

Case 14-M-0094, Proceeding on Motion of the Commission to
Consider a Clean Energy Fund

Clean Energy Fund Investment Plan: Large-Scale Renewables Chapter

Portfolio: Market Development

Submitted by:

The New York State Energy Research and Development Authority

April 29, 2016

7 Large-Scale Renewables

NYSERDA seeks to bolster the development of Large Scale Renewables (LSR), including on-land renewable resources and offshore wind (OSW), to bolsters progress toward Governor Cuomo's Clean Energy Standard mandating that 50 percent of all electricity consumed in New York by 2030 result from clean and renewable energy sources. NYSERDA's approach to promote the development of these valuable resources focuses on enabling additional penetration of technologies currently installed in New York while also supporting the development of new renewable resources and projects.

NYSERDA aims to build on the success of nearly 2,000 MW achieved through the Renewable Portfolio Standard by implementing critical market development activities to enable the development of further large scale resources. This work will be designed to help New York achieve its Clean Energy Standard.

The first initiatives described in this Chapter will focus on reducing the cost of OSW in New York, as New York has stated its intention to work toward a meaningful long-term commitment to develop the OSW resource to maximize the energy, climate, and economic value. Progress overseas and current market conditions make this an optimal time to advance the development an OSW industry and generation projects in New York State. OSW is a significant source of renewable energy in Europe with over 11,000 MW installed as of the end of 2015. The OSW industry in Europe is also making progress in reducing the costs. Further significant cost reductions can be achieved for New York if planning and pre-development activities commence in the near term.

The first initiative is to develop an OSW Master Plan as called for by Governor Cuomo in his 2016 State of State. The plan will provide a comprehensive State roadmap to advance OSW in a manner that is sensitive to environmental, maritime and social issues. The plan will also prioritize in-field pre-development activities that the State may undertake that will reduce the costs of OSW development. A complementary second initiative for the implementation of the pre-development activities includes collecting and analyzing field data and other site assessment work that will reduce risks and costs for this important resource.

Program investments and activities will be informed via engagement with stakeholders and subject matter experts.

7.1 Offshore Wind Master Plan

7.1.1 Overview

Present Situation	<ul style="list-style-type: none">• Governor Andrew M. Cuomo, in his 2016 State of the State address called for the creation of a New York Offshore Wind Master Plan.• Market conditions and international progress makes it an optimal time to develop an Offshore Wind (OSW) Master Plan for NYS as requested by Governor Cuomo which can ensure that New York is prepared for OSW development in a timely manner.
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	<ul style="list-style-type: none"> • OSW represents an essential renewable energy resource for New York State toward achieving its State Energy Plan targets and Clean Energy Standard (CES) mandate that half of New York State’s electricity will come from renewable resources. • New York is leading a regional collaboration funded by the Department of Energy, which includes Maine, Massachusetts, New York, and Rhode Island, with a goal to explore the potential for mutual action to develop offshore wind at the scale necessary to reduce costs by achieving economies of scale and establishing a regional supply chain. • According to the National Renewable Energy Laboratory, New York State (NYS) has 39 GW of gross offshore wind capacity potential between 12 and 50 nautical miles from its shores and in waters less than 200 feet deep, where the turbines would have minimal visual impact and can utilize proven bottom-fixed technology.¹ • Despite a strong level of interest and multiple leases for OSW areas, there are no OSW farms in New York or the US, except for a 30 MW project under construction in Rhode Island. • To date, BOEM has awarded eleven commercial offshore wind leases, including nine through its competitive lease sale process (two offshore Rhode Island-Massachusetts, two offshore Massachusetts, two offshore Maryland, two offshore New Jersey and one offshore Virginia). • On March 16, 2016, the Department of Interior announced that the Bureau of Ocean Energy Management had identified New York’s first offshore Wind Energy Area (WEA). The proposed lease area is south of Long Island, approximately 12 nautical miles from the closest point of land and will be able to accommodate up to 1 gigawatt of offshore wind generating capacity, enough to power over 500,000 homes.² BOEM has publically stated it intends to hold a lease auction for the NY WEA before the end of calendar year 2016. • While large amounts of OSW have been built in Europe and OSW suppliers, contractors and developers in Europe are making excellent progress in reducing costs, the costs of OSW have limited the development of OSW in the US. • For OSW to be a viable solution for New York at scale, market barriers including costs must be reduced.
Intervention Strategy	<p>NYSERDA in conjunction with the NYS Department of State and other state agencies will engage community members, environmental advocates, the maritime community, industry, tribes and government partners at all levels to develop a New York Offshore Wind Master Plan (Plan) that will provide a comprehensive state roadmap to advance Atlantic offshore wind in a manner that is sensitive to environmental, maritime and social issues in a cost effective manner that maximizes environmental and economic benefits. Elements of the Master Plan will include the identification and publication of: (1) site identification and leasing strategies; (2) site assessment and site characterization pre-development activities; (3) cost, benefit, interconnection and other studies; (4) analysis and recommended mechanisms for energy offtake agreements; and (5) outreach and educational efforts.</p> <p>For a visual representation of this strategy, please reference the flow chart entitled “Logic Model: Offshore Wind Master Plan,” which can be found in Appendix A.</p>
Goals	<p>Provide a comprehensive State roadmap for advancing development of offshore wind in a cost effective and responsible manner, providing New York with a new renewable generation resource that can make a significant contribution to the state’s clean energy</p>

