# Wind Energy Development

## *A Guide for Local Authorities in New York*

**October 2002**

**Prepared for:**

**New York State Energy Research & Development Authority**
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# Chapter 1: Introduction

## Why is this guide needed in New York?

This guide has been prepared to help local agencies and other government officials become familiar with the benefits and impacts associated with wind energy development in their communities. Commercial wind projects totaling 48 MW were installed in New York during 2000 and 2001, and further wind energy development is likely in the future. Although the recent growth of the wind industry is welcomed by many in New York State, local authorities in wind-rich counties are concerned about their ability to address existing or anticipated proposals from wind energy developers interested in installing projects within their jurisdiction.

> Wind energy is the world's fastest growing source of energy; growing 29% annually over the last five years (1996 – 2000)

Since wind energy is a relatively recent addition to New York's energy generation mix, most local agencies have little or no knowledge of the technology. In addition, towns and municipalities have limited resources or time to invest in acquiring such knowledge. This guide is intended to provide readers with information on wind energy technology, the project development process, and the experiences of other communities that have considered wind energy projects both within New York State and throughout the rest of the country. The objective is to assist local agencies in making informed decisions about wind energy development in a timely manner and to help others in the community understand the implications of actions taken by local authorities.

> The Town Board of South Bristol in Ontario County recently instituted an 8-month moratorium on wind energy development to allow time to develop a local code to govern wind farm construction

What does a wind project mean to a local community and what role do local authorities play in the promotion or development of wind energy projects? Wind energy development has a number of local benefits including the creation of jobs, payments to farmers for land leases, and increased revenue to local governments through property taxes or negotiated voluntary payments in lieu of taxes. On a broader scale, wind energy displaces other forms of energy generation, resulting in a reduction of greenhouse gases and air pollutants. Questions regarding wind energy projects are similar to those raised for other forms of energy development and include the look and sound of a wind energy project in the community, impacts on local vegetation and wildlife, soil erosion during construction activities, and safe installation and operating procedures. Through zoning, permitting, tax regulations, and other actions, local authorities are tasked with making timely and defensible decisions to guide wind energy development in a manner consistent with environmental protection and community values.

This guide is not intended to be a set of instructions to be followed since there is not necessarily a "right" or "wrong" way to proceed in evaluating or implementing wind energy projects. Some of the examples provided in this document may be good ideas for some communities but not for others. Rather, the guide is intended to educate local planning agencies and other stakeholders about the impact of their actions on factors such as the cost and schedule of the project, potential revenue stream from property or other taxes, safety and setback concerns, and others.

This guide is designed to help local communities understand the basic issues and concepts, identify options and approaches for local planning agencies and other government authorities to effectively manage wind energy development, and facilitate effective communication between local officials and the wind industry. References are provided throughout the guide for additional information on a variety of topics.

## *Wind Energy Today*

Over the last two decades, wind energy technology has matured and worldwide markets have grown at an impressive rate. Although the U.S. dominated the early market for commercial wind energy installations in the 1980s, the Europeans have exceeded the U.S. in terms of installed wind energy capacity in recent years. Significant wind energy development has also occurred in other regions of the world, notably in India, China, the Middle East, and Latin America. Total worldwide wind energy capacity will likely exceed 25,000 MW in 2002.

Since the 1980s, the cost of wind technology has dropped dramatically and technology advances have resulted in improved performance and increased reliability. In comparison to non-hydro renewable energy sources, wind- generated energy is the most market-ready and offers the lowest costs. In some locations, the cost of energy produced from wind energy projects is competitive with conventional fossil fuel power plants. In addition, concerns over escalating fuel prices and environmental issues have spurred interest in wind energy as a mainstream generation option. Wind energy offers utilities a product whose purchase price is known for the duration of the 15- or 20- year power purchase agreement. The cost of wind-generated energy does not need adjustments for fuel price fluctuations. The price stability is an attractive benefit to power purchasers.

The prospects are favorable for continued growth of the wind industry both in the U.S. and internationally as the economics of wind energy continue to improve. Wind power today costs only about one-fifth as much as in the mid-1980s, and its costs are expected to continue to decline. Large commercial wind projects are operating in over a dozen states; however, the majority of the development has occurred in the Midwest and West. At the end of 2001, over 4,000 MW of wind energy projects were operating in the U.S. Almost half of this capacity was installed in 2000-2001.

> In 2002, New York has more installed wind energy capacity (48 MW) than all other Northeast and Mid-Atlantic states combined (41.7 MW)

## *Wind Energy Development in New York*

Rural areas in the Northeast, such as those in upstate New York, are receiving increased attention from wind energy proponents and developers.

New York's geographic location and relative proximity to load centers, combined with its good wind resources, the high costs of electrical energy in the Northeast, concerns over regional air quality, federal tax incentives, and legislative mandates in New York and neighboring states has resulted in renewed interest in wind energy development in New York. Some specific factors that are driving the market for wind energy in New York include the following:

- New York State is ranked 15th in annual wind energy generating potential (62 billion kWh)—more than California or any state east of the Mississippi and the largest potential of any state in the Northeast.
- Renewable energy purchase mandates or renewable portfolio standards (RPS) in neighboring states are driving the demand for new renewable resources in the region, particularly wind energy.
- Being located downwind from the major industrial centers of the Upper Midwest, New York has a long history of working to reduce emissions from fossil fuel combustion sources to help reduce acid rain, improve air quality, and curb emission of greenhouse gases.
- In 2001, Governor George Pataki issued an Executive Order requiring all state agencies to purchase 10% of their electricity from renewable energy sources by 2005 and 20% by 2010. This Order effectively creates a stable, long-term market for retail sale of wind energy in New York.
- Funding incentives available to project developers and green power marketers through NYSERDA's EnergySmart Program are helping to promote the technology by reducing some of the initial capital costs for selected wind projects and providing incentives for consumers to purchase green power at the retail level.
- The Federal Production Tax Credit (PTC) for wind energy has been extended through 2003 and prospects for further extension are promising. A five-year extension of this incentive is a component of the President's National Energy Policy. The PTC and a national Renewable Portfolio Standard (RPS) are components of energy bills being considered by Congress.
- New York State consumers are now free to choose retail electricity service providers. Research shows that given the choice, consumers often select services that offer some renewable energy content.

> Additional information on New York wind projects:
>
> *Fenner Wind Power Project – CHI Energy, Inc.*
> ***http://www.fennerwind.com/index.html***
> ***http://www.chienergy.com/fenner.html***
>
> *Madison Wind Power Project – PG&E National Energy Group*
> ***http://www.purewind.net/madisonsite.html***
> ***http://www.atlantic-renewable.com/new_york.htm***
>
> *Wethersfield Wind Power Project – CHI Energy, Inc.*
> ***http://www.chienergy.com/wethersfield.html***

Although wind energy research and wind resource assessment projects had been previously conducted in New York, commercial development activities were not seriously initiated in the state until the late 1990s. Since 2000, three wind energy projects have been installed in the state and several others are in the planning stages.

Figure 1 shows the location of the first three wind projects in New York. Two of the facilities, the Fenner Windpower Project and the Madison Windpower Project, are located in Madison County, southeast of Syracuse. The third project, Wethersfield Windfarm, is located in Wyoming County, approximately 40 miles southeast of Buffalo. Additional details on these projects are listed in Table 1.

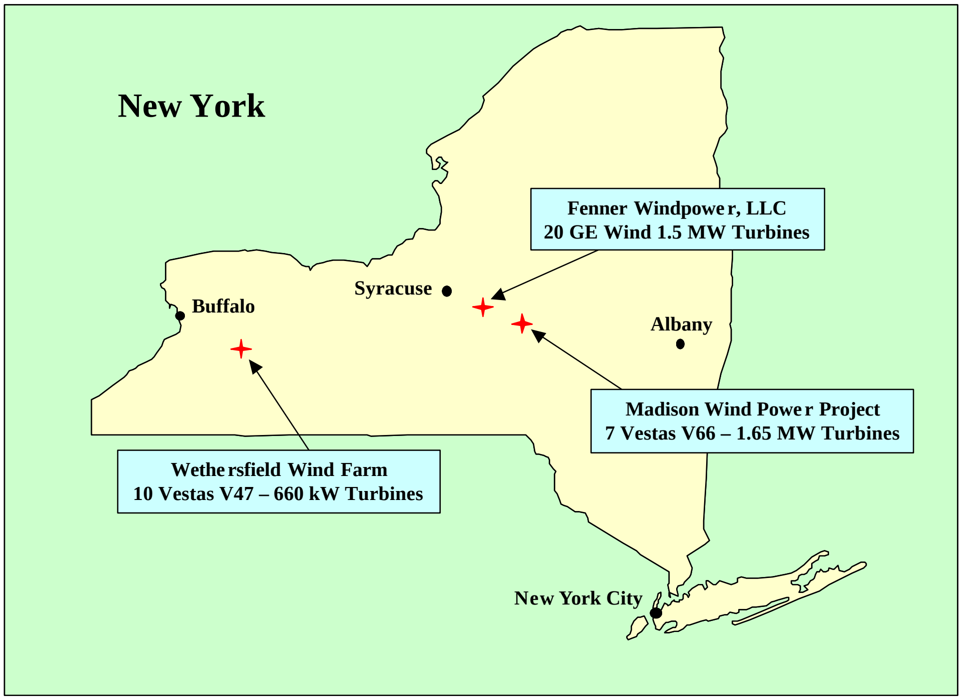


**Figure 1. Location of Wind Projects Operating in New York**

**Table 1. Description of Wind Projects Operating in New York**

| **Project Name** | **Madison Windpower, LLC** | **Wethersfield Wind Farm** | **Fenner Windpower, LLC** | **Totals** |
|---|---|---|---|---|
| **Town** | Madison | Wethersfield | Fenner | |
| **County** | Madison | Wyoming | Madison | |
| **Project Owner** | PG&E Generating | CHI Energy, Inc. | CHI Energy, Inc. | |
| **Number of Turbines** | 7 | 10 | 20 | **37** |
| **Turbine Type** | Vestas V66 – 1,650 kW | Vestas V47 – 660 kW | GE Wind – 1,500 kW | |
| **Rotor Diameter** | 216.5 ft (66 m) | 154 ft (47 m) | 231 ft (70.5 m) | |
| **Hub Height** | 220 ft (67 m) | 213 ft (65 m) | 213 ft (65 m) | |
| **Total Capacity (MW)** | 11.55 | 6.6 | 30 | **48.15** |
| **Annual Expected Energy (MWh)** | 24,000 | 19,000 | 89,000 | **132,000** |
| **Estimated Number of Households Served (@ 6,000 kWh/yr/household)** | 4,000 | 3166 | 14,833 | **22,000** |

Developers are actively pursuing additional wind projects in a number of other locations in New York. Good wind resources have been identified along large hilltops in western, central, and north-central upstate New York. Project proposals from wind energy developers are likely in these areas, assuming other siting considerations are met. The Long Island Power Authority (LIPA) is also investigating installation of wind turbines off the south and east coast of Long Island in shallow water areas. There may also be some development potential along the Lake Erie waterfront south of Buffalo.

