Ocean-based Offshore Wind:
Downstate New York's Local, Scalable and Peak Coincident Renewable Resource

Deepwater Wind's Comments on the Scope for the 2013 New York State Energy Plan

About Deepwater Wind

Deepwater Wind is the U.S. leader in the development of renewable, offshore wind power projects. This status is confirmed by Deepwater's selection, through competitive solicitations, as the preferred developer of offshore wind projects by the states of Rhode Island and New Jersey[1]. In addition, the Block Island wind farm, a 30 MW facility to be located in state waters in Rhode Island, is on schedule to be the first offshore wind plant operational in North America. Deepwater is supported by a group of top-tier investors including an entity of the D.E. Shaw group and First Wind Holdings.

[1] Garden State Offshore Energy, LLC, a joint venture between Deepwater and PSEG Renewables, was selected as a preferred developer by the New Jersey Board of Public Utilities in 2008.

Executive Summary:

With the rapid evolution of the global offshore wind industry and an estimated 5,000-8,000 MW of commercially-viable potential off of downstate New York, ocean-based offshore wind represents New York State's most compelling new source of electric energy. As such, ocean-based offshore wind should be highlighted in the scope of the 2013 New York State Energy Plan. Deepwater's comments highlight: 1) downstate's offshore wind resource, 2) the role of offshore wind in meeting the State's "Energy Needs and Goals" (section 2 of the draft scope) and 3) "Local, Regional, and Federal Action" required to develop this resource (section 9 of the draft scope).

The demand for electric energy and capacity in New York City and its adjacent suburbs in Westchester, Nassau and Suffolk counties, is expected to continue to grow, which will result in the need for new power generation before 2020. For Long Island, this need is demonstrated by the Long Island Power Authority's RFP released in August 2010 seeking new firm capacity during the 2016-2018 timeframe. This need for additional electric energy in New York State's dominant load centers could be accelerated by several factors, such as the retiring of existing power plants as the result of pending air and water quality regulations, and/or an under-realization of the state efficiency targets included in projected load growth numbers.

Ocean-based offshore wind, downstate New York's only local, scalable and peak-coincident renewable resource, is the region's most compelling new source of electricity. The scale of this offshore wind resource is large and robust enough to:

- meet most of New York City and Long Island's new generation requirements;
- significantly contribute to New York's renewable energy goals without imposing large new transmission infrastructure costs (relative to upstate wind, wind in the Midwestern states, or Canadian hydropower);
- supply a valuable new source of peak-coincident generation to the State's vital load centers;
- support the development of a new marine renewable energy industry in New York Harbor and the southern Hudson Valley; and
- address the glaring geographic inequity in New York State's existing RPS program.

Recent technical developments in the offshore wind industry enables, for the first time, this clean source of power to be available to downstate New York customers at a cost that is competitive with new downstate fossil-based alternatives (net of all consumer costs and benefits) and at a lower cost than any alternative large-scale renewable project. This next generation of offshore wind projects provides this cost-competitive energy without creating a visual impact on New York's coastal communities; while at the same time providing important local benefits including a new marine renewable energy industry with jobs for New Yorkers, reduced air and water pollution, and energy market price suppression.

Due to the long lead times required to permit and develop offshore wind, New York must act in the near-term for this offshore wind resource to contribute to downstate's electric generation needs and the State's renewable energy goals. New York's neighboring states are actively developing this local resource and have been identified by the federal government as priority areas for offshore wind development. Offshore wind serving downstate New York cannot be developed without the State's support and action in two key areas:

1) **Creation of Appropriate Revenue Mechanism(s)**
    - encourage downstate regulated and public load serving entities – Con Edison, Long Island Power Authority, and the New York Power Authority – to release a RFP to evaluate real downstate offshore wind project proposals; and
    - create a separate tier within New York's RPS for downstate renewables.

2) **Support for Leasing and Permitting of Federal Submerged Lands off of Downstate New York**
    - engage with the U.S. Department of Interior's Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) to prioritize federal leasing and permitting for New York's adjacent waters.

1. Offshore Wind – Downstate New York's Local, Scalable and Peak Coincident Renewable

Local. Offshore wind is the downstate New York's abundant, local renewable resource. The U.S. Department of Energy estimates that the U.S.'s mid-Atlantic region has nearly 300,000 MW of offshore wind potential over ocean water that is less than 100 ft. deep and an additional 180,000 MW in waters that are between 100 and 180 ft. deep.[2] As depicted in Figures 1 and 2, there is an outstanding, commercial-grade offshore wind resource in close proximity to New York City and Long Island.

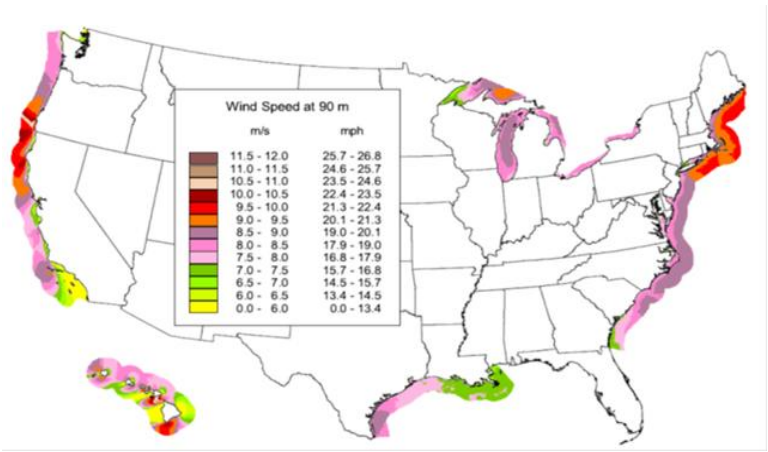


Figure 1: *Northern Mid-Atlantic has strong offshore wind resource. (Source: U.S. DOE)*

