# 2. Wind Energy in New York State

## 2.1. Market Drivers and Barriers

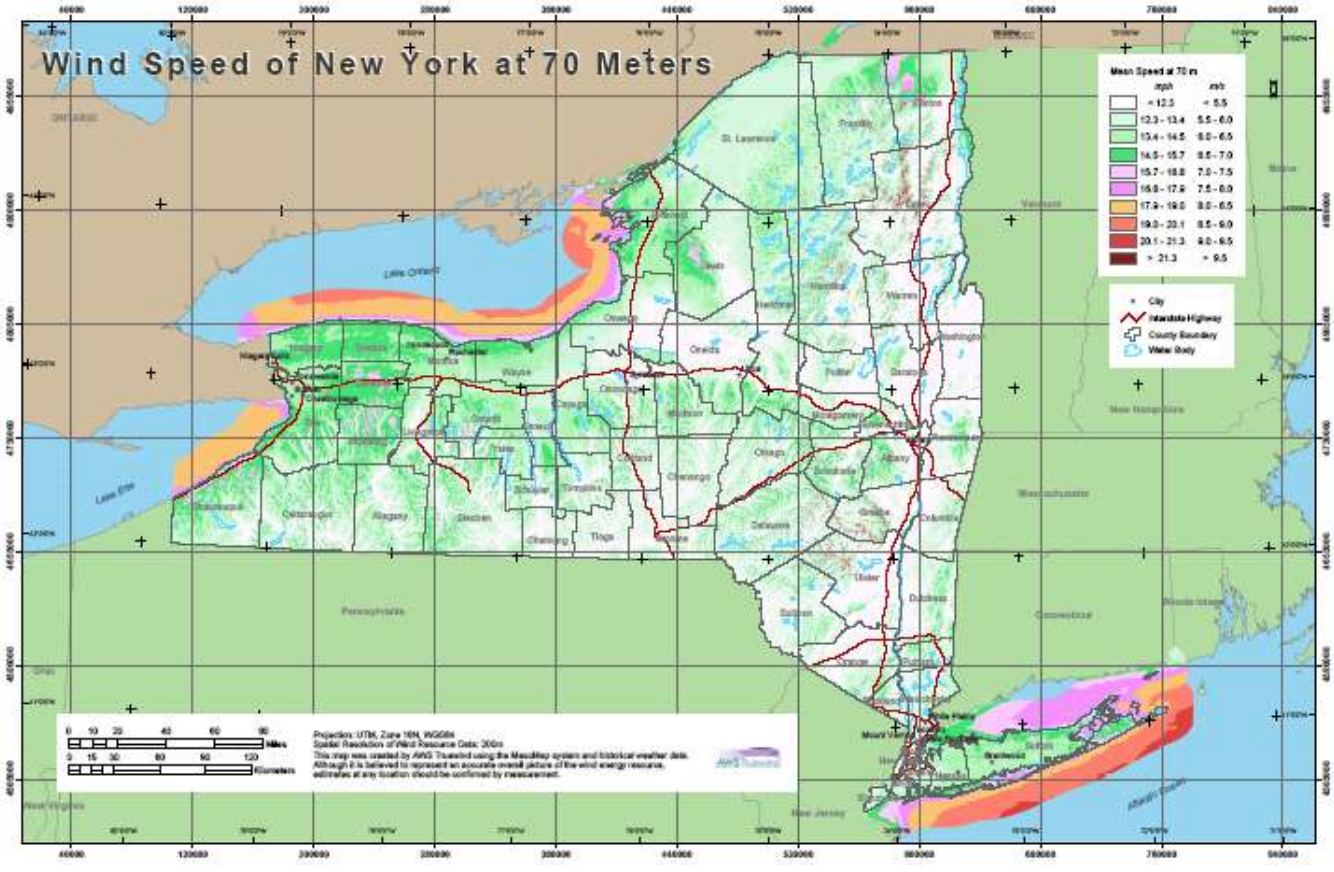
### Drivers for Wind Development in New York State

Windy rural areas in the Northeast, such as those in Upstate and Western New York, have proved to be attractive to wind energy developers. Market drivers for wind development generally include an area's proximity to major load centers, available electrical transmission capacity, and a good wind resource; regionally, drivers include 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. Some specific factors that are driving the market for wind energy in New York include the following:

- **A good resource:** New York State is ranked 15th in annual wind energy generating potential (7080 MW or approximately 62 billion kWh)—more than California or any state east of the Mississippi and the largest potential of any state in the Northeast.[1] The location and relative strength of wind resources in New York State are shown in Figure 1.
- **State mandates:** Renewable energy purchase mandates or renewable portfolio standards (RPS) in New York and neighboring states are driving the demand for new renewable resources in the region, particularly wind energy. Originally, the New York State RPS called for an increase in renewable energy used in the state from its then-current level of about 19% to 25% by the year 2013. In 2009, the RPS goal was expanded to 30% renewable energy by 2015. Wind energy is expected to supply a significant portion of the RPS requirement, which effectively creates a stable, long-term market for the retail sale of wind energy in New York. Additionally, in 2001, then-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. In 2008, then-Governor David A. Paterson continued this executive order.
- **Regional initiatives:** New York is a member of the Regional Greenhouse Gas Initiative, or RGGI, a cooperative effort by Northeastern and Mid-Atlantic states to reduce carbon dioxide ($CO_2$) emissions from fossil fuel-burning power plants. RGGI provides an incentive for developers to invest in wind and other renewable energy generation technologies rather than in new fossil fuel-powered units, because fossil fuel units are required to purchase RGGI permits for their $CO_2$ emissions, while wind, solar etc. have no such emissions and thus need no $CO_2$ permits.
- **Tax credits:** The federal American Recovery and Reinvestment Act, passed in 2009, provided a three-year extension of the Production Tax Credit (PTC) through December 31, 2012, and introduced additional incentive options including an Investment Tax Credit (ITC) and grant program.
- **Consumer choice:** New York State consumers are free to choose retail electricity service providers. Many electricity service providers offer renewable or "green" electricity products, including wind energy, for a small premium (ranging from 0.5 – 2.5 cents per kilowatt hour). Research shows that given the choice, consumers often select services that offer some renewable energy content.

[1] American Wind Energy Association (AWEA)

**Figure 1: Wind Speed of New York at 70 Meters**




Source: AWS Truepower

## Barriers to Wind Development in New York State

Despite New York's significant wind resources and the numerous market drivers discussed above, there are also barriers to wind energy development in New York State. Such barriers include wind farm siting challenges, wind resources that are far from major electricity markets, difficulties in financing wind farms, uncertainties associated with future legislative mandates and tax incentives, and shortfalls in transmission capacity. These barriers are discussed in more detail below:

- **Siting challenges:** Wind farm siting has proved to be a significant challenge to developers in New York State. Prior to January 1, 2003, development of large scale electricity generation facilities was controlled by the state under Article X; however, between the expiration of Article X in January, 2003, and the adoption of a new state-level siting process in July, 2011, the permitting of these facilities fell to local municipalities. Municipalities in New York State write their own zoning ordinances, and in the absence of a state-level permitting process, these local laws, which determine how land may be used, had an enormous impact on where and how wind turbines could be built. Historically, some municipalities in the state have welcomed wind farm development as a boost to the local economy; a few have banned it outright. However, most municipalities in wind-rich areas of the state have revised their zoning codes to regulate where turbines may be sited, so as to allow development while protecting scenic viewsheds, environmentally sensitive areas, and historic sites. In addition to the requirements of municipal zoning ordinances, wind farm proposals since 2003 have gone through the SEQRA process, usually with the local municipality serving as lead agency, to assess any potential environmental impacts that could result from their construction and operation.

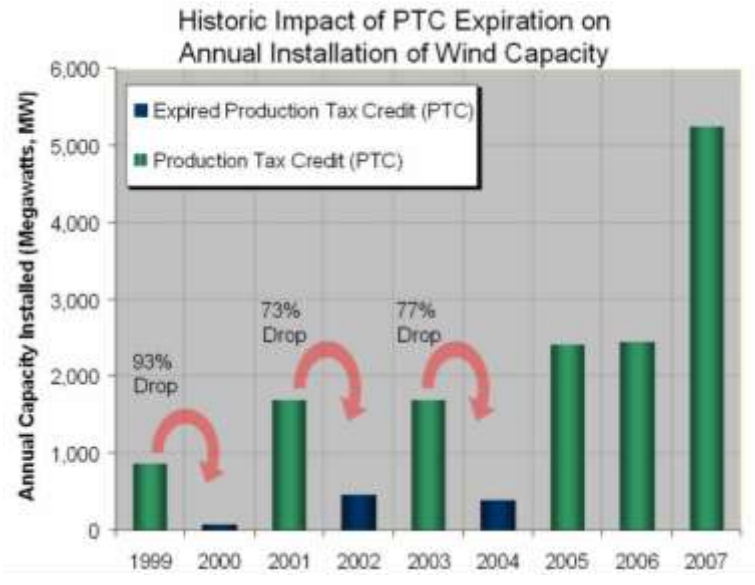
At this writing, the state has adopted a new "fast track" permitting process for electricity generating facilities of 25 MW or greater capacity. Under this "new Article X," a state-appointed siting board is created and charged with processing power plant development applications within a year of receiving a complete application. The siting board may defer to municipal ordinances, but it also has the ability to override local rules it considers unduly restrictive or burdensome to the developer. The siting board will also assess the potential for environmental and other impacts from proposed projects, and this assessment will replace the SEQRA process. The NYSDEC has been charged with promulgating the rules under which the siting board will operate. The new process is intended to lower barriers to power plant siting and permitting.