Figure 2 is a wind resource map for New York sponsored by NYSERDA in 2001. Based on the map and assuming that protected areas within the Adirondacks and Catskills are excluded from development, the following upstate New York counties have potentially developable wind resources:

| | | |
|---|---|---|
| Albany | Lewis | Otsego |
| Allegany | Livingston | Schoharie |
| Cattaraugus | Madison | Schuyler |
| Chautauqua | Oneida | Steuben |
| Delaware | Onondaga | Wyoming |
| Erie | Ontario | Yates |
| Herkimer | | |

> Visit www.truewind.com for an electronic version of the map with search and zoom features.

The wind map shows the estimated annual average wind speeds at a height of 213 ft (65 m) above the ground. This height corresponds to the hub height of many conventional wind turbines. In New York, areas with wind speeds greater than 15.7 mph (7.0 m/s) are considered potentially 'good' for wind energy development.[1] As wind technology improves, sites with lower wind speeds may also be favorable for development.

Although the wind resource is the primary consideration in identifying a potential development site, other factors to consider include the following:

- Proximity to transmission lines
- Site terrain (topographic complexity) and accessibility
- Orientation and exposure of the site to prevailing wind
- Location and density of residential buildings
- Landowner interest
- Land acquisition costs (lease or purchase)
- Type and extent of vegetation cover
- Soil conditions
- Compatibility with existing land use
- Sensitive environmental areas
- Proximity to aviation and telecommunication corridors
- Likelihood of local acceptance
- Land size and ability to expand in the future

[1] Lower wind speeds may be acceptable for on-site use of small-scale wind generation systems.

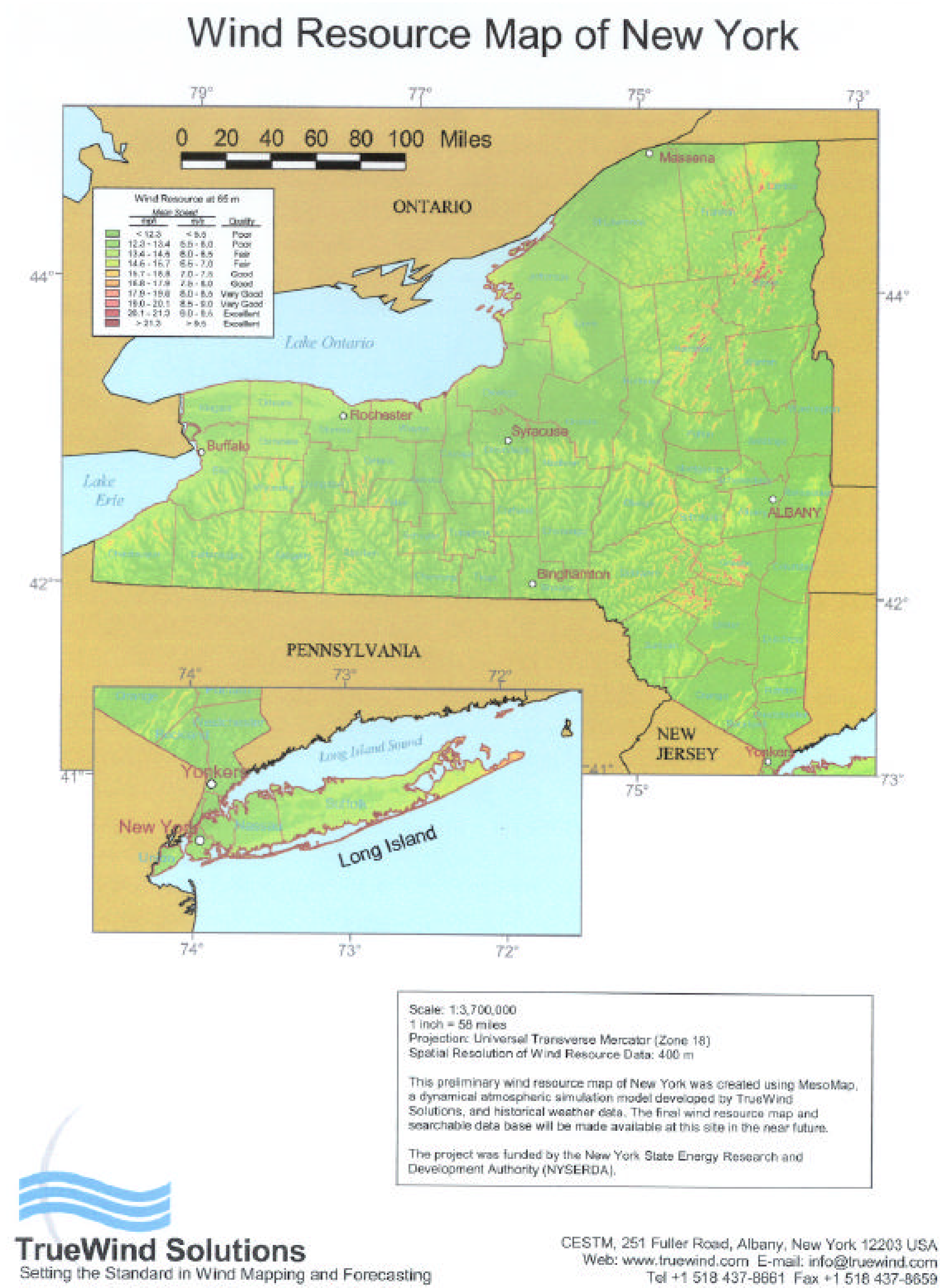


**Figure 2. Wind Resource Map of New York**

## *Approach and Organization*

Global Energy Concepts (GEC) prepared this guide for local authorities under the direction of the New York State Energy Research and Development Authority (NYSERDA). In developing information for this guide, GEC took two tactics. First, they identified and summarized the experience of local planning agencies and other government authorities with wind power development outside of New York. This task included identifying sample ordinances and guidelines, either in place or under consideration, that impact wind energy development on the local level. They also surveyed developers and other project participants to gather information and examples of successful and unsuccessful interaction with local planning agencies, and we reviewed information already available on similar topics including information published by the National Wind Coordinating Committee (NWCC), the Isaac Walton League, Union of Concerned Scientists, American Wind Energy Association (AWEA), and National Renewable Energy Laboratory (NREL).

The second approach was to gather information on the experience to date in New York by surveying town and county officials about the benefits, concerns, and potential future issues in areas that have operating or proposed wind projects, as well as other regions of the state with good wind resources that may face such issues in the future. Discussions were held with developers active in New York to understand their perspectives on wind development and identify any concerns related to interactions with local agencies.

This guide attempts to address the questions and concerns that were raised in these discussions. The document is organized into a series of chapters. Following the introduction, Chapter 2 provides a basic primer on wind energy—the technology, development process, and key considerations in planning and implementing a wind energy project. Chapter 3 addresses the process and regulations that apply to wind energy projects in New York State. Chapters 4 and 5 discuss factors that are typically addressed at the local level including zoning and permitting issues (Chapter 4) and other considerations such as revenue to local authorities and/or taxes (Chapter 5). In each of these sections, examples are used to illustrate approaches taken in regions with wind energy development, either in New York or in other states.

## *Additional Resources and Information*

A number of useful resources within the wind energy industry can provide additional information. NYSERDA is taking the lead in New York by providing information on wind energy. They continue to sponsor the preparation of a number of fact sheets, technical reports, wind maps, and other publications related to wind energy. A list of on-going projects and electronic copies or links to publications is available at www.powernaturally.org.

The National Renewable Energy laboratory (NREL) is responsible for much of the federal government sponsored wind energy research and development. Information on their programs and publications can be obtained through the website, www.nrel.gov/wind. Other Department of Energy (DOE) facilities, including Sandia

National Laboratory, Oak Ridge National Laboratory, and Idaho National Laboratory, also conduct wind energy research. Additional publications and resources are also listed on the DOE Wind Program website, www.ener.doe.gov/wind.

The American Wind Energy Association (AWEA) is an industry trade organization made up of member wind energy companies. AWEA publishes a weekly newsletter and maintains a comprehensive website, www.awea.org, with detailed information on the technology, policy issues, legislative actions, industry members, and frequently asked questions. AWEA members have also undertaken an initiative called Wind Powering New York and a link to information specifically about wind power in New York is located on their website.

The National Wind Coordinating Committee is a consensus-based collaborative that identifies issues that affect the use of wind power, establishes dialogue among key stakeholders, and catalyzes appropriate activities to support the development of an environmentally, economically, and politically sustainable commercial market for wind energy. They have investigated several issues of interest to local agencies and prepared in-depth reports on topics such as siting, permitting, and economic development associated with wind energy projects. A list of publications and electronic copies are available at www.nationalwind.org.

Additional sources of information and references are provided in Appendix A.

# Chapter 2: General Information on Wind Energy

## What are the basic concepts?

A few basic definitions will assist readers unfamiliar with the attributes of wind energy projects to use the information in this guide. Additional information is available from documents and web sites listed in the reference sections.

A **wind power plant** is a facility with multiple wind turbines operating as a single power plant and interconnected to the utility grid at a single point. A wind power plant includes wind turbines, a control system, power collection equipment, and a project substation or switchyard. Wind power plants are also called wind farms, wind power stations, wind plants, wind parks, and wind energy projects.

**Wind turbines** include the tower, blades, and nacelle that house the drive train and generator. A wind turbine is also known as a windmill, wind energy conversion system (WECS), wind-generating unit, and wind turbine generator (WTG). Wind turbines are also used in small-scale or dispersed applications such as village power, water pumping, and individual home use.

A **site** is the physical location of a wind power plant. During the wind resource assessment process, the location of the measurement equipment is called the **monitoring site.** The area surrounding a monitoring site may eventually be developed into one or more wind power plants. A **monitoring station** includes the equipment used in monitoring the wind resource, specifically: the mast (or tower), one or more wind sensors, a device to record meteorological data (data logger), safety equipment (e.g., lightning protection and fences), and possibly additional sensors for measurement of other parameters.

### *Large and Small Wind Turbines are Different*

Wind turbines are generally divided into two broad categories based on their rated capacity and their intended applications. **Small wind turbines** are typically less than 50 kW in size, but can be as large as 250 kW and are designed for use in residential, agricultural, small commercial and some industrial applications. In all of these applications, the turbine(s) are providing energy for the end user to offset the use of grid power. **Large wind turbines** have rated capacities ranging from 660 kW to 1,800 kW (1.8 MW) and are designed for use in electricity generating power plants. Large turbines are typically deployed in wind farms and are intended to provide wholesale bulk electricity production for delivery on the local transmission network

Small wind turbines can be grid-connected for residential or industrial electricity generation or they can be used in off-grid applications such as water pumping or battery charging. Small turbines are typically installed as a single unit or in small numbers. The smallest turbines (with power ratings less than 1 kW) are normally used to charge batteries for sailboats, cabins, and small homes. Turbines with power ratings between 1 kW to 20 kW are normally used for water pumping, small businesses, residential power, farm applications, remote communication stations, and government facilities. They are often found as part of a hybrid system that can include photovoltaic cells, grid power connections, storage batteries, and possibly back-up diesel generator sets. Turbines rated at 50 to 250 kW are used in light commercial/industrial, larger farms, and village power applications.