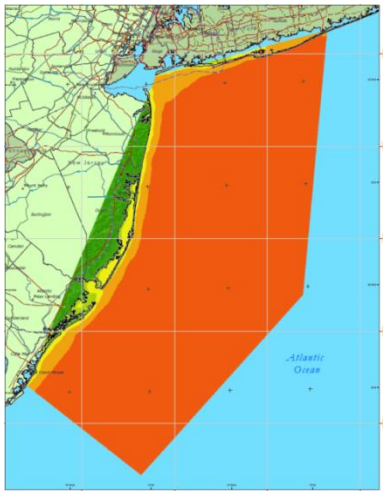


Figure 2*: Commercial grade offshore wind resource in close proximity to Downstate NY.*

Scalable. Deepwater has been developing offshore wind in downstate New York since 2005, and in this time has completed a comprehensive set of offshore wind feasibility studies[3]. Based on this analysis, Deepwater estimates that between 5,000 MW and 8,000 MW of offshore wind could be cost-effectively developed to serve downstate New York. This commercial potential assumes the use of turbine and jacket foundation technologies that are commercially available today and are successfully operating in European offshore wind projects and that offshore wind projects are located:

- more than 15 miles from shore to minimize visual impacts on coastal communities;
- in waters that are less than 180 feet deep;
- in areas that have suitable soil types; and
- away from shipping channels and environmentally sensitive or alternative use areas.

New York City and Long Island's electricity system is currently adequate to physically accept a significant amount of ocean-based offshore wind energy. NYISO analysis determined that at least 1,400 MW of offshore wind could be injected into New York City and Long Island without the need for transmission upgrades.[4] Other renewable energy technologies would face significant challenges in generating a comparable quantity of renewable energy in the densely populated downstate New York region.

Peak Coincident. Ocean-based offshore wind is strongest during hours when east coast cities most need energy. NYSERDA's analysis of downstate New York's offshore wind resource indicates that wind speeds are highest in the late

[2] US Department of Energy. A National Offshore Wind Strategy: Creating an Offshore Wind Energy Industry in the United States. Feb. 2011.
[3] Deepwater's feasibility studies addressed wind resource and energy production potential, geophysical, geotechnical and construction feasibility, environmental and alternate / conflicting uses
[4] Growing Wind: Final Report of the NYISO 2010 Wind Generation Study. September 2010

afternoon, when New York City and Long Island loads are at their peak (see Figure 3). This analysis indicates that offshore wind may be a valuable resource in meeting peak demand in load pockets in New York City and Long Island.

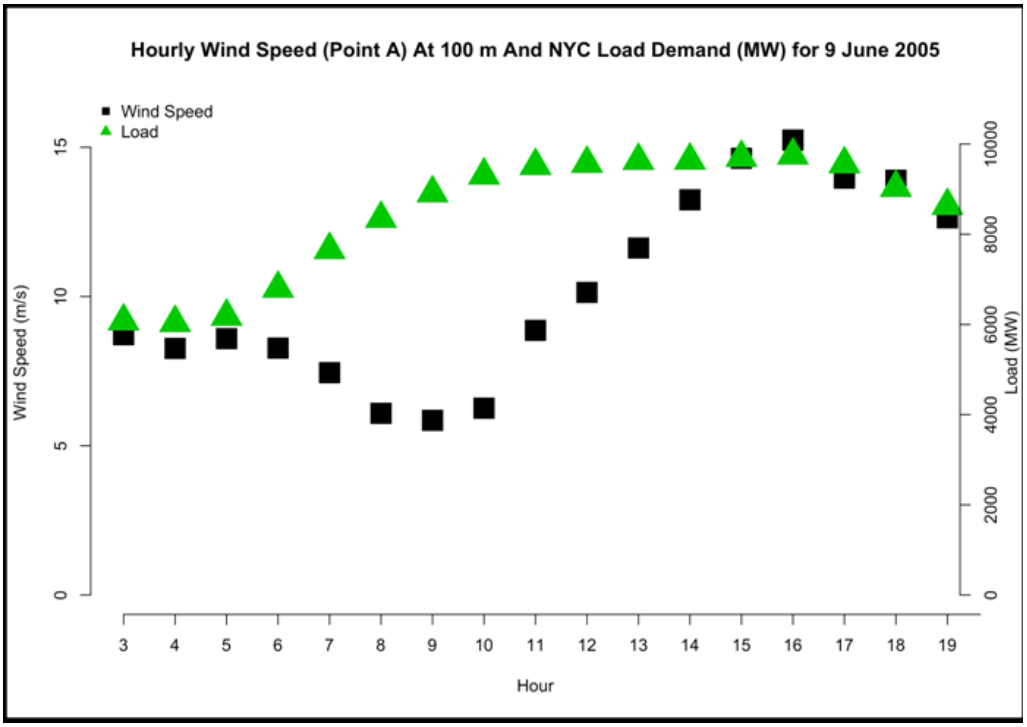


Figure 3: *Downstate offshore wind speeds are strongest when demand for electricity is highest in New York City (Source: NYSERDA, 2010 see citation 5))*

The strong peak coincidence of downstate offshore wind provides a considerable advantage over inland wind sites in New York. These inland sites in New York have both seasonal and daily patterns of wind generation that are largely out of phase with New York's load patterns.[5] As such, offshore wind projects generally generate renewable electricity at periods of higher demand compared to inland wind projects – resulting in electricity that is more valuable and more likely to displace higher priced, less-efficient generators in downstate New York.