- **Wind resources far from markets:** Much of the land-based wind resource in the state is located on ridgelines and high plateaus, far from cities, which tend to be in lower-lying areas and often close to rivers, lakes or the ocean. Furthermore, even small wind turbines tend to be difficult to site in urban or densely populated residential areas, unlike solar panels, which blend more easily into these sorts of environments. This means electricity generated at a wind farm may have to travel a long distance to reach the places where it is most needed. Transmitting electricity over large distances can result in significant losses of electricity from transmission lines; it can also require costly infrastructure investments, because new lines may need to be installed to increase carrying capacity when a wind farm is built in a remote area previously served only by smaller distribution lines. Finally, remote locations can pose other problems in the construction phase of wind development, since local roads may not have sufficient carrying capacity to accommodate construction vehicles, equipment and supplies may have to travel long distances to reach the construction site, and personnel may have to be housed onsite or in nearby temporary accommodations.

- **Financing difficulties:** As with any major electricity generating facility, building a wind farm is an expensive undertaking. Some developers can self-finance, but others must find investors or financiers willing to underwrite a project. This can be difficult in the current economic climate, especially given the uncertainty attached to some important incentives, such as the federal Production Tax Credit (PTC), which is due to expire in 2012. In April, 2010, one of the most active wind developers in New York announced it would cancel some planned developments and put others on hold until the economy improves.

- **Uncertainties about mandates and incentives:** As mentioned above, the PTC is set to expire in 2012. This credit is extremely important to wind developers, as illustrated by Figure 2, comparing construction during periods when the credit was in place, and construction during periods when it was allowed to lapse. Historically, Congress has renewed the credit for only a year, or a few years, at a time, and this has contributed to an economic atmosphere for wind development that is consistently uncertain.

**Figure 2**



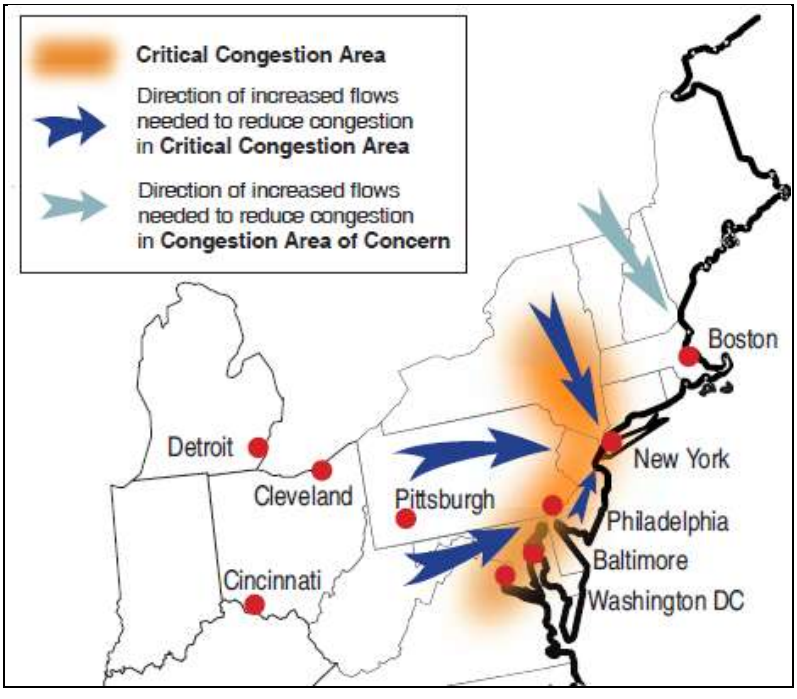

Source: American Wind Energy Association

- **Transmission capacity shortfalls:** As mentioned above, new transmission lines may need to be installed to support wind farm development in many areas of the state. Wind developers will only build wind farms where sufficient transmission capacity exists, or can be built, to deliver the produced electricity to the marketplace. According to the U.S. Department of Energy, "The match between actual wind development and strong wind resources has occurred primarily where there has been adequate transmission capacity to interconnect the new wind generators and deliver their electricity to loads, or in areas in which there is a willingness to build new transmission capacity quickly…. Where there is high wind resource potential but little new wind development, those gaps occur principally because there is neither adequate transmission capacity to deliver wind generation, nor an expeditious way to build new transmission for that purpose."[2]

  In 2009, the U.S. Department of Energy released its National Electric Transmission Congestion Study. Figure 3 illustrates a critical congestion area in New York State, which serves as a barrier to wind energy development in the northeastern portion of the state.

