel template to ensure that they remain in the exact alignment necessary for the tower base plate to fit onto the bolts with a minimum of fuss. Once again, the pedestal is very carefully inspected by a Quality Control Engineer before it receives a “release for pour.” With less concrete used in the pedestal than in the base, the pour usually requires only one or two trucks at a time, fed from a single batch plant. A concrete pump is necessary to reach out from the edge of the excavation and place concrete in the pedestal forms centered on the base. Once adequate time has passed for initial curing of the pedestal, the forms will be stripped, and along with all other debris, removed from the hole in preparation for backfilling the excavation.

c. Carefully backfill the excavation.

The excavation is backfilled in carefully compacted layers, each of which are tested for compliance with compaction standards. The hole in which the base sits is filled until the grade is even with the surrounding area. Any excess material will be removed to the approved disposal location

d. Install underground electrical collection system.

At the same time that work progresses on the foundations, the installation of the underground electrical collection system will occur. The cables are laid in trenches alongside the roads, or in some cases ditches are dug between the towers across the open fields. Cables may be installed using either a trenching machine or in open trenches dug with a back hoe similar to the equipment used to excavate the foundation hold. The appropriate machinery size and exact method for cable placement is determined after the layout is approved and the routing and quantities can be finalized. Completion of the backfill at the foundation and installation of main cabling runs allows construction crews to complete final rough grading of the area in preparation for the receipt of major components of the wind generator.

### **Step 5: Turbine component assembly**

a. Truck in components and equipment for turbine construction.

Wind generator turbine components include three blades, three tower sections, one generator unit (nacelle), one transformer, and one set of controls. These parts are delivered directly to the prepared area around the base of the tower, arriving on approximately nine large trucks. In addition to delivery trucks, the first large cranes will arrive at the project site to offload the components when they are received. Three types of cranes may be used: large truck-mounted hydraulic cranes which move from tower site to tower site via the road network; smaller, rough terrain hydraulic cranes which travel primarily by road or sometimes across a field; and large crawler-type cranes which are trucked from location to location or, where possible and appropriate, crawl on project roads or across fields.

b. Erect the tower.

After delivery of components, the tower that supports the wind generator can be erected. The tower typically arrives in three sections to be erected one on top of the other and bolted together at the joints. Installation of the control cabinet and first section of the tower are coordinated. Once the first section is placed, bolts are torqued to the manufacturer's specifications and inspected by the Quality Control Engineer to confirm that all are in compliance. The wind generator umbilical (power and control cables) is then lowered inside the tower and secured to the anchor and guide system within it. The upper end of the umbilical is coiled and protected in the upper section of the tower until the nacelle is set on the tower.

c. Install the nacelle.

Following erection of the tower, the actual generator unit is installed. With the use of a large crane, the nacelle is raised into place, then bolted to the top of the tower. After the bolts are torqued and inspected by the Quality Control Engineer, the umbilical cables are terminated at the generator terminals and the controls junction box.

d. Connect the tower and blades to generator unit.

The final step, installation of the rotor and blades, is the most delicate, due to the assembly's sensitivity to the wind. If the wind is high the installation of the rotor is delayed until the conditions ensure that it can be done safely. The rotor is assembled on the ground by attaching the three blades to the hub. Bolts are torqued and inspected, also on the ground, before installation. The tower is then lifted into place, using a large crane, and attached to the rotor shaft of the nacelle. After torquing and inspection of the bolts, the nacelle is cleaned and all hatches are closed, making the unit ready for startup.



### **Noble's Good Neighbor Policy**

Noble places a high priority on establishing good faith with individuals whose properties are adjacent to or affected by wind facilities under development. Through our Good Neighbor Policy, we meet with project neighbors early on in the development process to address any specific concerns they may have, and to identify and address any potential impacts a project may have on them.

We recognize that the successful development of windparks requires good community relations, and we achieve this on every project through the simple practice of CARE:

- C**ollaboration
- A**ccountability
- R**espect
- E**thical Standards

Collaboration – We listen to landowners' concerns, meet their needs prior to initiating design of a site, keep them informed throughout the process, provide a contact person that can be reached at all times, make the resolution of issues our highest priority, and always keep their interests in mind.

Accountability – We are committed to our agreements and to “say what we do and do what we say.”

Respect – Landowners and their land are always treated with the highest level of respect. We strive to leave everything in better condition than we found it.

Ethical Standards – In all of our dealings with our landowners, we hold ourselves to the highest standards of ethical behavior.

---

If you have further questions about the construction process, please contact us at our local office or send an email to [info@noblepower.com](mailto:info@noblepower.com). Or, you can send us a message from our website, [www.noblepower.com](http://www.noblepower.com), where you'll also find more information about Noble's Windparks and wind energy.



**Clean energy, more jobs.**

**Noble Environmental Power**  
info@noblepower.com  
www.noblepower.com

*Wind Power...the natural choice™*