2. Recent Technical Advances Combined with Important Project Benefits Make Offshore Wind Downstate New York's Most Compelling New Generation Option

2.1 Technical Evolution Makes Offshore Wind Cost-Competitive and With Minimal Visual Impact

Europe has been developing offshore wind projects for over twenty years. During this time, Europe has installed 1,136 offshore turbines, totaling 2,946 MW across 45 projects in 9 countries.[6] According to the European Wind Energy Association, at least 3,000 MW of new offshore capacity is currently under construction and 19,000 MW of additional capacity has been approved and contracted.[7] Recently, the European market has evolved to use larger wind turbines (see figure 4) in larger scale projects (upwards of 1,000 MW) that are farther from shore.

[5] NYSERDA. Pre-Development Assessment of Meteorological and Oceanographic Conditions for the Proposed Long Island – New York City Offshore Wind Project Area. Final Report 10-22 Task 2 October 2010

[6] European Wind Energy Association Statistics (2010)

[7] European Wind Energy Association Website: www.ewea.org (accessed on 4/28/2011)

The European financial community has demonstrated its willingness to invest in these larger next-generation turbines. Over $2.3 billion of offshore wind projects were financed in 2010[8]; with a significant percentage of these projects planning to use turbines of 5 MW or larger. Additionally, just in the first quarter of 2011, Deepwater has received information from several of the leading offshore turbine manufacturers that they plan to introduce new offshore turbine models during the 2012-2013 timeframe with capacities of 6-8 MW. Since offshore turbine components are primarily manufactured and assembled on waterfront locations, and transported via large vessels, the maximum potential size of the technology is only limited by material science. This provides an advantage over onshore turbines that are limited in size by the feasibility of transporting blade, nacelle, and tower components over land.

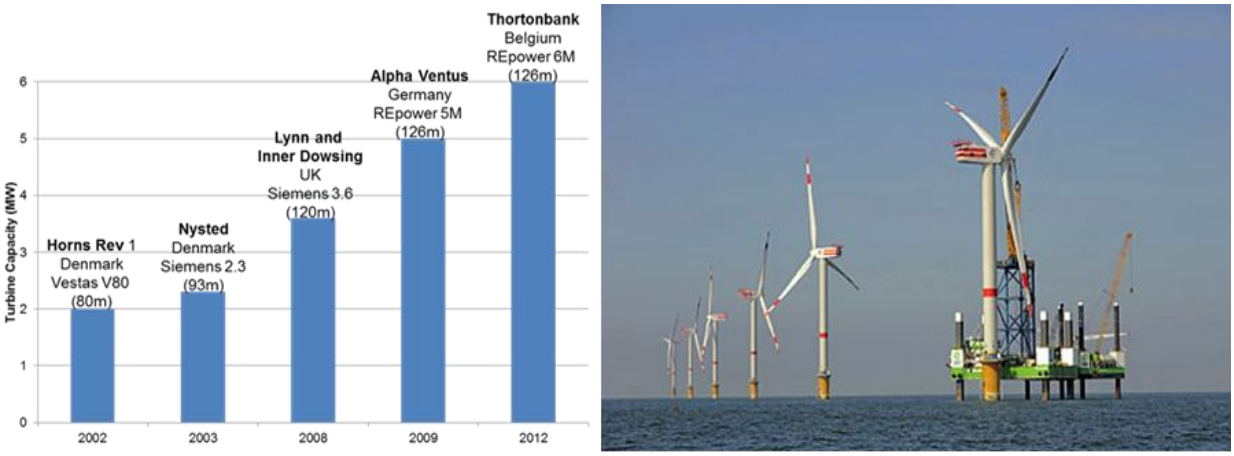


Figure 4: *Europe's more mature offshore wind industry is trending toward larger scale turbines that provide economies of scale. Turbine rotor diameter provided for each turbine. Germany (Alpha Ventus) and Belgium's (Thorton Bank, installation pictured on right) first offshore wind farms successfully utilize larger-scale turbines (5MW or larger).*

Larger turbines, larger projects and increased global competition among turbine suppliers are reducing the price of energy from offshore wind to be cost-competitive with other sources of new generation in downstate New York. Deepwater is developing projects that utilize these larger, more efficient turbines to serve New York City and Long Island.

Deepwater's projects in downstate New York will be barely visible from the coast, with most turbines located greater than 20 miles from shore. Figure 5 depicts the visual impact of wind turbines by distance from shore. At greater than 20 miles from shore, in addition to being unobtrusive to coastal communities, Deepwater's projects take advantage of the stronger winds found in the open ocean.

[8] Green Giraffe Energy Bankers. Project finance for offshore wind – some lessons from Europe. Offshore Wind Power Conference Presentation. February 1-2 2011, Boston, US.

Figure 5: *Most turbines in Deepwater's downstate New York projects will be located greater than 20 miles from shore.*

In addition, Deepwater is developing a regional submarine transmission network that will allow offshore wind farms to simultaneously supply wind-generated energy to downstate New York and several surrounding states. The benefits of utilizing offshore transmission networks are numerous including reduced wind energy prices as a result of being able to build larger wind farms, reduced transmission capacity prices as a result of higher utilization rates on the transmission lines, and increased reliability benefits resulting from the ability to control the flow of power over a HVDC line and the ability to firm up intermittent wind power with imported power from other markets.[9]

Taken together, Deepwater's projects represent a next generation of offshore wind generation that is cost-competitive (net of benefits) with other sources of new generation or transmission in the densely populated and transmission constrained northeast. In addition, as outlined in the next section, Deepwater's projects create important benefits for New Yorkers that differentiate offshore wind projects from fossil based generation and transmission alternatives.