¹ NREL. *Assessment of Offshore Wind Energy Resources for the United States*. Golden, Colorado: National Renewable Energy Laboratory, 2010.

² <http://www.boem.gov/New-York/>

	goals and the CES mandate and provide related economic development opportunities for New York.
State Energy Plan/Clean Energy Standard Link	This work is an essential and timely pre-cursor to developing OSW in NYS and meeting the State Energy Plan and CES goals for 2030 that mandate that half of New York State's electricity will come from renewable resources. The Offshore Wind Master Plan will identify and prioritize pre-development activities including resource assessment, baseline environment studies and site characterization that will reduce OSW project risks and costs in New York.

7.1.2 Target Market Characterization

Target Market Segment(s)	The target market is OSW developers, suppliers, contractors and market participants for large-scale renewable electricity generation in NYS.
Market Participants	<ul style="list-style-type: none"> • Wind and OSW Industry Representatives • Government (Federal, State, Regional and Local) • Environmental Community • Tribes • Utilities • Economic Development Representatives
Market Readiness	<ul style="list-style-type: none"> • Offshore wind is a significant source of renewable energy in Europe. In the United Kingdom, OSW currently provides approximately 5% of the country's annual electricity requirements and expects this to grow to 10% by 2020.³ • The OSW industry in Europe is making significant progress in reducing the costs of offshore wind and expects further cost reductions over the next few years due to advances in turbines, foundations, grid connections, energy production, operations and maintenance and logistics. With targeted investments to reduce the costs further, OSW cost-competitiveness for NYS will be expedited, leading to earlier availability of this resource to meet the state's objectives. • Previous studies and analyses by NYS agencies and authorities in the OSW market serve as a logical starting point for this new effort; the market is prepared for further work to advance OSW for NYS. • The specific state, federal and industry responsibilities in advancing the development of OSW energy resources are at the discretion of each entity. The extent to which NYS chooses to accept a larger share of the responsibility in consultation with other involved agencies, the more refined the eventual development proposals and lower power contract pricing can be expected to be. Ultimately, modest and well-targeted NYS efforts and resources designed to reduce soft costs, hard costs and uncertainty will be recouped through a lower cost of renewable energy to ratepayers. • Complementary near term actions expected on the part of both State and Federal authorities include the following: <ul style="list-style-type: none"> ○ NYSERDA and New York Department of Environmental Conservation (DEC): Two new multi-year wildlife projects are scheduled to begin in 2016 that will help to inform the orderly siting of offshore wind energy. In the first the New York State DEC is undertaking a marine mammal and sea turtle monitoring program to better document and understand the occurrence and distribution of large whales and sea turtles in the New York Bight. This work will be coordinated with another effort supported by NYSERDA which will collect spatial data on birds, mammals, and turtles in the same region using high-definition digital aerial surveys. Together, these two approaches