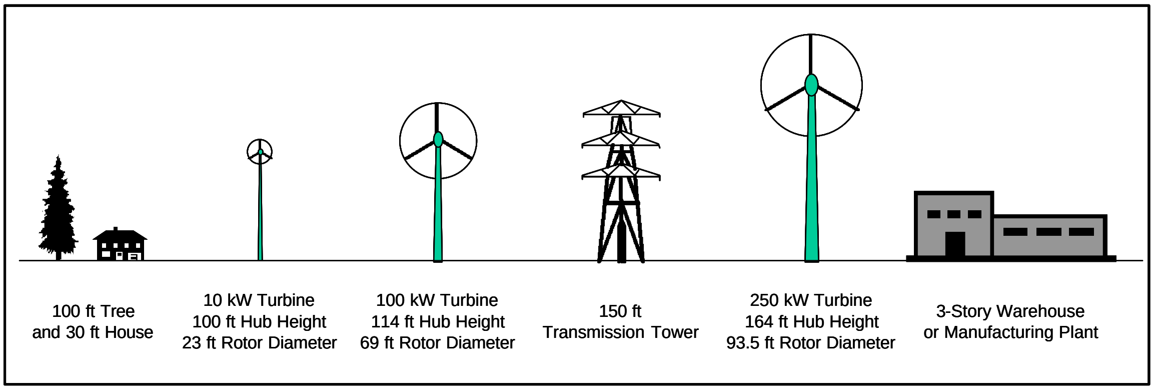


**Figure 3. Small Wind Turbine Height Comparisons**

Large wind turbines are most commonly deployed in large arrays of multiple turbines. Less common, but increasingly of interest to municipalities or electric cooperatives, large turbines are also installed in distributed generation applications that consist of a single or a few turbines connected directly to a distribution line. Many large wind turbine manufacturers are offering models in the 1 MW range. Wind turbines as large as 1.8 MW are available for land-based applications in the U.S. For offshore environments, manufacturers are testing designs in the range of 3-5 MW.

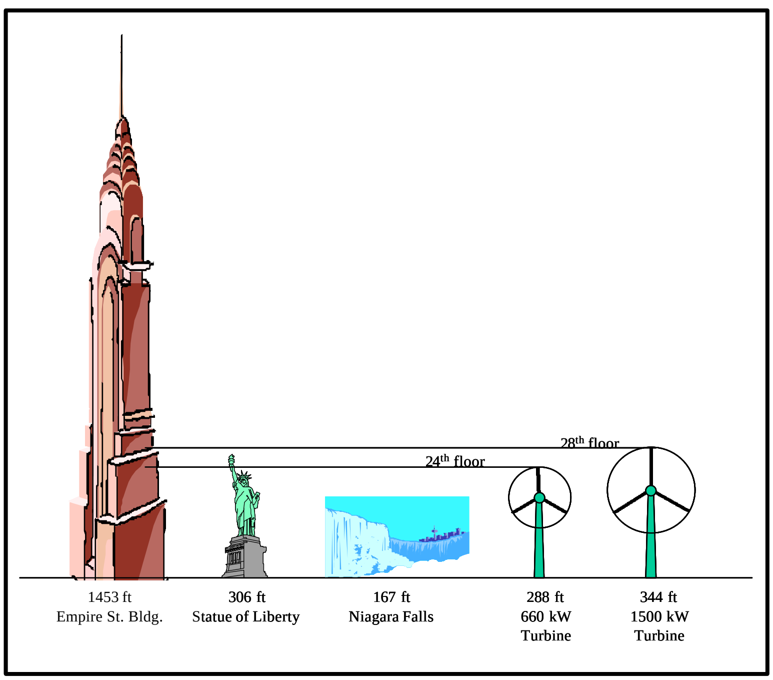


**Figure 4. Large Wind Turbine Height Comparisons**

Examples and information pertaining to both large and small wind turbines are included in this guide. Although there is some overlap, the majority of the technical issues, permitting requirements, and operating procedures are different for large and small wind turbine applications. Therefore, it is important to differentiate and address the large and small wind turbine applications separately rather than trying to address them with the same set of regulations or review processes. Because large-scale applications are likely to have more impact on a community, additional information on wind power plants is provided in the following sections.

## *Large-Scale Wind Power Plants*

The three existing wind power plants in New York State are typical examples of medium- to small-sized wind farms in terms of the number of turbines and the installed MW capacity. Larger wind projects (100 MW or more) have been installed in several locations in the western U.S.

Although there are examples of utility-owned projects, wind power plants have most commonly been owned and operated by independent power producers that enter into long-term energy sale contracts with one or more utilities, competitive power marketers, green power retail service providers, or commercial users. Land for the projects is typically leased rather than purchased. Only a small percentage of the leased land (approximately 5%) is used for the turbine footprints, access roads, and maintenance structures. Other activities such as grazing and crop cultivation are compatible with wind energy and often continue on the land leased for wind projects. Additional transmission lines and/or substations are often necessary to support the energy collection from the projects; the ownership, location, and carrying capacity of nearby transmission lines dictate the interconnection requirements.

> Wind projects typically occupy between 15 to 30 acres of land per MW of installed capacity.

Wind turbines are arranged to capture as much wind energy as possible at a particular site. Although there is often some leeway in choosing turbine locations, wind is extremely site specific and significant variations in wind speed can occur over short distances. As a result, project developers choose turbine models and specific locations carefully to maximize the energy output from a project site.

Wind turbines are usually mounted on tubular towers. Since wind speed typically increases with height above the ground, project developers and turbine manufacturers try to optimize the energy production by evaluating the tradeoffs between the increased energy production at higher heights and the added cost of a taller tower. Height restrictions and lighting requirements also play a role in choosing an appropriate tower height. The diameter of a 213 ft (65 m) tubular tower is about 14 feet at the base.

The majority of civil and electrical work required to design and construct a wind power plant is similar to these activities for other power plants. In addition to the wind turbines and towers, wind power plants contain other components that are necessary for proper operation:

- Electrical Power Collection System – Pad-mounted transformers are generally located immediately adjacent to the base of each tower. These transformers occupy an area on the ground approximately 8 feet by 10 feet and are used to transform the low-voltage power produced by the turbine to the higher voltage of the on-site electrical collection system. The on-site electrical collection lines typically run underground between the pad-mounted transformers and the project substation, in cable runs that are parallel to the turbine rows.

- Substation and Interconnection – For most wind energy projects, electrical energy produced by the turbines passes through a substation where it is metered and the voltage is increased to match the voltage of the utility grid. Plant isolation breakers, power quality monitors, and protective equipment are also present in the substation to protect both the electrical grid and the wind turbines. A system of switches and overhead infrastructure is used to connect the substation to the utility's power lines.

- Foundations – In general, the foundation design is based on the weight and configuration of the proposed turbine, the expected maximum wind speeds, and the soil characteristics at the site. Typical foundation approaches include an inverted "T" slab design and the patented concrete cylinder design (Figures 5 and 6, respectively).

**Figure 5. Inverted "T" Slab Foundation**

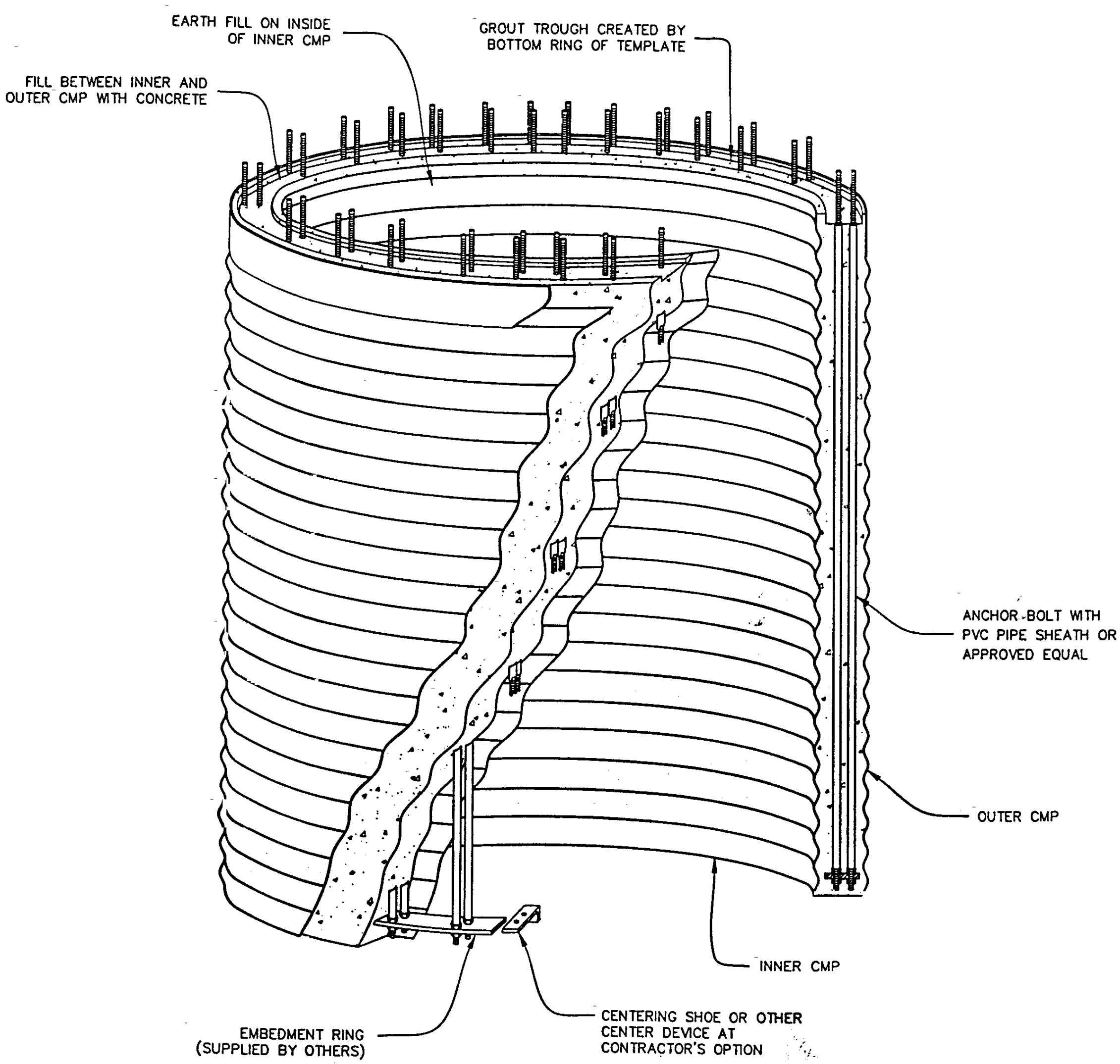


**Figure 6. Concrete Cylinder Foundation**

- Control and Communications System – In addition to individual turbine control systems on each machine, a wind project typically includes a Supervisory Control and Data Acquisition System (SCADA). SCADA systems consist of a central computer with control capabilities for individual turbines and the ability to collect, analyze, and archive time-series data. Communication cables connecting the central computer with the individual turbine controllers are commonly buried in the same trenches as the electrical collection system.