2.2 Benefits from Offshore Wind Projects

Benefits that differentiate downstate offshore wind projects from other sources of fossil-based new generation include 1) supporting New York's renewable energy goals, 2) establishing a new marine energy industry for New York that has important economic development opportunities and 3) potentially displacing expensive and polluting downstate generators with renewable energy.

2.2.1 Supporting New York's Renewable Energy Goals

New York State has a long history of leadership on the responsible development of its natural resources to meet environmental, economic and energy security goals. A prime example is New York State's Renewable Portfolio Standard (RPS), which seeks to generate 30% of the electricity consumed in New York from renewable sources by 2015. As of April 2010, in support of the RPS, NYSERDA had contracted with 1,365.5 MW of upstate inland wind (13 projects), 36.9 MW of hydroelectric (19 projects) and 129.7 MW of biomass (6 projects).[10] Figure 6 depicts the total renewable generation contracted by RPS solicitations through April 2010. In total, these projects are expected to generate approximately 44% of New York's 2015 main tier target. Over the next five years, New York State must more than equal

[9] Deepwater Wind received a grant from NYSERDA to produce a study that would evaluate various offshore transmission network technologies and design elements. Deepwater anticipates finalizing that study in summer 2011.

[10] NYSERDA. New York State Renewable Portfolio Standard Performance Report. Program period ending April 2010.

the efforts of the last five years in order to meet the State's 2015 RPS goals and begin to develop resources to meet RPS goals beyond 2015.

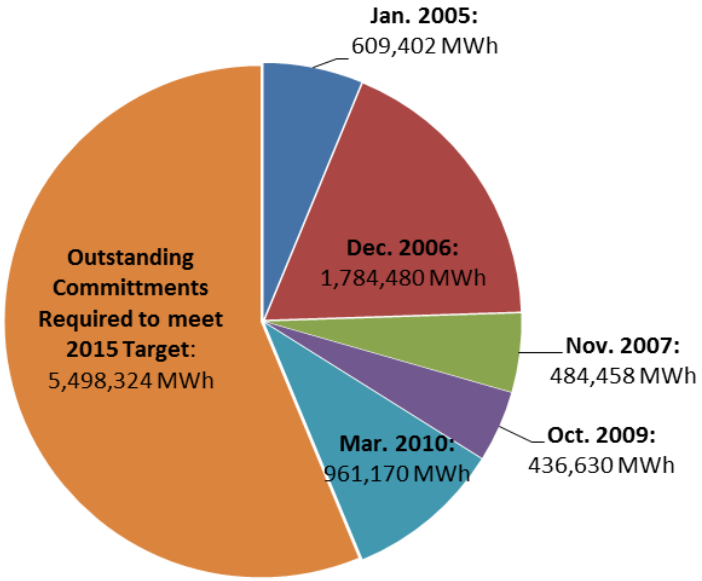


Figure 6: *NYSERDA's first five RPS solicitations have resulted in contracts for approximately 44% of New York's 2015 RPS goal. New York still needs to contract for 5,498,324 MWh of renewable energy – requiring more than equal the effort of the last five years to meet the 2015 target.*

New York's strategy to date has relied on upstate inland wind and, to a lesser extent, small-scale hydropower, to meet New York's RPS goal. Yet with so many prime upstate inland wind locations already developed, the cost of siting, permitting and constructing future utility-scale inland wind farms and associated transmission required to deliver this renewable energy to downstate New York is uncertain, and likely to be more expensive.[11]

Offshore wind – downstate's local, scalable and peak coincident renewable resource – provides a compelling compliment to upstate resources. Downstate offshore wind requires minimal transmission to deliver a significant amount of peak coincident renewable energy to New York City and Long Island. Figure 7 provides an illustrative analysis of the contribution of a downstate offshore wind project, of varying size, on the outstanding renewable generation required to meet the 2015 RPS goal.[12] Offshore wind project sizes in Figure 7 are a small fraction of the estimated 5,000 to 8,000 MW of medium-term offshore generation potential off of downstate New York.

[11]New York Renewable Portfolio Standard Market Conditions Assessment. Final Report. Prepared for The New York State Energy Research and Development Authority. Prepared by Summit Blue Consulting, LLC. February 19, 2009

[12] An offshore wind farm contracted prior to 2015 would contribute to the 2015 RPS goal while an offshore wind farm contracted after 2015 would contribute to future New York State renewable energy goals.