³ The Crown Estate, <http://www.thecrownestate.co.uk/energy-and-infrastructure/offshore-wind-energy/>

	<p>will provide the high quality baseline wildlife data, helping policy makers to define specific Wind Energy Areas, and helping to reduce the time and costs necessary for developers to conduct surveys required for OSW development, reducing the cost of OSW energy.</p> <ul style="list-style-type: none"> ○ New York Department of State (DOS): DOS will expand upon the DOS-initiated stakeholder engagement process addressing public and private interests in New York State Atlantic Ocean waters that consider multiple uses of the ocean for the development of an appropriate siting policy. DOS will therefore follow previous efforts with targeted infrastructure research and outreach initiatives coordinated among NYS entities. ○ NYSERDA: In addition to the DEC marine mammal monitoring program and NYSERDA aerial surveys described above, further pre-development activities including in-field resource assessments, site characterization and other environmental assessments will be executed under a complementary Investment Plan, Offshore Wind Pre-Development Activities. These activities will primarily consist of collecting and analyzing field data that will reduce OSW project risks and costs in New York. The Offshore Wind Master Plan will prioritize these pre-development activities. The confluence and interactions between these two Plans are depicted in Appendix B.
Customer Value	<p>An OSW Master Plan developed with input from NYS and Federal agencies as well as other stakeholders and rigorous analysis will provide consumers with the most cost effective, beneficial and responsible path for taking advantage of New York’s large, untapped OSW resource; 39 GW of gross offshore wind capacity according to the National Renewable Energy Laboratory.</p> <p>The Offshore Wind Master Plan will identify and prioritize pre-development activities that will reduce OSW project risks and costs in New York. According to the February 2015 New York Offshore Wind Cost Reduction Study prepared for NYSERDA by the University of Delaware Special Initiative on Offshore Wind, a \$10M investment in pre-development work can reduce the LCOE of NYS OSW projects by 1.3% or \$2.6/MWh⁴. For a 600 MW of offshore wind farm off NYS with a 46% capacity factor, \$10M of pre-development work will reduce the cost of energy by \$6.4M/year or \$160M over a project’s 25-year lifetime resulting in a return on investment of over 16 times for the customer.</p>

7.1.3 Stakeholder/Market Engagement

Stakeholder/Market Engagement	<ul style="list-style-type: none"> • NYSERDA’s team has engaged with OSW developers and suppliers, environmental organizations and other stakeholders, state agencies, Federal agencies such as BOEM and other regional states, to inform and optimize this investment plan to ensure its success. As part of this plan, NYSERDA will continue to work with these groups and others to develop the OSW Master Plan in a timely and cohesive manner. • NYSERDA will also utilize the Clean Energy Advisory Council (CEAC) as a way to engage with stakeholders, as appropriate.⁵
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⁴ <http://www.nyserdera.ny.gov/-/media/Files/EERP/Renewables/New-York-Offshore-Wind-Cost-Reduction-Study-2014.pdf>

⁵ The Clean Energy Advisory Council was established by the Public Service Commission through an Order in the Clean Energy Fund Proceeding (Case 14-M-0094. et al, Proceeding on Motion of the Commission to Consider a Clean Energy Fund, Order Authorizing the Clean Energy Fund Framework, filed January 21, 2016).