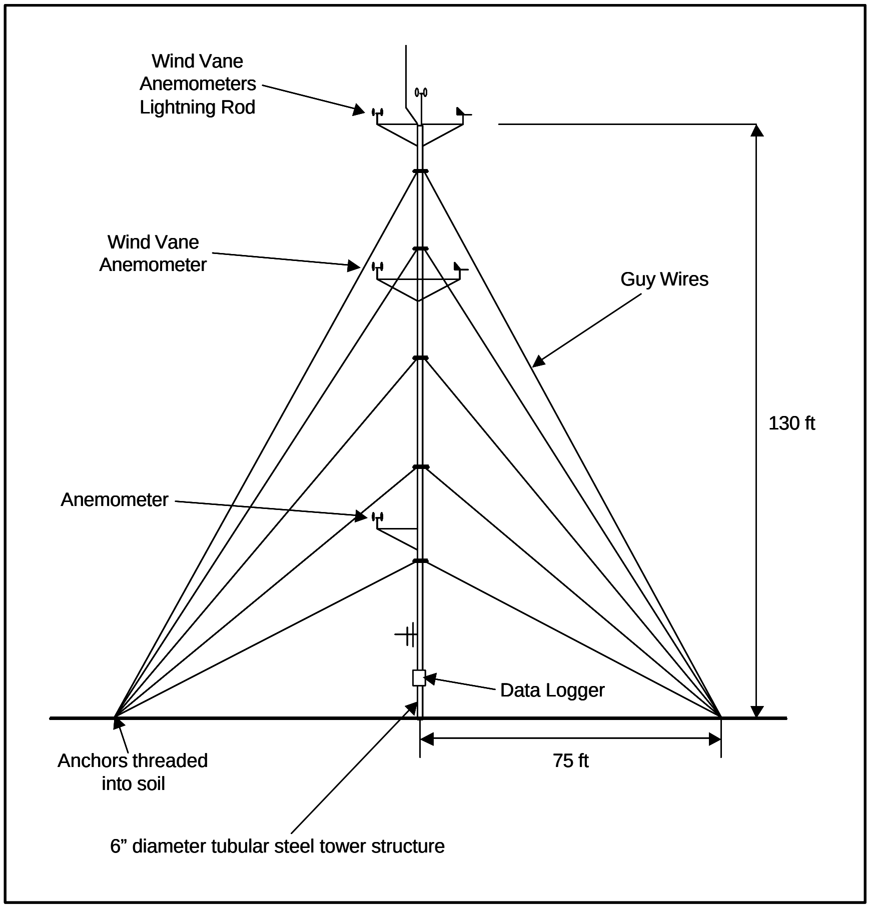


**Figure 7. Conventional 130-ft (40-m) Met Tower**

- <u>Meteorological Towers (met towers)</u> – Met towers are used to continuously record wind speed and direction data. Other parameters such as air temperature and pressure may also be collected. Met towers are generally erected on a project site during the development phase to determine if the wind resources at a site are sufficient to warrant additional development activities. Once a project is constructed, on-site met towers often continue to operate in order to maintain an accurate record of wind speed and direction data experienced by the turbines; data that are necessary to verify turbine performance to warranted specifications. When prospecting for wind sites, developers typically use met towers between 98 and 164 feet high. As development and turbine technology progresses, hub-height met towers up to 262 ft may be more commonly installed.

- <u>Access Roads</u> – Access roads to each turbine location are typically 18 ft to 20 ft wide and consist of compacted crushed rock. In hilly or complex terrain, access roads are constructed to specified slopes and turning radii that are necessary to allow delivery of large components such as blades and tower sections. During the construction phase of a project, ‘crane pads’ (flat, well graded and compacted areas constructed of crushed rock) are installed along the access road and adjacent to the tower foundations. During project operation, the crane pads remain in place in the event that a crane is required to replace large components that cannot be handled by the service crane in the turbine.

- Operation and Maintenance (O&M) Facility – O&M facilities for wind power plants generally consist of an office and maintenance shop. These spaces can be located on-site or off-site and in some cases may be in separate locations. An office is necessary for plant management staff, control computers, and communication systems. The maintenance shop is used to store vehicles and spare parts, and provides a work space for repair of turbine components.

## *Development Steps for Wind Energy Projects*

The major steps associated with developing wind energy projects can be summarized into the following broad tasks:

- Wind Resource Assessment and Site Selection
- Permitting
- Financing
- Construction
- Operation
- Decommissioning

In general, it requires two to three years for project development to proceed from initial site prospecting to construction completion and operation in a region or state that does not have a history of wind energy development. The construction activities are fairly short compared to a fossil fuel plant; a 50 MW wind project can be installed in less than a year. The most time-consuming steps of the development process are the wind resource assessment and the permitting tasks. At least a full year of wind data is generally recommended to obtain an accurate representation of the wind resource. Permitting timelines vary depending on location and the need for environmental assessments.

To date, wind energy development has occurred in areas with favorable market conditions or incentives for wind energy. Developers focus on identifying potential project sites within these regions since there is a higher likelihood of selling the energy at a competitive price. A brief discussion of the activities and requirements for each step is provided below:

### Wind Resource Assessment and Site Selection

There are three basic steps to identifying and characterizing the wind resource: prospecting, validation, and micrositing. The process of locating sites for wind energy development has many similarities to exploration for other resources such as minerals and petroleum. Prospecting includes identifying potentially windy sites within a fairly large region—such as a state, county, or utility service area—and investigating the development potential and general suitability of these sites for wind energy projects. Wind prospectors are generally trained meteorologists who rely on multiple sources of information such as terrain maps, wind atlases, local wind speed data, and other climatological information to identify good wind sites. Developers also conduct site visits to assess local conditions such as the height and vegetation growth patterns (an indicator of high winds), location of residential buildings, quantity and existing uses of land, proximity to transmission lines, identification of potentially sensitive environmental areas, and other factors.

Validation of the wind resource involves a more detailed level of investigation and analysis. Validation is the process of installing monitoring stations to verify the magnitude and characteristics of the wind resource at a promising site. Site-specific wind speed data are critical because a small change in the annual average wind speed at a site can have a significant impact in determining whether or not a project is economically viable.

Upon identifying parcels of land with apparent development potential, developers generally approach the landowners to obtain permission to install monitoring stations and negotiate land lease options. The installation of monitoring stations often represents the first point of interaction between a developer and a local authority, assuming that approval is required to erect the met tower. If the met tower is located in an area that contains a height restriction on buildings or towers, the developer may be required to obtain a special use permit.

If the wind data confirms the viability of a project at a site, developers pursue land rights for the entire project. Micrositing is the process of collecting additional wind data for the purposes of identifying potential turbine locations and optimizing the project layout.

## Permitting

Almost every wind energy project is required to obtain some form of approval from government agencies. As part of the project planning activities, developers research town, county, state and at times federal rules and regulations to become familiar with local requirements and to determine the jurisdiction of the various entities. The number of agencies and levels of government involved depend on a number of factors such as:

- The location of wind turbines, transmission lines, substation, O&M facilities, and access roads,
- The installed capacity of the facility,
- Ownership of the land, and
- Ownership of the project.

Further discussion of permitting is provided in subsequent chapters.

## Financing

Most wind energy projects require some form of financing to construct the project. To secure financing, a developer is required to demonstrate that all necessary permits have been obtained, the project is properly designed and energy projections are based on sound technical analysis, a good market for the energy exists, or as is often the case, a power purchase agreement is in place.

## Construction

Construction of wind energy projects generally requires 5 to 12 months, depending on the size of the project, terrain, and weather conditions. Construction is typically planned for low wind months; however, some projects may require up to 18 months if high winds unexpectedly occur. The type of equipment used is similar to most construction sites with the exception of the large-capacity crane that is necessary to install the top tower sections, nacelle, and rotor. During construction, the project schedule is focused on minimizing the time required for the large-capacity crane due to their high operating costs. Conventional earthmoving equipment such as excavators, bulldozers, graders, dump trucks, and cement trucks are the first pieces of equipment at the site and are used to construct the access roads, foundations and install power cabling. While the infrastructure is being installed, turbine and tower components are delivered to the site and staged near the foundations. Upon completing assembly of the turbines, electrical and communication connections are made and turbine testing begins. Once the turbines are commissioned, energy production can begin.

**Estimated Construction Schedule of a 30 MW Wind Power Plant**

| | | |
|---|---|---|
| Site Preparation | Access Roads | 2 - 6 Months |
| | Foundations | |
| | Power Collection System | |
| | Substation/Grid Interconnection | |
| | O&M Building | |
| Turbine Installation | Receive Tower and Turbine Components | 1 - 1.5 Months |
| | Set Tower Base Sections | |
| | Complete Tower Assembly | |
| | Install Nacelle and Rotor | |
| Construction Completion | Complete Internal Turbine Assembly/Connections | 1 - 2 Months |
| | Energize Project Site | |
| | Commission and Test Turbine Functions | |
| Post Construction | Performance Testing to Verify Proper Operation | 1 - 3 Months |

Assuming Fifteen (20) 1.5 MW Wind Turbines on 65m Towers

It can take as many as seven trailers to transport the components for one turbine and from 5 to more than 15 trailers to transport the large-capacity crane. Turbine and crane components are transported in compliance with Federal and various State Department of Transportation (DOT) requirements for both size and weight. However, a common concern in rural communities is that the bearing capacity of local roads may be insufficient to accommodate multiple large loads. An increase in traffic during construction activities is noticeable in most rural communities. Project monitoring to ensure compliance with permit requirements is common during the construction phase. Monitoring may be performed to verify that site work is adequately protecting sensitive environmental areas (if any are present); road conditions following construction have not degraded; and the project is in compliance with structural, electrical, and other building codes.

## Operation

The turbines are designed to operate automatically and independently. The control system manages all necessary adjustments in operation, monitors turbine performance, and initiates alarms when conditions warrant. Much of the site operation is handled remotely from the O&M office via the use of computers and a high-speed communication network between the turbines.

In general, projects are staffed with one operator for every 10 to 20 turbines, depending on the project and turbine size. Operators are specially trained and apply both electrical and mechanical skills to address turbine faults, troubleshoot operation problems, and perform repairs. Much of the work is performed inside the turbines, which involves a significant amount of climbing.

## Repowering/Decommissioning

Repowering wind energy projects refers to the replacement of old, more costly and typically smaller wind turbines with new equipment. As the turbines approach their design life (i.e., 20 years) or if a significant improvement in technology occurs, a project owner may assess the costs associated with repowering a site. An advantage of repowering is that the site conditions and wind resource are well known. In addition, surrounding communities are familiar with the project's presence. To date, repowering has only occurred in California where wind turbines have been installed since the 1980s. These early wind turbines are significantly smaller in size than the current generation of machines. As a result, project owners can replace numerous small turbines with one large model.

The new wind energy projects in New York are expected to operate for 20 years but some lease agreements between landowners and the project owners may extend well beyond this period. As a result, wind turbines may be present on the land at these sites for many more years if repowering is acceptable to the landowner and local approval is obtained.

Decommissioning involves the removal of all evidence of a wind power project after it has reached the end of its design life. Depending on permit requirements and terms of the land lease agreements, the project owner may also be required to restore the land to original site conditions. Decommissioning includes removal of all turbines and towers, concrete foundations to some reasonable depth below grade, underground cabling, power poles, met towers, substation equipment, and O&M buildings. Site restoration includes regrading and replanting areas where foundations, roads, and buildings were located.