**Figure 3: Critical Congestion Areas in Northeastern USA**

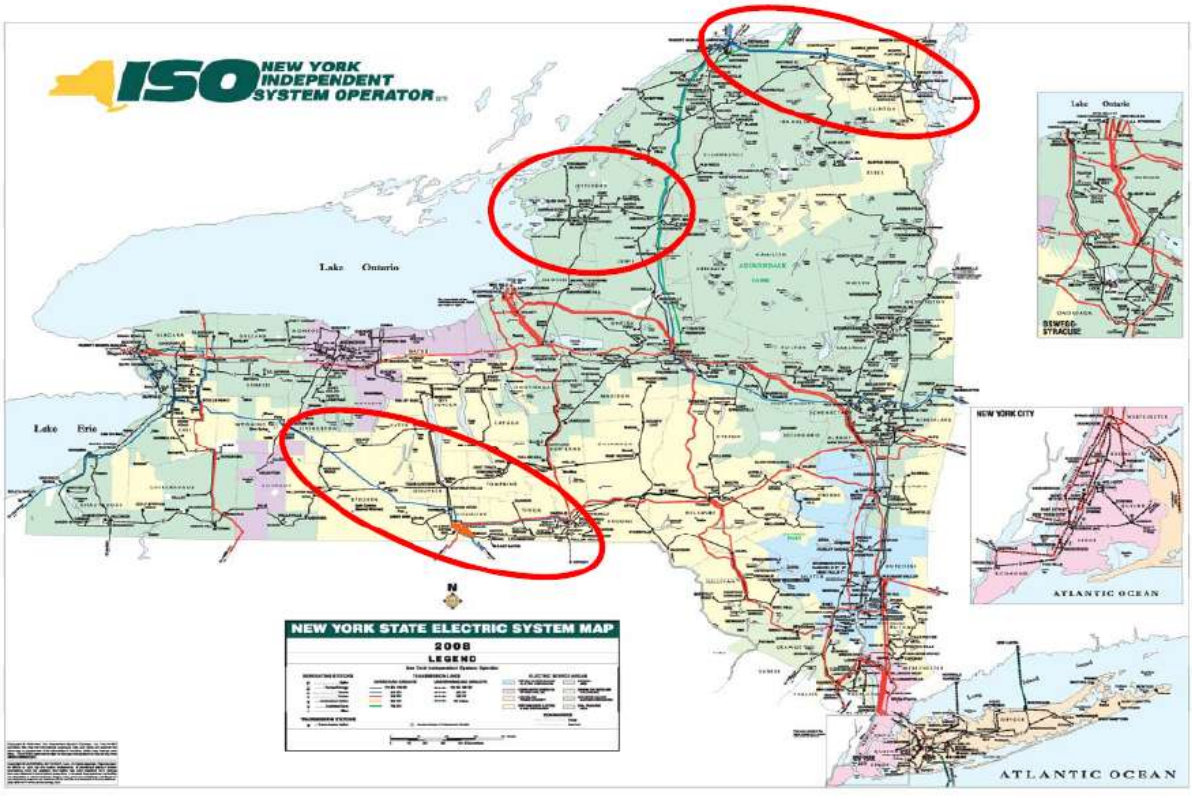
[2] U.S. Department of Energy, 2009, National Electric Transmission Congestion Study




Source: U.S. Department of Energy, 2009, National Electric Transmission Congestion Study

In addition to areas of congested transmission, there are areas in the state where shortfalls in local transmission facilities limit wind farm development, as illustrated on this map from the NYISO:

**Figure 4: New York Transmission Map Displaying (circles) Where Local Transmission Facilities Limit Wind Plant Output**

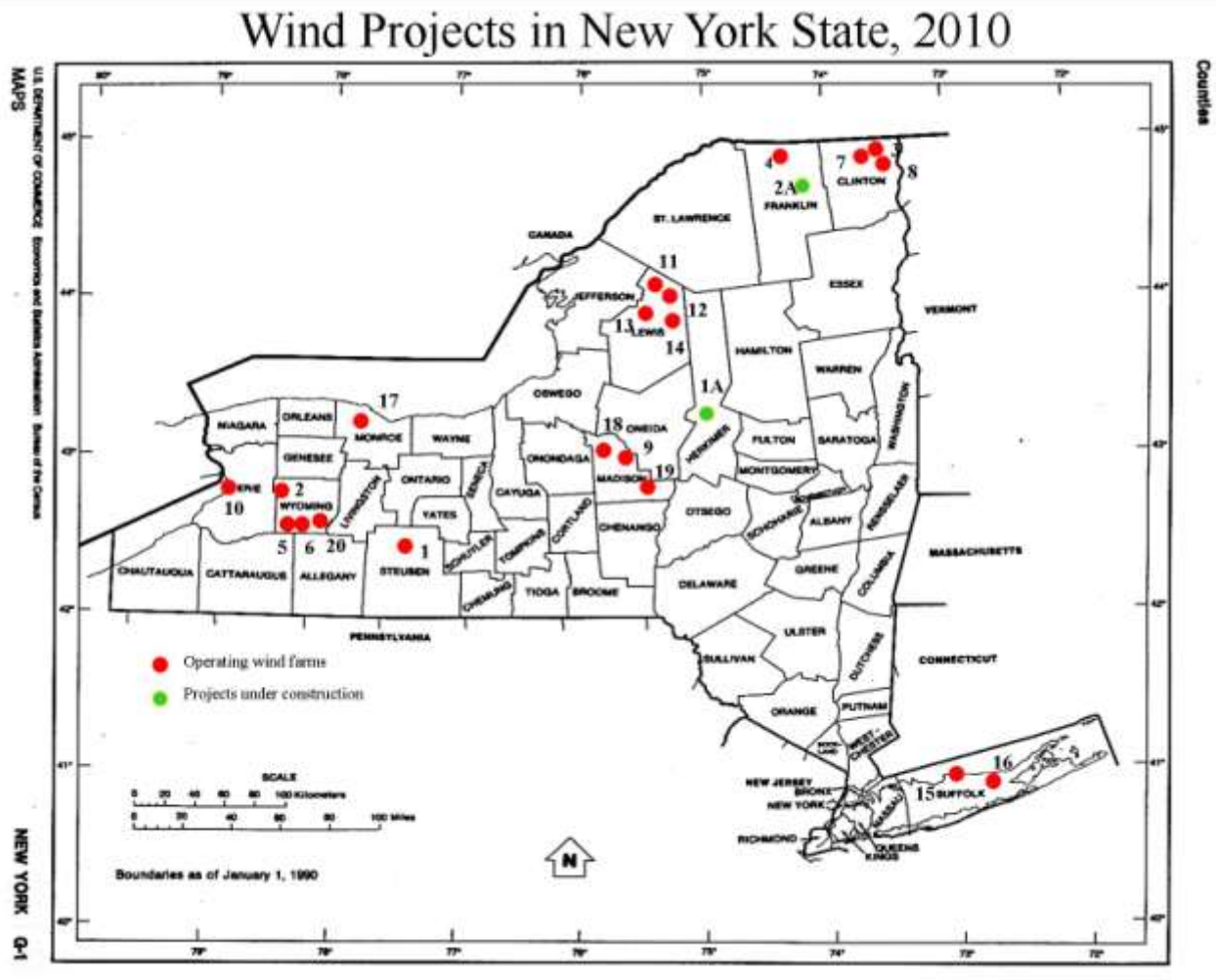



Source: New York State Independent System Operator, "Growing Wind; Final Report of the NYISO 2010 Wind Generation Study."

## 2.2. Installed Utility-Scale Projects

Although wind energy research and wind resource assessments had been previously conducted in New York, commercial development activities were not seriously initiated in the state until the late 1990s. As of December, 2010, 20 utility-scale wind energy projects have been installed in the state. The installed capacity in the state is 1,274.3 MW, which makes New York eighth in the nation for installed capacity. There are two additional projects under construction, representing an additional 95 MW of capacity (Hardscrabble and Bellmont), and several other projects are in the planning stages. Figure 5 shows the location of existing utility-scale wind projects in New York, and Table 1 provides additional details.

**Figure 5**




Source: American Wind Energy Association, Pace Energy and Climate Center

| Table 1–Wind Energy Projects in New York | | | | | |
|---|---|---|---|---|---|
| **Number** | **Name** | **Capacity (MW)** | **Turbines** | **Developer** | **Year Online** |
| 1 | Dutch Hill/Cohocton Wind Farm | 125 | 50 | First Wind | 2009 |
| 2 | High Sheldon Energy | 112.5 | 75 | Invenergy | 2009 |
| 3 | Noble Altona Windpark | 97.5 | 65 | Noble Environmental Power | 2009 |
| 4 | Noble Chateaugay | 106.5 | 71 | Noble Environmental Power | 2009 |
| 5 | Noble Wethersfield | 126 | 84 | Noble Environmental Power | 2009 |
| 6 | Noble Bliss Windpark | 100.5 | 67 | Noble Environmental Power | 2008 |
| 7 | Noble Clinton Windpark | 100.5 | 67 | Noble Environmental Power | 2008 |
| 8 | Noble Ellenburg Windpark | 81 | 54 | Noble Environmental Power | 2008 |
| 9 | Munnsville | 34.5 | 23 | Airtricity | 2007 |
| 10 | Steel Winds Wind Farm | 20 | 8 | UPC Wind/BQ Energy | 2007 |
| 11 | Maple Ridge Wind Farm, phase II | 90.75 | 55 | PPM Energy/Horizon Wind Energy | 2006 |
| 12 | Maple Ridge Wind Farm 1a | 33 | 20 | PPM Energy/Horizon Wind Energy | 2006 |
| 13 | Maple Ridge Wind Farm (2006 portion) | 61.05 | 37 | PPM Energy/Horizon Wind Energy | 2006 |
| 14 | Maple Ridge Wind Farm (2005 portion) | 136.95 | 83 | PPM Energy/Horizon Wind Energy | 2005 |
| 15 | South Holt wind farm | 0.1 | 2 | Long Island Power Authority | 2005 |
| 16 | Calverton | 0.05 | 1 | Long Island Power Authority | 2002 |
| 17 | Harbeck Plastic wind turbine | 0.25 | 1 | Lorax Energy Systems | 2002 |
| 18 | Fenner Wind Power Project | 30 | 20 | Atlantic Renewable Energy | 2001 |
| 19 | Madison Wind Power Project | 11.55 | 7 | Atlantic Renewable/PG&E Generating | 2000 |
| 20 | Wethersfield Wind Power | 6.6 | 10 | Western NY Wind Power Partners | 2000 |
| 1A | Hardscrabble | 74 | 37 | Iberdrola Renewables | UNDER CONSTRUCTION |
| 2A | Noble Bellmont | 21 | 14 | Noble Environmental Power | UNDER CONSTRUCTION |