7.1.4 Theory of Change

<p>Market Barriers Addressed</p>	<ul style="list-style-type: none"> • Environmental impacts • Maritime impacts including navigation and fishing • Socio-economic impacts • Grid interconnection • High project costs resulting in high customer costs • Minimal public familiarity with and understanding of OSW • Risk in developing OSW projects with respect to actual wind, wave and sea-bottom conditions as well as potential physical, biological and social impact factors • Project pipeline visibility (scale is critical to building a supply chain and reducing costs)
<p>Testable Hypotheses</p>	<ul style="list-style-type: none"> • For OSW to be deployed in New York, stakeholders must be engaged so that they understand the benefits and impacts of OSW and their concerns are addressed, where possible. If NYSERDA successfully conveys to stakeholders why developing offshore wind is necessary and how their needs and perspectives will be incorporated in future development through the development of an OSW Master Plan, OSW will be able to move forward in New York when the economics are improved. • For OSW to be deployed in New York, costs must be reduced. If NYSERDA reduces project risk and timelines by developing and executing an OSW Master Plan, the cost of OSW projects in New York can be reduced.
<p>Activities</p>	<ol style="list-style-type: none"> 1. <u>Develop a Blueprint for the Offshore Wind Master Plan</u> NYSERDA, in collaboration with DOS, DPS, other state agencies and interested stakeholders, will develop a Blueprint for the OSW Master Plan that outlines the objectives, major elements, initial steps and schedule for creating and implementing an OSW Master Plan. Elements of the plan will include, but are not limited to: (1) site identification, OSW leasing and development strategy; (2) site assessment and site characterization pre-development activities; (3) cost, benefit, interconnection and other studies; (4) analysis and recommended mechanisms for energy offtake agreements; and (5) outreach and educational efforts. The Blueprint will facilitate discussion and stakeholder engagement. 2. <u>Stakeholder Engagement</u> Multiple meetings with stakeholders will be organized and held to review the Blueprint and receive input in the development and execution of the Master Plan. Stakeholder meetings will include coastal residents, the maritime community including the commercial fishing and shipping industries, the environmental community, the ocean sciences community, economic development representatives, utilities, OSW industry representatives, tribes and state, local and federal government representatives. A Market Advisory group will be created to provide input on pre-development field work and other activities. 3. <u>Studies</u> Multiple studies will be undertaken to understand the costs, benefits and impacts of OSW in New York. Studies to be undertaken will include, but are not limited to: <ul style="list-style-type: none"> • Marine, aviation & safety/security risk assessments – probabilistic risk analysis for vessels and aircraft operating in vicinity of potential offshore wind energy areas and determination of mitigation actions such as turbine placement and lighting to reduce identified risks. • Commercial & recreational fisheries assessments – evaluate fishing areas, potential displacement and changes in fishing effort and potential economic impacts. • Essential fish habitat studies – identify essential fish habitats and habitat areas of particular concern for managed species, threats posed by development to habitats and possible conservation efforts.