# Chapter 3: The Approval Process in New York

## What roles do government agencies play in the development process?

There are a number of governmental agencies on a local, regional, state, and federal level that may be involved in the approval process for wind energy projects in New York State. The following sections discuss these agencies, their jurisdiction, and their potential interaction with wind project developers.

Although not a requirement for project approval, one of the most important incentives for wind projects is the Federal Production Tax Credit (PTC) provided to project owners through the Internal Revenue Service. This production credit is available for a 10-year period if a wind project is operational prior to the expiration date of the incentive. The PTC has expired—then been extended—multiple times in the last few years. It is currently set to expire on December 31, 2003. Given the economic benefit from the PTC and the uncertainty associated with each extension, wind developers have often been forced to consolidate their development schedules to ensure their projects are completed before the PTC expiration date. As a result, long permitting periods are an issue for wind energy developers if delays potentially jeopardize their ability to place a project in service by a certain date.

### *Federal Agencies*

In most cases, wind energy projects have limited involvement with federal agencies unless they are located on federal lands. In these cases, the National Environmental Policy Act (NEPA) is triggered, a NEPA Environmental Impact Study (EIS) review is necessary, and a number of federal agencies may be involved in the approval process. The majority of the wind development in New York is likely to be on private land; therefore, significant federal review is unlikely to occur.

The exceptions to this rule are the requirements imposed by the Federal Aviation Administration (FAA) for siting in aviation corridors and lighting on any structure taller than 200 feet. Given the height of today's commercial wind turbines, the majority of wind power plants are subject to the FAA's review for lighting and a few may also require additional review if they are located near airports or military facilities.

The FAA has yet to establish any standard approach for lighting wind turbines that is consistent across the country. At the present time, wind developers submit lighting plans to their regional FAA office and an Obstruction Hazard Analyst determines lighting requirements on a case-by-case basis within each region. FAA lighting requirements

> The Madison wind project is required to have white strobe lights on each tower during daylight hours and overcast conditions. At night, steady red lights are required.

have been an issue for the wind industry because requirements vary widely from region to region, and even within individual regions, depending on which official oversees an individual project. FAA requirements are particularly important for local authorities to understand because lighting impacts the nighttime appearance of a project. Although developers can appeal the FAA decisions, they ultimately have limited control over the lighting requirements.

> The regional FAA office responsible for the Fenner Wind Power Project in Madison County was concerned that a wind turbine blade might block a solitary light when viewed from certain angles if the rotor was in a parked position. Therefore, they required each of the 20 turbines to have two aviation lights on the back of the nacelle.

FAA lighting approaches can include both daytime and nighttime lights for wind turbines. Lighting requirements have even varied by turbine type. Some wind projects are required to light every wind turbine, some are required to light alternating turbines, and some have lights on only the turbines around the perimeter of the project. Requirements on met tower lighting also vary.

## *State Approval Processes*

Many states have instituted consolidated review processes for electric generating facilities that are coordinated under a single state agency. Such processes are intended to provide clear and consistent direction to project planners, reduce duplication between levels of government, eliminate conflicts between different agencies, and lessen the burden on local authorities with limited expertise or resources to conduct comprehensive reviews. Two states, Oregon and Minnesota, have expanded their consolidated approval processes to specifically include procedures and requirements for large wind energy projects. New York's consolidated process for energy facilities, and the role of other New York state agencies is discussed in the following sections. Information on the state coordinated wind energy review processes in other states is also discussed.

### New York State Requirements

**New York State Public Service Commission (PSC)**

Although there are no specific processes established for wind energy projects, New York State has a consolidated electric generating facility review process that applies to all types of large electric generation facilities. NYS Public Service Law, Article X – Environmental Compatibility and Public Need for Major Electric Generating Facilities, establishes the review and approval process for construction and operation of any generating facility with a capacity of 80 MW or more. Projects above this size must obtain a Certificate of Environmental Compatibility and Public Need from the PSC. The consolidated certification process was structured to eliminate the need for obtaining other approvals from state agencies or local municipalities.

Another consolidated review process in New York State is established in NYS Public Service Law, Article VII – Environmental Compatibility and Public Need for Electric and Gas Transmission Facilities. The certificate from this process is required for any project utilizing a transmission line with a design capacity of 125 kV or more and extending at least one mile. As with the Article X certificate process, the qualifying transmission facilities are exempt from most other agency reviews.

Both of these processes involve lengthy pre-application, application, hearing and decision, and post-certification phases. Several wind developers have indicated that the schedule and cost of the process is prohibitive, in part because of their need to meet deadlines associated with other wind energy incentives, particularly the Federal PTC.

Only a few projects in New York are likely to be impacted by Article VII and X criteria since land availability, wind resource variability, and other site-related characteristics will naturally result in smaller project sizes. Wind energy projects sized such that they do not require Article VII and X certificates are subject only to approval and permitting by local authorities.

**New York State Environmental Quality Review (SEQR) Act**

In New York State, the environmental impacts of a proposed wind energy project are typically assessed in accordance with the State Environmental Quality Review (SEQR) Act. This act requires that local and state agencies give equal consideration to environmental protection, human and community resources, and economic factors when considering proposed actions. SEQR process does not result in a permit; however, a SEQR assessment must be completed before any agency decides to approve, undertake, or fund a private or public project.

The two significant submittals in the SEQR process are the *Environmental Assessment* (EA) form and if required, the *Environmental Impact Statement* (EIS). If the EA provides the lead agency with sufficient information to make a determination as to the impacts and mitigating measures to be employed, it may be possible to obtain a *Negative Declaration of Significance*, which means that an EIS is not required. Conversely, if the project is determined to have a significant impact, then an EIS will need to be prepared. In the case of the Fenner and Madison wind power projects, the EAs submitted by the developer sufficiently addressed the concerns of the lead agencies, eliminating the need for an EIS.

There are a few instances when the SEQR process is not triggered. For the Madison wind power project, for example, the project site was located in an unincorporated area that was not regulated by local land use laws. The only local requirements were associated with building permits. However, since the project received funding from NYSERDA, a state agency, the SEQR process was triggered and an EA was performed.

> Additional information on specific aspects of the SEQR process is available at the New York Department of Environmental Conservation web site. http://www.dec.state.ny.us/website/dcs/seqr/index.html

**Compliance with New York State Department of Agriculture and Markets - Agricultural District Laws**

Villages, towns, cities, and counties in New York State have broad ability to enact land use rules and regulations; however, these powers must be in accordance with the policy and goals of *Article AA-25 of the Agricultural and Markets Law*. This law prevents unreasonable restrictions by local government rules on land use within agricultural districts unless it can be demonstrated that public health or safety is threatened. The purpose of the law is to encourage development and improvement of agricultural land for production of food and other agricultural products.

Currently, agricultural law in New York does not address placement of wind turbines within agricultural districts. As previously mentioned, wind energy facilities are compatible with a number of agricultural activities. Many farm owners view wind turbines as an alternative source of revenue that can supplement their other operations.

Recent wind energy projects in New York have received some attention from the Department of Agriculture and Markets. The Department's concerns are associated with restoration of topsoil and reversal of soil compaction caused by heavy equipment in the areas surrounding the turbines and substation that are situated on land within an agricultural district. Projects using land within agricultural districts are encouraged to contact the Department of Agriculture and Markets to determine project impacts and identify appropriate remedial actions that the project sponsors should consider undertaking.

**Other Agencies Relevant to Permitting**

Other governmental agencies/entities that may or may not be involved in granting approval for a wind project in New York include:

- <u>New York Department of Environmental Conservation (NYSDEC)</u> – NYSDEC may become involved in project approval if land to be affected by the project falls into their jurisdiction associated with the Clean Air and Clean Water Acts. Issues related to streams or wetlands represent one of the most common ways in which NYSDEC could become involved.

- <u>New York Independent System Operation (NYISO)</u> – NYISO was established in 1997 as a result of the restructuring of the electric utility industry. NYISO is intended to create fair and open competition in the wholesale market and create an electricity commodity market in which power is purchased and sold based on competition. NYISO may affect wind energy development plans in the event that the project development requires interconnection to the bulk transmission system. Generation projects must demonstrate to the NYISO that project operation is consistent with transmission system planning and operating standards. Further information about NYISO can be found at www.nyiso.com

- <u>New York State Office of Parks, Recreation, and Historic Preservation</u> – Although the specific mechanism for their involvement may not be clear, consultation with this department may be necessary if there are visual impacts to historic structures.

## Examples in Other States

As previously mentioned, both Oregon and Minnesota have established a consolidated wind energy facility siting and permitting process. Although these processes occur at the state level, aspects of their approach can be incorporated and applied at a local level. The coordinated process allows for developers, citizens, local governments, and state agencies to participate in a single review of a proposed project. In both Oregon and Minnesota, extensive requirements are clearly outlined for developers to submit material indicating the details of their project plans. The approaches taken by these two states with regard to specific requirements are referenced and used as illustrations in subsequent sections of this guide. Excerpts and other details deemed to be particularly valuable to New York agencies are also included in Appendix B. (Note – Laws and regulations presented in this and other Appendices are subject to revision, therefore statements herein may not be accurate. This information has been presented for information purposes and this Guide should not be relied upon for specific legal requirements.)

In Oregon, a specific permitting track is identified for wind energy projects—separate from the approval process for other forms of power generation. Wind energy projects in Oregon are not required to document a 'public need' unlike the New York requirements in Article X of the NYS Public Service Law. Wind energy facilities with an average generating capacity of 35 MW or more must apply for a site certificate through the consolidated state process. Note that a 35 *average MW* energy facility corresponds to approximately a 100 *nominal MW* wind project with a 35% capacity factor because wind projects do not operate at full capacity all the time. Developers of smaller wind projects have a choice between obtaining a site certificate through the consolidated state process or obtaining separate approvals from local government and individual state agencies. The Oregon Energy Facility Siting Council, made up of citizen volunteers appointed by the Governor, performs the project reviews and issues the certificates. The Oregon process allows for expedited reviews for wind projects of less than 300 nominal MW (or 100 average MW).

In Minnesota, the Environmental Quality Board (EQB) is responsible for issuing site permits to wind projects larger than 5 MW (nominal) in capacity. Smaller facilities are required to comply with local government requirements. The Minnesota Legislature put interim procedures in place in 1995 and since that time seven large wind projects have been issued site permits under the consolidated process. The procedures specify information to be included in the permit application and details to ensure the public has opportunities to participate in the review process. Sufficient information is requested in the application to evaluate the environmental impacts of the proposed project; therefore, an additional environmental review is not required. The Site Permit process pre-empts local review of the project and eliminates the need for developments to seek project approvals from different local agencies.

## *Local Government Approval*

Town boards, regional planning commissions, county agencies, and other local authorities typically review and evaluate most wind energy projects. The local requirements and process will determine the level of effort and costs associated with obtaining the required approvals to construct a project. Examples of county regulations related to wind energy are included in Appendix C.