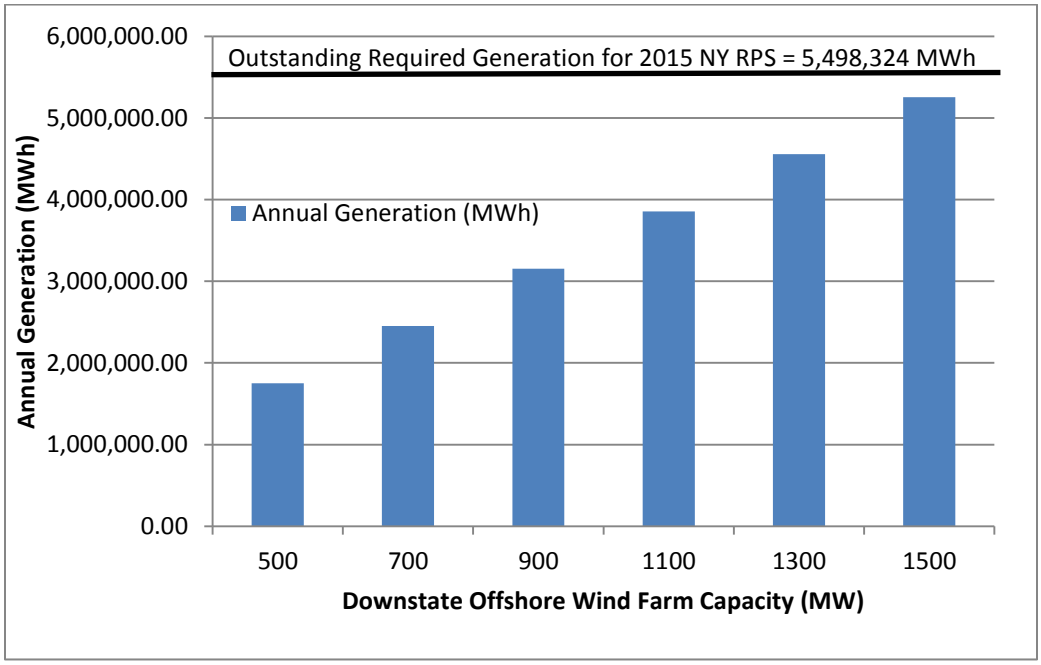


Figure 7: *Illustrative generation of an offshore wind farm (assumed capacity factor of 40%). Outstanding generation required for 2015 New York State RPS is included for reference.*

In addition, a downstate offshore wind farm would support geographic equity in New York's RPS. Currently, the RPS is funded by a surcharge paid by ratepayers of the State's five largest investor owned utilities, with support provided in approximately equal proportion from upstate and downstate ratepayers. In the first five RPS solicitations, approximately 97% of renewable generation was contracted for resources located in upstate New York.[13] Figure 8 provides an illustrative analysis of the contribution of a downstate offshore wind project on the geographic sharing of benefits in the RPS program. In Figure 8, the column on the left represents contracted generation from the first five RPS solicitations, where approximately 97% of renewable generation was contracted in upstate New York. Columns 2 through 7 in Figure 8 represent the contribution of a downstate offshore wind project on the RPS goal and geographic equity of the RPS program. For instance, the fifth column from the left, shows that the first 5 RPS solicitations plus a 1,100 MW downstate offshore wind project would allow New York to meet over 80% of its 2015 RPS goal and create an even split of RPS benefits between upstate and downstate New York (matching the approximately even split of funding for the program).

[13] NYS PSC Case 03-E-0188 – Proceeding on Renewable Portfolio Standard Proposed Rulemaking Published in the New York State Register on October 7, 2009. "Comments of Consolidated Edison Company of New York, Inc. And Orange and Rockland Utilities, Inc.

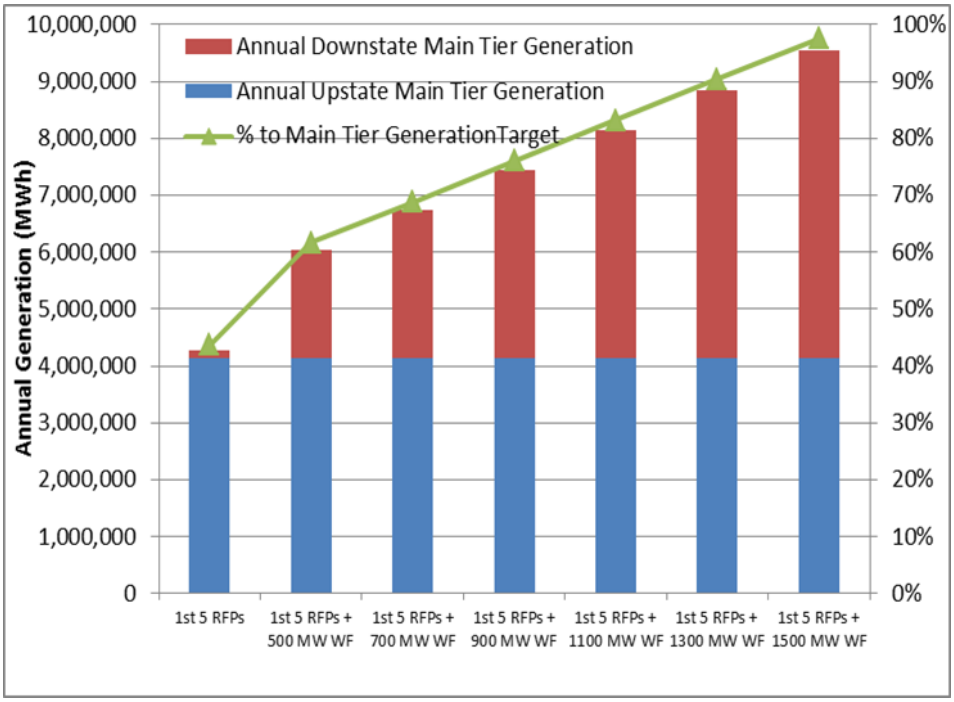


Figure 8: *Downstate offshore wind could help New York to meet its RPS goal while promoting geographic equity between upstate and downstate New York.*

In helping New York State equitably achieve its RPS goal, downstate offshore wind will provide economic development benefits to downstate communities and displace downstate New York's most expensive and polluting generators.

2.2.2 Economic Development

Renewable energy projects provide significant economic development benefits to local communities. NYSDERA[14] has quantified local economic development benefits from the New York State RPS. As demonstrated in Figure 9, economic development benefits are concentrated in upstate New York where the majority of renewable energy projects are currently located.