	<ul style="list-style-type: none"> • Visual resource assessments – Demonstrate the visibility of wind turbines in offshore areas considered for development under different lighting and visibility scenarios. • Historic & cultural resource assessments – study of potential submerged resources, mitigation actions and impacts on potential OSW sites. • Cost reduction pathways – Analysis of impact on costs due to new and emerging technologies, new and improved installation methods and potential state actions that can reduce costs. • Electric load, grid and interconnection requirements – detailed analysis to identify challenges, options and costs of injecting a large amount of OSW into zones J and K of the NY grid. • Regional activity impacts – consider the interaction of New York’s actions with those of other Northeastern and Mid-Atlantic states. • Supply chain assessments – Determine supply chain and infrastructure suitability along with possible actions that reduce costs and increase value, including port facility improvements and workforce training. • Offtake mechanisms and value modeling – analyze options for contractual mechanisms for New York to support energy offtake agreements for OSW projects and the value to ratepayers. <p>4. <u>Drafting of Offshore Wind Master Plan</u> With the results of stakeholder engagement, studies and any completed pre-development activities, an OSW Master Plan will be drafted in collaboration with other state agencies and interested stakeholders. The OSW Master Plan will identify additional potential areas for OSW development, pre-development activities that can lower the risks and costs of projects, transmission and interconnection strategies, and potential offtake mechanisms and their value.</p> <p>5. <u>Outreach</u> Throughout the process of developing the OSW Master Plan and after publication, NYSERDA, working with the New York Department of State (DOS) and others, will engage the public to increase public understanding of OSW and any associated consideration. NYSERDA, with the assistance of DOS and others will also seek to engage new participants including New York colleges and universities.</p>
Key Milestones	<p><u>Milestone 1</u></p> <ul style="list-style-type: none"> • Publish an OSW Master Plan Blueprint to facilitate discussion and stakeholder engagement in the summer of 2016. <p><u>Milestone 2</u></p> <ul style="list-style-type: none"> • Engage stakeholders in multiple meetings in 2016 and 2017 to review OSW Master Plan Blueprint and receive input for the OSW Master Plan. <p><u>Milestone 3</u></p> <ul style="list-style-type: none"> • Publish the final OSW Master Plan, after completion of studies and no later than end of 2017. <p>All plans, reports and data to be available to stakeholders via web platform and/or other dissemination methods.</p>
Goals Prior to Exit	<p>Provide a comprehensive State roadmap in the form of an OSW Master Plan for advancing development of offshore wind in a cost effective and responsible way that will facilitate the creation of a large, robust OSW industry in NYS that can make a significant contribution to achieving the State Energy Plan renewable energy targets and the CES mandate. Increase public and ratepayer understanding and support of OSW.</p>

7.1.5 Relationship to Utility/REV

Utility Role/Coordination Points	<ul style="list-style-type: none"> • Key utility coordination points will be with PSEG-Long Island (LIPA), Con Edison, and the New York Power Authority (NYPA), as these entities have the most impactful connection with OSW for New York State. These utilities will be engaged to identify preferred locations where OSW projects can provide grid support and other details relevant to utility planning including ongoing collaboration with DPS staff on interconnection studies. • NYSERDA will also take advantage of the CEAC Clean Energy Implementation and Coordination Working Group to coordinate planning and implementation with the New York State utilities.
Utility Interventions in Target Market	<ul style="list-style-type: none"> • Pre-development assessments have been completed for the site of the Long Island-New York City Offshore Wind Collaborative Project.^{6 7} • Additionally, feasibility studies were completed for OSW in the Great Lakes.⁸

7.1.6 Budgets & Expenditures

An annual commitment budget for all activities included in this chapter is shown in Table 1. The annual expenditure projection is included in Table 2. Budgets and expenditures do not include Administration, Evaluation, or Cost Recovery Fee; these elements are addressed in the Budget Accounting and Benefits chapter filing. The budget as presented in the Budget Accounting and Benefits Chapter will serve as the basis for any subsequent reallocation request. The additional level of detail presented within the table below is intended for informational purposes only.

Table 1: Annual Market Development Budget Allocation – Commitment Basis

Commitment Budget	2016	2017	2018	Total
Research and Technology Studies/Development/Demos	\$5,000,000	-	-	\$5,000,000
Total	\$5,000,000	-	-	\$5,000,000

Table 2: Annual Expenditures Projection

Expenditures	2016	2017	Total
Total	50%	50%	100%

7.1.7 Progress and Performance Metrics

Table 3 provides program Activity/Output indicators representing measurable, quantifiable direct results of activities undertaken in the initiative. Outputs are a key way of regularly tracking progress, especially in the early stages of an initiative, before broader market changes are

⁶ <http://www.nyscrda.ny.gov/Cleantech-and-Innovation/Power-Generation/Wind/Offshore-Wind>

⁷ <http://www.linycoffshorewind.com/>

⁸ <http://www.nyscrda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/offshore-wind-energy-development.pdf>

measurable. Outcome indicators can encompass near-term through longer-term changes in market conditions expected to result from the activities/outputs of an intervention. Outcome indicators will and progress will be measured periodically.