Note: PPM is now owned by Iberdrola; Source: American Wind Energy Association

# 2.3. Potential for Additional Projects

**Land-based potential**

According to AWEA, New York has a potential wind energy generation capacity of 7,080 MW; it is ranked 15th in the United States for wind energy potential. 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. There are also several companies investigating the feasibility of developing offshore wind energy projects in the Atlantic Ocean, Lake Erie, and Lake Ontario.

Figure 1 shows a wind resource map for New York. The map shows estimated annual average on-shore wind speeds at a height of 230 ft (70 m) above the ground. Knowing the height at which the measurements were made is important, because winds are typically stronger at greater heights, which is why modern, utility-scale wind turbines are much taller than residential-scale turbines. Thus, a 30 meter wind map of New York State would look somewhat different than the 70 meter map shown here.

Wind maps can provide a good general idea of the wind speeds in a given area, but on-site wind measurements, providing much more detailed wind resource information, are necessary to determine whether winds at a specific location are strong and consistent enough to make a wind farm viable. Typically, such on-site measurements are made for at least a year before the viability of a site can be assessed.

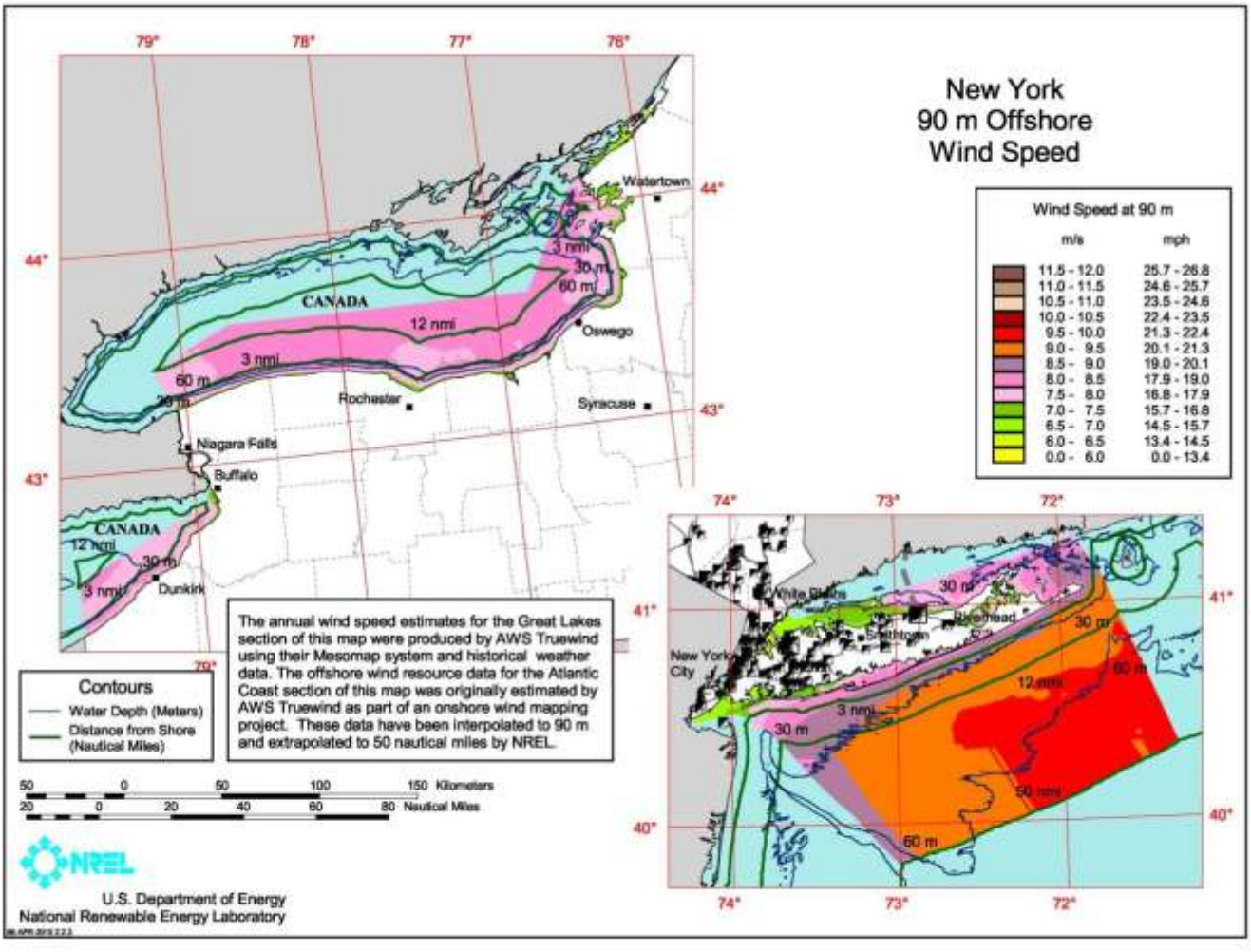
In New York, areas with annual average wind speeds greater than 14.5 mph (6.5 m/s) are considered potentially good for utility-scale on-shore wind energy development. Lower wind speeds may be acceptable for small-scale (residential or commercial) wind generation systems. As wind turbine technology improves, sites with lower wind speeds may become more favorable for utility-scale development.