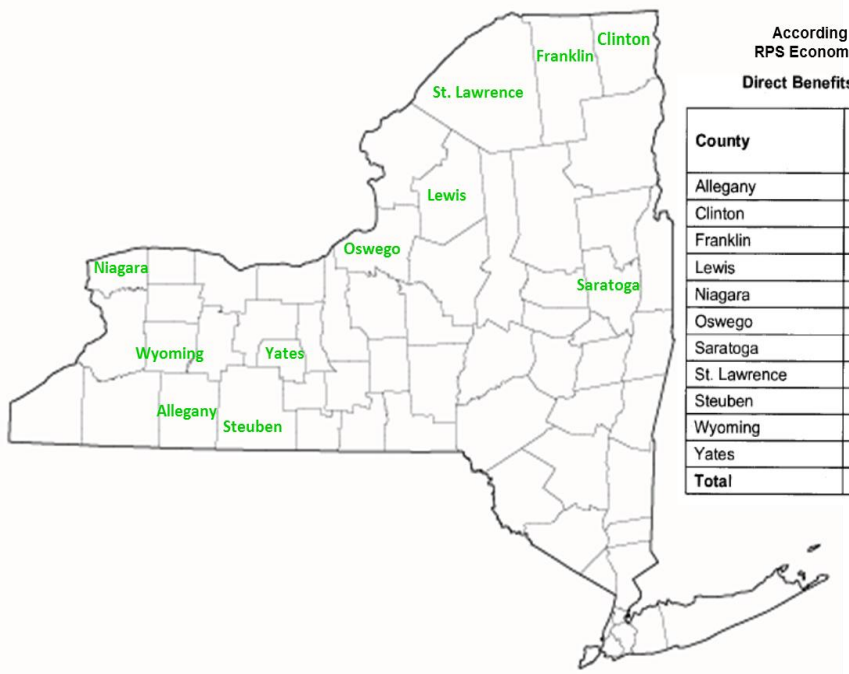
Developing New York's ocean-based offshore wind resource would establish a new marine renewable energy industry for downstate New York that has important economic development benefits. Europe's more mature offshore wind industry illustrates the potential scale of job growth in the U.S. The European Wind Energy Association forecasts that employment driven by offshore wind in Europe will increase from 6,370 employed in 2007 to 215,637 employed in 2030.[15] In addition, a significant percentage of offshore wind jobs are created near the project site. Local jobs are required for project execution, which includes pre-assembling components of the wind farm, on-site project management, installing the turbines and commissioning the project. In addition, local jobs are required for the long-term operations and maintenance of the offshore wind project.

For downstate New York, the construction and operations of a single utility-scale offshore wind project is expected to create hundreds of new jobs in the region. Specifically, the project will create logistics and port operations jobs, onshore marshaling, offshore construction and installation jobs and long-term operations and maintenance jobs. Figure 10 depicts the scale of the components utilized in next generation offshore wind projects, indicating the technology, labor and investment in local communities that are required to stage, install and operate an offshore wind project. Developing

[14] NYSERDA Main Tier RPS Economic Benefits Report, Prepared for NYSERDA by KEMA, Inc. Nov. 2008.

[15] European Wind Energy Association. Wind at Work: Wind Energy and Job Creation in the European Union. January 2009.

downstate's local offshore wind resource is aligned with downstate New York's vision for supporting a working waterfront as a vital part of the region's economy.[16]



According to NYSERDA's RPS Economic Benefits Report

Direct Benefits by County, 2006$

County	Total Direct $ (from Construction to end of facility life)
Allegany	$108,686,180
Clinton	$444,448,284
Franklin	$335,395,539
Lewis	$486,099,036
Niagara	$75,162,697
Oswego	$1,129,519
Saratoga	$3,525,356
St. Lawrence	$8,995,883
Steuben	$254,618,093
Wyoming	$304,685,275
Yates	$33,950,774
Total	**$2,064,621,293**

Figure 9: *Local economic development benefits from New York State's RPS program are concentrated in upstate New York where the vast majority of New York State's renewable energy projects are located.*

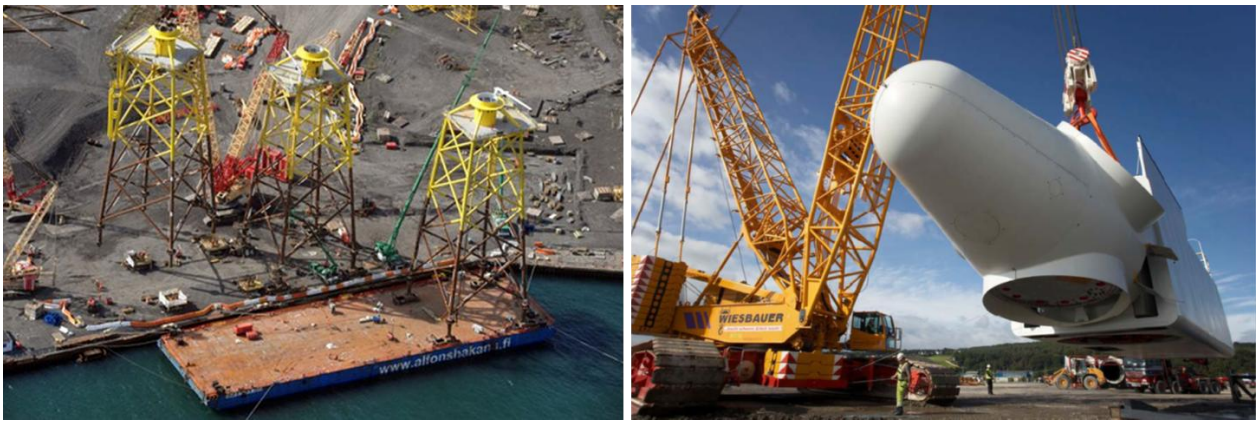


Figure 10: *The pre-assembly, staging, installation and operations and maintenance of an offshore wind project require a significant investment in local communities, creating important local economic development benefits.*