Local requirements include adhering to zoning rules; obtaining building, grading, or special use permits; and compliance with structural, mechanical, and electrical codes. The requirements associated with planning and permitting wind energy projects in New York vary depending on whether or not local land use or zoning rules exist for the land on which the project will be located. Many areas within New York do not currently have zoning or comprehensive plans in place. Wind energy projects located on land that does not fall under local zoning or land use regulations may only require a local building permit. In areas that are governed by these plans, wind energy projects are generally required to obtain Special Use or Conditional Use permits. A few local governments in New York State have established specific zoning requirements that apply to commercial or bulk generating wind energy facilities. A few examples include:

- Town of Martinsburg, Lewis County
- Town of Fenner, Madison County
- Town of Stockbridge, Madison County (zoning requirements pending)
- Town of Harrisburg, Lewis County

Copies of local zoning requirements from these towns are included in Appendix D. In addition, county and regional planning commissions that have been actively researching and supporting local governments in their consideration of wind energy projects include:

- Madison County
- Tug Hill Planning Commission
- Central New York Regional Planning & Development Board

# Chapter 4: Specific Permitting Considerations

## What are the details?

The most common form of interaction between local planning agencies and wind projects is through formal zoning and permitting actions. This chapter addresses some of the issues that are frequently raised as part of these processes. In responding to proposals or permit applications for wind energy projects, local agencies are responsible for ensuring that developers comply with existing codes and the best interests of the community are served. However, because wind energy is a relatively new technology and most local agencies do not have experience with wind projects, they are often evaluated as special cases. As a result, an application is treated as a unique occurrence rather than as a standardized process and, in most cases, becomes more complicated.

Local agencies must attempt to strike a balance between making reasonable requests for information and imposing undue burdens on the developer. Similarly, while it is important to be thorough and comprehensive, it is equally important to conduct a process within reasonable time frames. This section is intended to assist local agencies in understanding the impact that their decisions and schedules have on the economic viability of a wind project in today's competitive markets. Examples of experience from around the country are highlighted and referenced for additional information throughout the chapter.

For small turbines, an entirely different set of considerations is pertinent. Discussion and examples of small turbine issues are noted as appropriate. For most small turbine applications, the decision to install a project is not solely an economic one. Nonetheless, costs associated with permitting and approvals represent a larger percentage of the overall cost of small wind systems.

Permitting issues and permitting processes will vary according to location and individual proposals. As a result, regulatory agencies may find some sections of the information in this chapter more applicable to their situation than others. Some elements of a wind project (i.e., road construction or grading plans) are similar to the requirements for any development project. Other aspects are specific to wind power projects. It is important to identify the most important factors and focus the process on obtaining resolution of the key issues.

Whether permitting a large commercial wind energy facility or a single small turbine on a farm, permitting considerations will likely include most of the following items:

- Setbacks from residences, roads, and property lines
- Public health and safety considerations
- Noise
- Avian and biological effects
- Visual impacts

- Soil erosion
- Demand on local services
- Waste management
- Decommissioning

The level of detail required to address these issues in a permitting strategy varies depending on project location, existing land uses, community concerns, local environmental issues, state or local energy policies, local economy, electrical system energy requirements, and political attitudes. Like any form of regulation, there are tradeoffs between mitigating the impact of the project on the local culture and environment and the costs to comply with the mitigating measures.

## *Zoning and Land Use Considerations*

Land use regulations are intended to ensure that there is sufficient land available for a variety of uses, adjacent uses are compatible, and there is a reasonable transition between areas of different usage. In comparison to other forms of power generation facilities, wind energy projects are land intensive. Wind projects require large tracks of land in order to obtain good wind exposure while minimizing inefficiencies due to wake losses. Acreage for a wind energy project can vary from 15 to 30 acres per MW of installed capacity depending on many factors such as topography, existing land usage, and vegetation cover. However, the specific footprint of the turbines is very small – only approximately 3% to 5% of the total acreage is used by the facility.

Most towns and counties implement land use plans to guide local development. Zoning ordinances are one of the first regulations encountered in developing a wind project. Some wind turbine applications may be appropriate for areas zoned as urban or industrial; however, the majority of large wind projects are typically installed in remote or rural areas. Small wind turbines may occasionally be installed in residential areas; however, they are most commonly installed in areas zoned for agriculture.

In some areas of the country, local agencies have anticipated the potential for future wind development and identified preferred siting areas for wind projects prior to receiving permit applications. This can be done by either establishing wind development "overlays" on existing land use plans or modifying zoning definitions to specifically identify wind energy as an acceptable use.

Wind energy facilities are compatible with agricultural and livestock grazing land uses, usually with little significant impact. However, wind energy projects have an effect on residential land use, recreational land use, general open space, and protected environmental and/or wildlife areas. Buffer zones or setbacks are common tools employed by permitting agencies to mitigate dangers from incompatible land usage and manage impacts. Wind Energy projects can have a beneficial effects such as providing a new source of revenue for rural farmers, their presence can secure land from subdivision and tract development, and they may help preserve habitat.

## Setbacks

Many concerns associated with safety, noise, and aesthetics can be addressed by placing distance between the wind turbines and people, property lines, roads, and scenic areas. Although there is no consensus on appropriate distances or types of setbacks, there are several common themes that appear in a number of wind energy regulations currently in place.

Most local government requirements include setback specifications for the distance between the wind turbine and structures (residences and other buildings), property lines, and roads. A few agencies have also defined setbacks from railroads and above-ground transmission lines. The most common way to define a setback distance is in terms of a multiple of the turbine height (for example 1.5 times the wind turbine height). Other options are to specify a fixed distance or a combination of a fixed distance and a multiple of the turbine height. When specifying the structure height, it is important to define whether the height is the top of the nacelle or the highest point reached by the rotor blade.

Examples
Wind turbine setbacks from residences
- Fenner/Stockbridge, NY – 1.5 x structure plus rotor radius
- Martinsburg, NY – 1500 feet
- Alameda County, CA – 3 x structure height or 500 feet, whichever is greater

With regard to setbacks from structures and residences, some permitting agencies differentiate between houses and buildings on the property leased for the project and houses and buildings on *adjacent* parcels. The implication is that a greater distance is appropriate from structures on adjacent parcels since those properties have less control over the development than the landowner. A waiver of such requirements is typically granted if written permission is provided from the neighboring landowner.

Examples
Wind turbine setbacks from property lines
- Fenner/Stockbridge, NY – 1.5 x structure height plus rotor radius
- Martinsburg, NY – 300 feet (rear and side lot lines)
- Contra Costa County, CA – 3 x structure height or 500 feet, whichever is greater (from all boundaries)
- Cook County, MN – tower height
- Wasco County, OR – at least 5 rotor diameters

Setbacks from property lines may vary for side and rear lot lines but are generally specified in the same way as setbacks from residences. Setbacks from property lines can pose a challenge for small wind turbines since these installations tend to occur on smaller land parcels. To address this issue, some agencies define setbacks for *commercial* wind turbines only. Small turbines are either exempt or evaluated on a case-by-case basis. Turbines should be exempt from property line setbacks if the adjacent property contains a wind turbine from the same plant or the adjacent property is a participant in the project through a land lease and/or wind access agreement. This is an important consideration particularly in New York since turbine layouts and plant infrastructure can result in many parcels of land being utilized for one project.

Setbacks from roads are typically greater for major highways than for local roads. In some cases, scenic setbacks have been required from particular state highways in close proximity to designated wind development areas.

When establishing setbacks, the intended effect must be balanced with economic considerations for the project and overall permitting objectives. For example, a setback decision made by a Town Board in Addison, Wisconsin, had the effect of reducing the number of proposed turbines by more than two-thirds for a wind project in their jurisdiction. The project developer proposed a setback of 650 feet around each turbine (approximately 2.5 x the maximum turbine height including the rotor) to address concerns raised about noise, safety and visual impacts. The Town Board decided to expand the setback to a minimum of 1000 feet from any residences, road right-of-ways, or property boundaries. The developer had a limited ability to re-position the turbines on the remaining leased property while still maintaining an acceptable energy output from the project. As a result, the number of proposed turbine sites was reduced from 28 to approximately 8 and the developer dropped the project because it was uneconomical.

## Height Restrictions

Height restrictions are a part of most land use plans and such regulations often have an adverse, though unintended, impact on wind turbine installations. Many planning agencies have acknowledged that height restrictions in their communities are in place only to restrict building heights or limit construction of cell phone towers. However, if wind turbines are not specifically exempt, developers or small turbine owners must request variances, which can be a time-consuming process. Height restrictions have particularly been a problem for small wind turbine installations.

> California recently enacted legislation to simplify and standardize zoning for small wind systems. The new law requires California cities and counties to enact ordinances that allow wind turbine heights of at least 65 feet on any property sized one acre or more. The bill also defines appropriate setback, noise, and engineering analysis requirements. If cities and counties failed to act by July 1, 2002, the law states that small wind turbines will receive a permit by default, providing that they meet the state's minimum requirements.

There can also be issues in areas that have specifically addressed wind turbines in that their height restrictions are no longer appropriate for the size of today's large wind turbines. For example, Wasco County, Oregon, limits the total height of wind turbines to 200 feet. Cook County, Minnesota, limits *tower* heights for wind turbines to 200 feet. Many commercial turbines are now installed on 215-foot towers.

Some counties also specify a minimum height for the blade tips above ground level. Minimum limits are driven by safety concerns and typically range from 15-30 feet. Because today's commercial wind turbines are typically installed on tower of at least 200 feet, minimum levels above ground are unlikely to be an issue. Although small turbines are installed on lower towers, their rotors are also smaller and these limits are also not an issue.

### Wind Access

Another factor to consider related to land use is the establishment of wind buffers or the protection of wind rights. Buildings or large structures placed upwind of a wind turbine may adversely impact energy production from the machine. When assessing setbacks and buffer zones around the turbines it is also important to protect the rights for access to the wind. Developers often address this by obtaining land lease options on crucial upwind land parcels; therefore, it is not necessary to establish specific wind access zones as part of a land use regulation. However, it is beneficial to understand the issue and evaluate whether steps are required to prevent future incompatible land usage or place building restrictions on neighboring lands.

> Schaumberg, Illinois, and Lincoln, Nebraska, specify that the minimum distance between turbines with different owners shall be at least five rotor diameters apart.

## *Additional Permitting Considerations*

In addition to local zoning approvals, local jurisdictions typically require one or more permits. Permit requirements vary by location but may include grading permits, building permits, conditional use permits, environmental permits, operating permits, or others. Because each town, county, or region is different, this section addresses a range of topics that may be considered in the issuance of a permit.

### Public Health and Safety

Public health and safety issues associated with wind energy projects are different from other forms of energy generation since a combustible fuel source, fuel storage, and generation of toxic or hazardous materials are not present. Wind energy projects do share similar electrical infrastructure requirements of medium-voltage power lines and substation equipment with conventional power generation facilities. However, wind turbines also include a few unique concerns related to the configuration of the equipment.

Blade throws, fire, and tower collapses are extremely unusual events yet they can be raised as issues during public meetings. Public agencies address these potential occurrences by establishing reasonable setbacks based on the size of the turbine and blades from residences and public corridors.