**Offshore and Great Lakes potential**

As shown in Figure 1, the strongest winds in New York State are offshore, in the ocean off the coast of Long Island, and in Lakes Erie and Ontario. Both the Atlantic continental shelf and the Great Lakes are attractive to wind developers, because of their relatively shallow waters, high wind speeds, and proximity to areas of high electricity demand. Offshore wind turbines tend to be more efficient than onshore turbines, due to the lack of wind turbulence over the water, and offshore winds tend to blow more strongly in the daytime than onshore winds, making offshore wind power more useful for serving daytime peak electricity demand. According to a June 2010 report by the National Renewable Energy Laboratory, New York's Atlantic offshore wind resource alone could amount to 147.2 GW of installed capacity. Figure 6 provides a closer look at this as-yet untapped resource.

Offshore wind development, though common in parts of Europe, has not yet occurred in the United States; it presents engineering challenges different from those associated with onshore wind development, and these challenges make offshore wind turbines more expensive than onshore turbines. There have been, however, a number of proposed offshore wind projects in New York State, both in the ocean and in Lakes Erie and Ontario.

**Figure 6: Offshore Wind Resources in New York State**

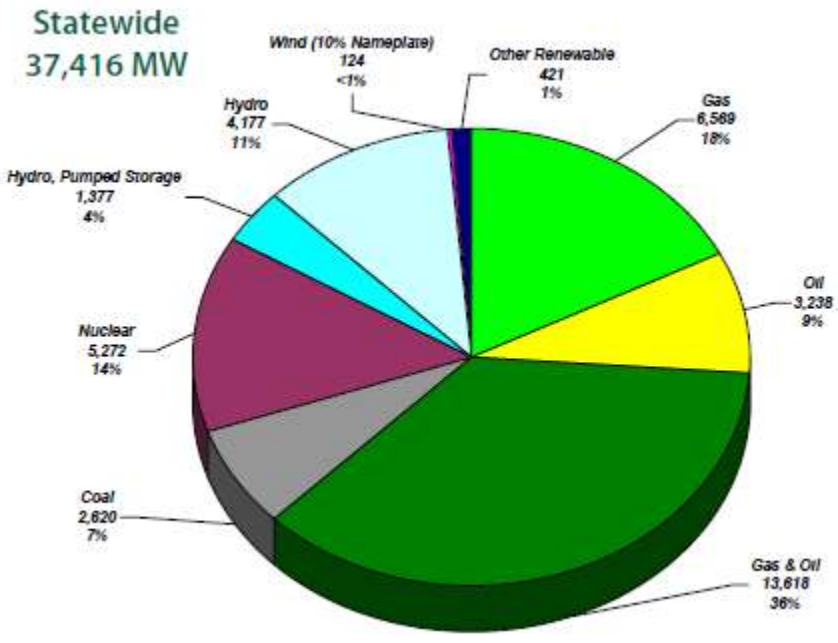



Source: Assessment of Offshore Wind Energy Resources for the United States.
U.S. Department of Energy National Renewable Energy Laboratory Technical Report 500-45889, June, 2010.

**Room to grow**

Because wind energy is an intermittent resource, the percentage of the state's total electricity generation it can reliably supply is limited. However, despite New York State's wind resources, and the substantial development that has already taken place, wind energy still contributes less than 1% to the state's electricity portfolio, as shown in Figure 7. This is much less than could be supplied by wind without causing reliability problems for the grid.