2.2.3 Potential Displacement of Downstate New York's Most Expensive and Polluting Generators

Renewable energy projects introduce a new source of near-zero marginal cost generation into the wholesale power market. This displaces higher variable-cost sources of energy and, because the hourly price of power is set by the most expensive plant dispatched, will lower the market price for all electricity produced during that period. Since the vast majority of New York's renewable energy projects are located upstate, this benefit is currently concentrated upstate.

[16] Vision 2020. New York City Comprehensive Waterfront Plan. New York City Department of City Planning. 2011.

Based on analysis[17] from the New York State Department of Public Service, as depicted in Figure 11, rate payers for all upstate investor owned utilities are expected to save more than $0.0015 / kWh (for all kWh of electricity delivered over the life of the RPS program). Con Edison's ratepayers are expected to receive a price suppression benefit of only one-half as much as the statewide level.

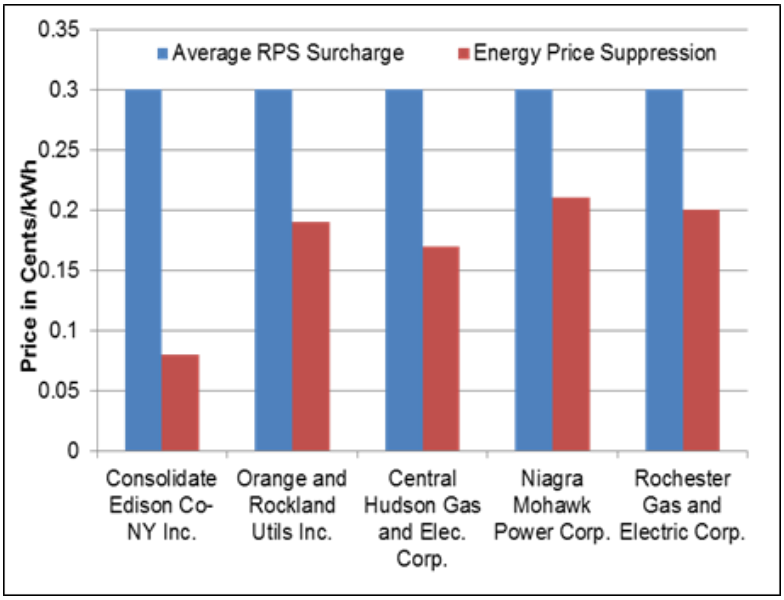


Figure 11: *Ratepayers of upstate IOU's receive considerable energy prices suppression benefits from the State's RPS. Downstate ratepayers (Consolidated Edison) receive considerably less of this local benefit.*

A downstate offshore wind project will inject a significant quantify of near-zero marginal cost generation into New York City and/or Long Island, effectively displacing higher-marginal cost fossil fuel generation and lowering the electricity market price. Deepwater estimates, based on a study prepared by Charles River Associates, that the consumer savings for Con Edison rate payers of a utility-scale offshore wind project that utilizes current turbine technology and delivers power directly into Zone J would be $0.0018 / kWh, or approximately 20% greater than the consumer savings forecasted for upstate rate payers as described in Figure 11. This would result in total price suppression benefits for Con Edison rate payers of approximately $185 million annually. These higher price suppression benefits for downstate customers are both a result of offshore wind's higher coincident peak and the higher prevailing energy market prices in downstate NYISO zones.

By displacing these higher-marginal cost fossil fuel generation sources with renewable energy, a downstate offshore wind could also significantly reduce the criteria pollutant emissions in New York State. Deepwater Wind estimates based on another Charles River Associates study, that a utility-scale offshore wind farm utilizing commercially available technologies and delivering power directly into Zone J would reduce New York State's NO_x emissions by 1.9%, SO_x emissions by 0.9%, Hg emissions by 0.8% and carbon emissions by 2.5%. Additionally, depending on the point(s) of interconnection for the transmission line from the wind project, localized emission reduction rates in specific generation pockets in the City, which frequently are low-income communities with above average asthma rates[18], could be considerably greater.

[17] Bill Impacts of RPS Options. Presented by Tom Rienzo. NYS Dept. of Public Service. Note: Analysis is based on the 30% Post-EEPS-With $24 million PV scenario as consistent with expected structure of the RPS program.
[18] New York Lawyers for the Public Interest

3. New York Must Act Now for Offshore Wind to Contribute to New York's Energy Needs and Goals

Recent technical advances and considerable benefits make offshore wind a compelling new source of generation for the U.S. Northeast. Atlantic Ocean states from Virginia to Maine, supported by the U.S. federal government, are moving aggressively to develop their local Atlantic offshore wind renewable resource.

For example, in November 2010, the U.S. Department of the Interior's Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) created the "Smart from the Start" Initiative to identify priority Wind Energy Areas (WEAs) for potential development and to accelerate the leasing process.[19] BOEMRE has identified areas off the coast of New Jersey, Maryland, Delaware and Virginia as the first set of priority WEAs in February 2011. BEOMRE is expected to identify areas off the coast of Massachusetts and Rhode Island as WEAs in spring 2011.