Ice shedding is another area of public concern. Ice can accumulate on the blades, nacelle, and tower during unique weather conditions. Many times, turbines will shut down in icing conditions because the wind vane and/or anemometer sensors become frozen rendering the turbine inoperable. Ice formation can also reduce power production; this is sensed by the control system that subsequently halts turbine operation. As the ice melts it will fall to the ground in the vicinity of the turbine. In areas with high icing potential, such as Minnesota and Vermont, some manufacturers employ the use of black blades to aid in reducing ice formation. The black color heats the blade surface, which can reduce the icing; however, it cannot be completely prevented. Again, setbacks are the primary mechanism used to address this occurrence.

The potential for vandalism or trespassing can also cause safety concerns. Wind turbines may attract more attention than other structures. Project developers report incidences of unauthorized access on their sites ranging from curiosity seekers to bullet holes in blades. Permits usually require fencing and posting at project entrances to prevent unauthorized access. Other requirements intended to reduce personal injury and public hazards include locked access to towers and electrical equipment, warning signs with postings of 24-hour emergency numbers, and fenced storage yards for equipment and spare parts. In some cases, fencing requirements are problematic if they impact other land uses such as grazing.

It is common for project developers to work with local emergency response teams to provide information or training on tower rescues and other wind-specific concerns. Falls, injuries from heavy or rotating equipment, and injuries from electricity represent the types of events that can occur at a wind energy facility. The height of the nacelles provides an additional challenge for medical responders. The national Occupational Safety and Health Administration regulations, in addition to state worker safety regulations, cover all of the worker safety issues associated with electricity, structural climbing, and other hazards present in a wind farm.

## Noise

Wind turbines emit sound due to the blades passing quickly through the air (particularly the blade tips) and from the rotating equipment within the nacelle. Determination of the sounds as noise is a subjective matter that can make control and mitigation of concerns difficult. Many environmental conditions can have a significant effect on the type of sounds emitted from a turbine as well as the distance they travel from the turbine. Wind direction, atmospheric conditions, wind speed, vegetation cover, topography and local background noise conditions all affect the reception of sounds from turbines. Sounds from turbines are typically more perceptible in low to moderate wind conditions since the natural background noise from the wind masks turbine sounds in high wind speed conditions.

Strategies for assessing or mitigating noise from turbines should consider the different tonal frequency of the sounds emanating from wind turbines, not just overall decibel level. Background noise should also be considered. Most local requirements use some form of exceedance over measured background levels as a threshold. The exceedance level can vary from 5 to 8 decibels.

Distance is the most effective mitigating measure in addressing noise from wind

***Examples of Noise Regulations:***

Town of Fenner, Madison County

- Noise from individual turbines shall not exceed 50 dbA as measured at the boundaries of all the closest parcels that are owned by non-site owners and abut the site parcels.

Riverside County, California

- 50 to 55 decibels depending on size of project and location
- Certain conditions may trigger an acoustic study
- Low frequency noise (between 5 to 100 hertz) is limited to 67 to 75 decibels.

turbines. Utilizing setbacks that specify a certain sound level at a certain distance from the turbine are also effective.

## Avian and Biological Effects

Construction of any power generating facility affects the biological resources in an area due to the physical presences and ecological interactions. Biological concerns associated with wind energy projects include:

- Bird and bat collisions with turbines, electrical lines, and site vehicles;
- Loss of habitat; and
- Loss of vegetation.

Of these issues, avian collisions and electrocutions have historically received the most attention, primarily due to the loss of raptors at the Altamont Pass area in California. The California Energy Commission report *Effects of Wind Energy Development: An Annotated Bibliography* contains a good listing of sources for further review. Collisions of birds and bats with turbines are relatively infrequent; however, they do occur. Depending on the protective status of the species or the number of incidences that occur, the collisions may or may not be considered biologically or legally significant.

Surveys of the biological resources, migration patterns, and determination of their protection status in an area where turbines are being considered can be a reasonable requirement, particularly for a region that does not have a history of turbine installations. Practical experience is now being gained with this issue at the three projects in New York, and should help other regions of the state better understand the impacts turbines can have. The magnitude of the survey should be commensurate with the size of the proposed projects and turbines being considered.

At times, local agencies have required project developers to establish a plan for monitoring avian incidents including recording and reporting any injuries or deaths.

Loss of habitat and vegetation can occur during the construction process as a result of increased human presence, noise, motion, and alteration of the terrain for roads, buildings, foundations or other site infrastructure elements. Although developers try to select sites with minimal tree cover, tree removal has occurred at some projects to improve exposure to the wind and for construction of access roads.
Site topography and project layout have the largest impact on loss of habitat issues. Construction in steep areas can produce more disturbances due to the need for more ‘cut and fill’ excavation work. Loss of habitat can be mitigated through re-vegetation actions or through setting aside other sections of land from development. Plans for site work should be reviewed to ensure sufficient soil and water quality control measures similar to those required for other construction projects are in place.

## Visual Impacts

The visual impact of wind turbines is greater than most energy generation facilities because of the height of the turbines, the large area occupied by wind energy projects, their location in exposed areas, and the movement of the rotor. The impact of the turbines on the landscape is subjective and the degree to which these impacts are an issue is a function of the value placed on the landscape and viewshed by the local community.

Visual impacts vary from different viewpoints surrounding the project site. In areas with hilly terrain, the surrounding topography can hide turbine views from many locations. Turbines may also be more visible during different types of lighting conditions and during winter seasons when surrounding trees are bare.

Turbine spacing can also have an impact on the aesthetics of a wind project. Spacing between turbines is primarily determined to optimize the energy output. Topography also dictates spacing between turbines. Sufficient space between turbines is necessary for the turbines to experience the best winds and to reduce turbine-to-turbine turbulence (which could affect long-term turbine life). The use of larger turbines has improved the visual impact of projects because fewer turbines are used and the space between them is greater.

The color of the turbines can also influence the magnitude of visual impacts. Most local agencies require that non-reflective, unobtrusive colors be used to paint the tower and blades. Most wind turbines are painted either a light gray or off-white shade.

It is also important to consider the lighting of wind turbines when evaluating the visual impact. FAA requirements could include strobe lighting, red flashing, or steady red lights. The nighttime visual impact may be greater than the daytime impact.

Modern visual simulation software can digitally simulate the view of a wind energy project from a variety of locations and in different light conditions. In New York, it could be valuable to obtain photos of areas where turbines are proposed during summer and winter since the vegetation and lighting during these two seasons are very different. In addition, topographic maps can be incorporated into the software to develop a map overlay that estimates the number of turbines visible from any location within a region. Local communities can request submittal of visualization maps and simulated project views to help assess the impacts.

Uniformity of color, structure types, and surface finishes can also improve the visual impact. Local authorities sometimes specify uniformity requirements in their permits.

## Cultural and Archeological Impacts

Cultural and archeological surveys are typically conducted as part of the environmental assessment. Because wind projects include vegetation clearance, disturbance of ground surface, and excavation below the ground surface, they have the potential to affect archaeological resources that may be present in the area. Local governments typically require that all work be halted if archeological resources are uncovered. Areas within specified distances are then roped off, and qualified archeological experts are retained to evaluate the find.

## Soil Erosion

For other types of project development, most local agencies have established sediment and soil erosion requirements that take into account local conditions. Road, building, and foundation construction are the principal wind-project construction activities that can cause erosion concerns. Selection of erosion and sediment control measures is guided by local soil conditions, weather environment, project needs, and local or state regulations.

Approaches to minimize or prevent soil erosion for wind energy projects are very similar to requirements for other forms of construction. Natural terrain features should be used as much as possible to minimize the amount of grading required. The amount of time that disturbed soil is exposed should be minimized. Existing vegetation should remain in place and undisturbed to the extent possible. If local conditions warrant, sediment ponds, hay bales, silt fences, or other measures should be employed to minimize soil transport. Vehicle travel off of access roads should be prohibited. Most local agencies require developers to submit grading, erosion, and/or sedimentation plans prior to issuance of building permits.

## Solid and Hazardous Waste

Waste from wind energy projects primarily consists of general solid waste associated with the shop office, packaging material from equipment and supply shipments, spent lubricants, and small components that have failed. Solid waste is typically managed through a solid waste removal service contract. Lubricant suppliers have established programs for collecting waste lubricants and oils generated during routine maintenance activities such as gearbox or hydraulic station oil changes. The shop building may use and store solvents for parts cleaning.

Large components that are replaced can be returned to the manufacturer for refurbishment. Leaks of hydraulic fluids or lubrication oils from within the nacelles represent the most common method for accidental releases of hazardous material into the environment. Depending on the fluid type, a project may be required to have a hazardous material handling plan by the NYS Department of Environmental Conservation.

## Project Decommissioning and Repowering

Decommissioning was previously introduced in Chapter 2. Although there is limited experience with decommissioning due to the relative youth of the wind industry, local agencies have attempted to address decommissioning concerns in several ways. Some agencies have required that turbines be removed from the site if they are not operational for a specified period of time (i.e., multiple years). Others require the permittee to maintain a fund for removal or post a bond. The most common approach is to require the submission of a decommissioning plan. In the worst-case scenario, salvage value for the scrap metal may be sufficient to cover the dismantling costs.

A key consideration in decommissioning requirements is determining the need for complete removal of the turbine foundations. (While typically extending 3-5 feet below ground surface for slab type foundations, they can, depending upon the design and soil conditions, extend as much as 30 feet below ground surface.) A common decommissioning standard is removal of all below-ground project elements to a depth of 36 inches. This is considered to be adequate for agriculture or future construction. Disconnected cables buried 36 inches or deeper can sometimes remain in place if their presence does not adversely impact land use and they do not pose a safety hazard.

**State of Minnesota Siting Permit Application Requirement**

Decommissioning and Restoration. The applicant shall include the following information regarding decommissioning of the project and restoring the site:

- The anticipated life of the project;
- The estimated decommissioning costs in current dollars;
- The method and schedule for updating the costs of decommissioning and restoration;
- The method of ensuring that funds will be available for decommissioning and restoration; and
- The anticipated manner in which the project will be decommissioned and the site restored.

One Developer's Proposed Approach for a 53 MW Wind Plant

Developer proposed to remove all project items to a depth of 36 inches

- 20-year project life
- $1 million is budgeted for decommissioning
- Decommissioning funds will be set aside in an independent management account
- Independent account management will report status of available funds to the project annually

Site restoration is generally a component handled within the land lease agreement between the developer and landowner. However, local governments may want to establish some minimum requirements that provide a consistent standard for an area that is compatible with other land uses.

As previously discussed, repowering wind energy projects refers to the replacement of older and typically smaller wind turbines with new equipment. Although this type of activity is not expected to occur in New York in the near term, government authorities should recognize the potential for repowering activities and address any concerns in their permits.

## Traffic and Road Degradation

The construction phase of a wind project results in a short-term increase in the number and size of tractor trailers present on rural roadways. For example, during construction each turbine may require up to twenty cement trucks to provide sufficient material for the foundation. Obviously, transportation of the tower sections, nacelles, and blades will require multiple deliveries using specialized transport vehicles. Large-capacity conventional crawler cranes required for turbine assembly are transported to the site in pieces utilizing anywhere from 10 to 20 tractor-trailers. Finally, other tractor-trailers are required to deliver supplies, tools and materials for construction.