**Figure 7: Generating Capacity in New York State by Fuel Source: 2010**



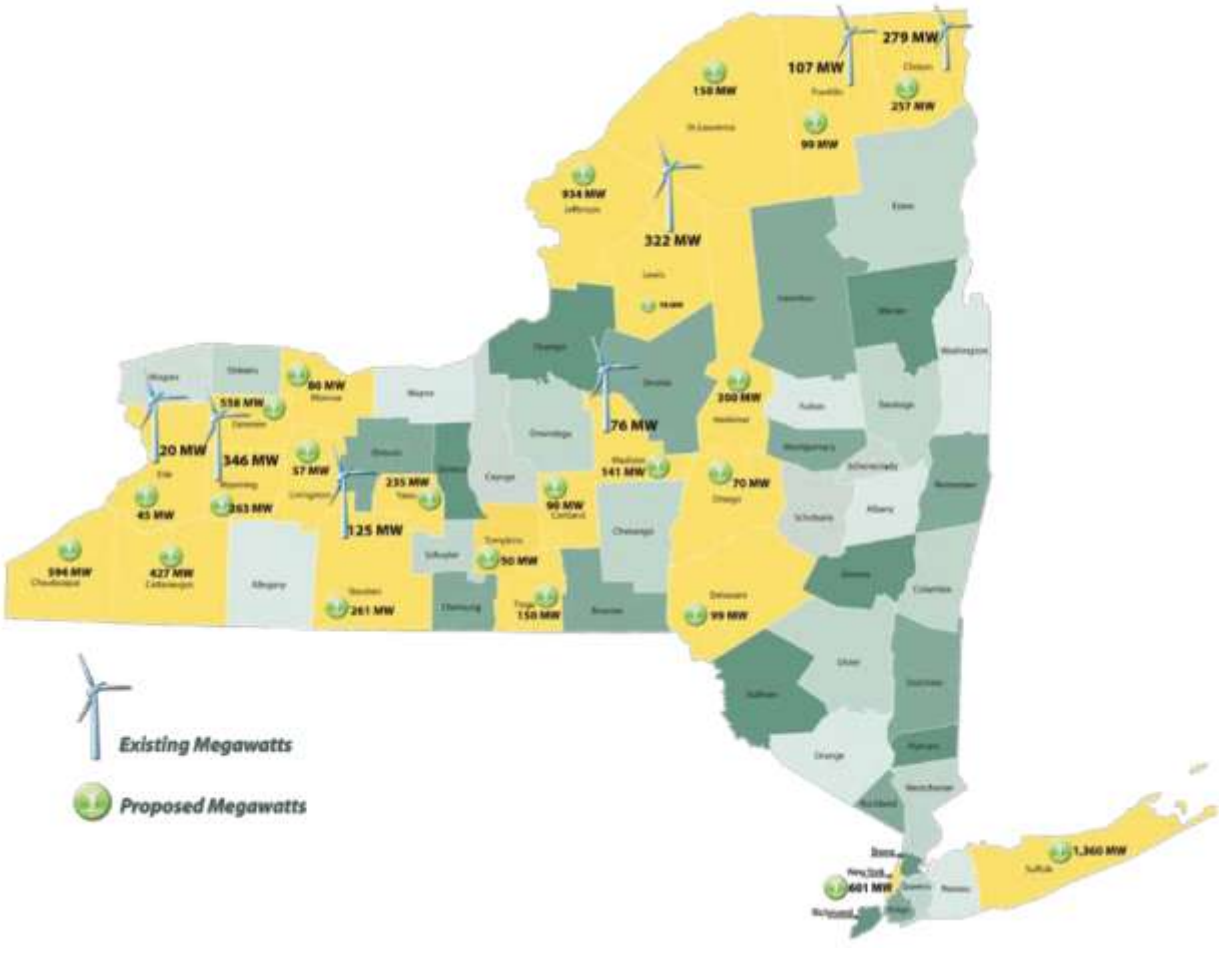

Source: New York State Independent System Operator, "Power Trends 2010"

New York State has taken steps to increase the total portion of its electricity portfolio that can be reliably supplied by wind. In 2008, the New York State Independent System Operator (NYISO) instituted one of the first state-of-the-art wind forecasting systems in the United States, and in 2009, NYISO became the first grid operator to include wind-generated electricity in its economic dispatch (meaning the grid's reliability requirements were fully balanced with the use of the least-cost available power). In a 2010 study, the NYISO found that up to 8 GW (8,000 MW) of wind energy could be added to the grid by 2018 with no adverse impact on system reliability. Eight gigawatts of wind energy would supply in excess of 20% of the state's expected peak load, on a nameplate basis (actual energy contribution would be in excess of 10%).

Developers are actively pursuing wind projects in a number of locations in New York, both on land and offshore. As of December, 2010, there were 47 wind energy projects in the New York Independent System Operator (NYISO) interconnection queue, representing approximately 7,000 MW of additional wind energy.[3] Many of these proposed projects will never be built; however, the state is committed to generating 30% of its electricity from renewable sources by 2015, and the continued development of New York's wind resources is essential to reaching that goal.

**Figure 8: Existing and proposed land-based wind generation in New York State**

[3] The NYISO queue lists the electricity generation projects that have applied for permission to join the State's electricity grid.




Source: New York State Independent System Operator, "Power Trends 2010"