Mid-Atlantic and New England states are also creating the necessary revenue processes to support offshore wind. For example, Massachusetts and Rhode Island have passed legislation that allows utilities to seek long-term contracts with offshore wind projects.[20] In addition, New Jersey has created a carve out in the State's RPS for offshore wind and Delaware and Virginia have applied a multiplier, 350% or 300% respectively, for offshore wind based renewable energy credits toward each state's RPS. Specific offshore wind planning, revenue, and permitting milestones by states with WEAs are provided in Figure 12, with New York State (currently without a WEA) included for reference.

Due to the long lead times required to permit and develop offshore wind projects, which Deepwater estimates could be 6-8 years without the benefit of BOEMRE's accelerated leasing initiative, New York must act in the near term for this offshore wind resource to contribute to downstate's new electric generation needs and the State's renewable energy goals. Offshore wind serving downstate New York cannot be developed without the State's support and action in two key areas:

1) **Creation of an Appropriate Revenue Mechanism(s)**
   - encourage downstate regulated and public load serving entities – Con Edison, Long Island Power Authority, and the New York Power Authority – to release a RFP to evaluate real downstate offshore wind project proposals; and
   - create a separate tier within New York's RPS for downstate renewables.

2) **Support for Leasing and Permitting of Federal Submerged Lands off of Downstate New York**
   - engage with the U.S. Department of Interior's Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) to prioritize federal leasing and permitting for New York's adjacent waters.

[19] U.S. Department of Energy Press Release describing the initiative is found at: http://www.energy.gov/news/10053.htm
[20] Massachusetts Green Communities Act (2008) and Rhode Island's Long-Term Contracting Standard for Renewables (2009)

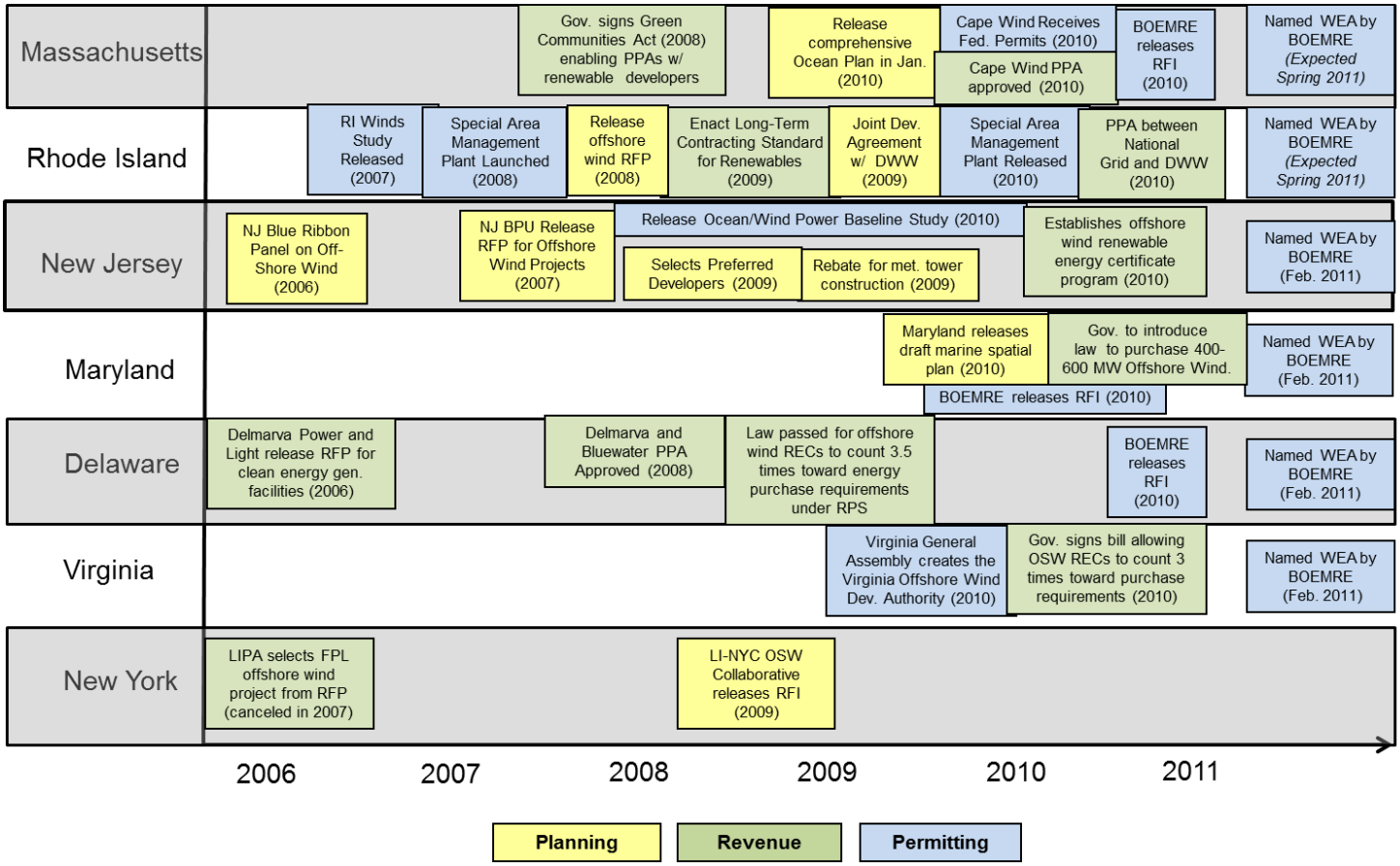


Figure 12: *Offshore Wind Development Milestones for State's that have WEAs. New York State, currently without a WEA, is included for reference.*