The increased truck traffic combined with the increased loading on the roads is a concern for transportation departments responsible for road maintenance and repair. Wind energy project developers recognize that the increased traffic may cause damage to roadways and usually include provisions for the turbine supplier and associated contractors to be responsible for any road repairs that may be necessary upon construction completion.

Town governments in conjunction with the project developer should document local road conditions in the vicinity of the project prior to construction. Project approval should stipulate that the developer restore any road damage to the documented pre-construction conditions.

During and after construction, local roads may also experience increased traffic due to local residents or tourists observing project progress and turbine operation. Residents on small rural roads may object to the unexpected increase in people visiting their area. Others may seize the opportunity to create small businesses selling tours or souvenirs. As the novelty of the projects decreases over time, traffic concerns will also decrease. However, installation of roadside information kiosks can help channel tourist traffic to an area or multiple areas determined to be acceptable to local residents.

# Chapter 5:  Other Local Issues

# What else should be considered?

A number of other issues arise during development of wind energy projects that local governments can address either as part of the permitting process or as separate issues.  In the case of the New York wind energy projects, these issues included payments to local governments, assessing impacts on property values, and compliance monitoring.

## *Payments to Local Governments*

Payments to local governments can take the form of property tax, sales tax (on miscellaneous materials and supplies purchased locally), or alternative payment agreements negotiated with the project owner to compensate for the additional burden the project may place on local services.  These payments can provide either an incentive for developers or deter their interests in an area.  Whatever approach or mechanism is used for establishing payments to governments, the magnitude of the payments should be comparable to the costs associated with additional services required by the project while providing a reasonable benefit to the larger community.  For many small towns, payments from wind energy projects result in a significant increase in revenue in comparison to other local revenue sources.

Wind energy projects have high initial capital costs in comparison to other comparably sized forms of energy generation.  However, fuel for wind energy projects is free as opposed to fossil-fuel-based generation technologies.  The resulting economics for wind generation means that much of the profit is obtained in the latter years.  Slight increases in upfront costs can result in a project becoming economically unviable.  Local governments should balance the desire for increased revenue with the possibility of limiting local economic activity.

Some areas have limited or exempted wind energy projects from paying certain or all local taxes as an incentive to draw development and increase the economic diversity of small rural towns.  Other forms of incentives include business or corporate incentives for establishing manufacturing or company headquarters in a region or state.

### Property Taxes

#### New York State

Payment of additional property taxes on improvements associated with wind turbines is exempt for a period of 15 years under New York State Real Property Tax Law (RPTL Section 487).  This exemption applies to village, city, county, town, and school taxing jurisdictions.  However, this exemption does not apply to special use districts such as fire districts.  The exemption from paying property taxes is a notable incentive for project developers when they are comparing potential project sites.  Appendix E contains a copy of RPTL Section 487.

However, each of the taxing jurisdictions has the option to choose whether to disallow the exemption. The option to disallow the exemption must be exercised by counties, towns, cities, and villages through the adoption of a local law or resolution.
This tax exemption has become a significant negotiation issue between project developers and local taxing jurisdictions. Taxing jurisdictions that have not disallowed the exemption can do so at any time prior to the turbines being constructed – thereby making the project pay its full tax burden. Local governments can use this provision as leverage to negotiate a voluntary payment with the developers.

## Voluntary Payments

In New York, local taxing jurisdictions can negotiate an agreement with a project developer that establishes a specified annual payment in return for continuation of the property tax exemption. There are no specific guidelines for determining the magnitude of these voluntary negotiated payments. One agency indicated that they are considering a payment of approximately $5,000 per MW per year with a contract term of 15 years.

Based on information from Madison County, New York, voluntary payments from the Madison Wind Power Project amounts to approximately $30,000 per year each for both the town of Madison and Madison Central School District or approximately $5,200 per MW. The Fenner Wind Power Project is providing the town of Fenner with approximately $150,000 per year for 15 years or approximately $5,000 per MW.

Recently, a bill (S6212/A9797) passed both the New York Assembly and Senate that would amend the real property law, authorizing municipalities to collect payments in lieu of taxes (PILOTs) for solar or wind energy systems. This bill has been delivered to the Governor. The law merely authorizes municipalities to enter into PILOTs, in effect formalizing voluntary negotiated payments into PILOTs.

## Alternative Method for Basing Payments to Local Governments

Although basing payments to local governments on the value of the project or the installed capacity is the most common method utilized today, several alternatives have been explored. For example, use of actual turbine energy production (kWh) may be a more objective measurement for basing payments. This is the same approach commonly used as the basis for payments to landowners. In the case of payments to landowners, the payments are generally based on 2% to 4% of the gross energy production from each turbine on a landowner's property. Some agreements may include an initial lump sum payment to the property owner; however, the annual payments are typically based on a lower percentage (1.5% to 2.5%) of the gross energy production from each turbine. Energy production is directly related to the wind speed over the land, which is the best method for determining and comparing the wind energy value of one section of land to another.

Minnesota recently passed new legislation (2002 Omnibus Tax Bill – Laws of Minnesota Chapter 377) that revises the way wind energy projects are taxed. Wind energy projects in Minnesota are now exempt from paying property taxes. However, they are required to make payments to local taxing jurisdictions based on energy production from the turbines. The payments are based on project size as identified below:

- Large-Scale Wind Energy Conversion Systems: Projects with installed capacities of 12 MW or greater will make payments of 0.12 cents per kWh.
- Medium-Scale Wind Energy Conversion Systems: Projects with installed capacities between 2 and 12 MW will make payments of 0.036 cents per kWh.
- Small-Scale Wind Energy Conversion Systems: Projects with installed capacities between 250 kW and 2 MW will make payments of 0.012 cents per kWh.
- Systems with installed capacities less than 250 kW are exempt from the production tax.

When basing payments from wind energy projects on capacity, a 30 MW wind farm on a moderately windy site provides the same local revenue as a 30 MW wind farm on land with a high wind resource. If payments were based on actual energy production, more revenue may be available from the project with a higher wind resource. A downside to this approach, however, is that tax revenues will vary from year to year due to variations in the wind resource.

### *Impacts on Property Values*

There is limited documentation available on the impacts of wind turbines on property values. The difficulty in assessing the impacts is associated with properly relating changes in property values to the presence of wind turbines. Since property values fluctuate on a variety of factors, principally being subjective opinions of the buyers and sellers, it is difficult to isolate changes related to the wind turbines. Local, regional, and national economic factors also influence property values.

Concern over decreased property values is most often expressed by neighboring property owners that are not participating in a wind power project. More specifically, these neighbors are not receiving annual payments for land leases or easements. They feel that the close proximity of their property to a commercial wind energy project will reduce the number of potentially interested buyers, resulting in lower selling prices. This belief should not be discounted; however, there may be potential buyers that enjoy the presence of a renewable energy source situated close to their land and the ‘high tech’ appearance of the turbines. Property owners that are participants in the project have the revenue generated from the turbines as an additional factor that can increase the value of the land.

On a larger scale, tax revenue from commercial wind energy projects into the local governments and schools is greater than the financial burdens the projects place on local services. The net increase in funds available to local jurisdictions has had beneficial impacts. More income from wind energy projects can allow either increased local services or decreased local tax burdens. Either result has a positive influence on the local economy. Over time, improved services or reduced residential tax burdens may have the effect of making the community or region more desirable and possibly increasing property values.

## *WTGs on Property Owners Tax Assessment*

A unique situation occurred at the Madison and Fenner wind power projects in which the wind turbines were listed as improvements on the tax parcel owned by the landowner. Even though the wind turbines are exempt from real property taxes, (where the local tax authorities have not disallowed the wind and solar tax exemption) the presence of the turbines on the landowner's tax assessment (as opposed to the project owner's) caused considerable concerns for the landowner. The tax-exempt status in NY expires after 15 years, after which the turbines become fully taxable. Listing the turbines on the landowner's parcel means that, theoretically, the landowner is liable to pay the large tax on the wind farm improvements in the event the project owner defaults or goes bankrupt.

An alternative to placing the turbines on the landowner's parcel is for the turbines to be placed on a separate "suffix" parcel that is associated with the wind project owner and all tax liabilities for this "suffix" reside with the project owner (and not the underlying landowner). "Suffix" parcels are more commonly used for billboards or cellular phone towers which are placed on leased land. The only recourse for tax authorities is against the owner of the "suffix" and not the owner of the land.

This appears to be a relatively simple method for addressing an issue that is extremely important to landowners.

## *Permit Compliance*

Recent experiences from the New York projects identified some concerns that local building inspectors may lack sufficient knowledge and understanding of the projects and technology. The local inspectors in rural areas are more familiar with residential, agricultural, and commercial construction as opposed to civil works or power plant construction. Although wind energy projects utilize turbines that are unique in comparison to other forms of energy generating equipment, the issues associated with building and electrical code compliance are the same as any other power generating plant. Road construction and O&M building construction are no different from other construction projects. The local utility receiving energy from the wind plant is responsible for inspection and acceptance of the substation.

Note that projects that receive financing (which is by far the most common approach) will be monitored by an Independent Engineer (IE) hired by the financing company to verify construction compliance with the project specifications. The financing companies rely on IEs to identify issues that may pose problems for project operation or long-term reliability of the facility. Although there is no interaction between the IE and local inspectors, local agencies may not be aware that there is very likely a third party ensuring project construction is being conducted in accordance with the specifications.

# References

NWCC Siting Subcommittee. (1998). *Permitting of Wind Energy Facilities – A Handbook.* National Wind Coordinating Committee. Washington, D.C.

New York State Consolidated Laws, Public Service, Article X – Siting of Major Electric Generating Facilities, Sections 160-172.

New York State Agriculture and Markets Law, Article 25AA – Agricultural Districts.

New York State Agriculture and Markets Law, Article 25AAA – Agricultural and Farm Land Protective Programs

New York State Department of Agriculture & Markets. *Local Laws and Agricultural Districts: Guidance for Local Governments and Farmers.* November 21, 2001.

**Environmental Impact Assessment in New York State**

State Environmental Quality Review Act

**http://www.dec.state.ny.us/website/dcs/seqr/index.html**

**NYSERDA – Wind Web Page**

**http://www.nyserda.org/energyresources/wind.html**

*Long Island's Offshore Wind Energy Development Potential: A Preliminary Assessment*. April 2002 – Long Island Power Authority and the New York State Energy Research and Development Authority.

**STATE-LEVEL DOCUMENTS**

**Oregon**

**Oregon** Energy Facility Siting

**http://www.energy.state.or.us/siting/sitehm.htm**

Oregon Administrative Rules – Division 24 (OAR 345-024) – Specific Standards for Wind Facilities. **http://www.energy.state.or.us/siting/rules/div24.pdf**

White, J.G. (Oregon Office of Energy). 2002. "Oregon's Siting Process for Large Wind Energy Facilities." *AWEA Windpower 2002 Conference Proceedings*, Portland, OR.

**Minnesota**

**Minnesota Environmental Quality Review Board – Wind Siting Rules**
**http://www.mnplan.state.mn.us/eqb/wind/**

*Green Mountain Power Wind Power Project Development*, EPRI TR-109061, December 1997.