Table 3. Initiative Specific Metrics

Indicators ⁹		Baseline (Before/Current)	2019 (Cumulative)
Activity/Outputs	OSW Master Plan Blueprint published	0	1
	Stakeholder meetings to review Blueprint and solicit input for OSW Master Plan	0	3
	OSW Master Plan published, providing a comprehensive roadmap to reduce the costs of OSW and accelerate the development of OSW for New York and identifies additional potential offshore wind energy areas.	0	1

This investment will not have any direct, near-term benefits in energy efficiency, renewable energy generation or CO2 emission reductions. This investment in offshore wind planning will increase stakeholder engagement and understanding of OSW, private investment and competition and reduce the costs of future NYS offshore wind projects resulting in customer savings.

7.1.8 Fuel Neutrality

Fuel Neutrality	This initiative is not being delivered on a fuel neutral basis.
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7.1.9 Performance Monitoring and Evaluation Plans

Performance Monitoring & Evaluation Plan	<p>NYSERDA’s approach to monitoring and assessing the effectiveness of the initiative and overall market development is described below.</p> <p><u>Test-Measure-Adjust Strategy</u></p> <ul style="list-style-type: none"> Tracking of standard activity metrics including: number of stakeholder meetings, published Blueprint and published Master Plan. <p><u>Market Evaluation</u></p> <ul style="list-style-type: none"> Market Evaluation is not planned for this initiative, beyond aspects addressed in the Test-Measure-Adjust Strategy. <p><u>Impact Evaluation/Field Verification</u></p> <ul style="list-style-type: none"> Impact evaluation/field verification is not planned for this initiative.
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⁹ A 0 (zero) denotes that the actual value is currently believed to be zero for baseline/market metrics.

7.2 Offshore Wind Pre-Development Activities

7.2.1 Overview

<p>Present Situation</p>	<ul style="list-style-type: none"> • Governor Andrew M. Cuomo, in his 2016 State of the State address called for the creation of a New York Offshore Wind Master Plan. This investment plan is for the execution of the pre-development activities called for in the Master Plan. These pre-development activities will include collecting and analyzing field data and other site assessment work that will reduce Offshore Wind (OSW) project risks and costs in New York. • OSW represents an essential renewable energy resource for New York State toward achieving its State Energy Plan targets and Clean Energy Standard (CES) mandate that half of New York State’s electricity will come from renewable resources. • According to the National Renewable Energy Laboratory, New York State (NYS) has 39 GW of gross offshore wind capacity potential between 12 and 50 nautical miles from its shores and in waters less than 200 feet deep, where the turbines would have minimal visual impact and can utilize proven bottom-fixed technology.¹⁰ • Despite a strong level of interest and multiple leases for OSW areas, there are no OSW farms in New York or the US, except for a 30 MW project under construction in Rhode Island. • While large amounts of OSW have been built in Europe, the costs of OSW have limited the development of OSW in the US. • To date, BOEM has awarded eleven commercial offshore wind leases, including nine through its competitive lease sale process (two offshore Rhode Island-Massachusetts, two offshore Massachusetts, two offshore Maryland, two offshore New Jersey and one offshore Virginia). • On March 16, 2016, the Department of Interior announced that the Bureau of Ocean Energy Management had identified New York’s first offshore Wind Energy Area (WEA). The proposed lease area is south of Long Island, approximately 12 nautical miles from the closest point of land and will be able to accommodate up to 1 gigawatt of offshore wind generating capacity, enough to power over 500,000 homes.¹¹ BOEM has publically stated it intends to hold a lease auction for the NY WEA before the end of calendar year 2016. • While large amounts of OSW have been built in Europe and OSW suppliers, contractors and developers in Europe are making excellent progress in reducing costs, the costs of OSW have limited the development of OSW in the US. • For OSW to be a viable solution for New York at scale, market barriers including costs must be reduced.
<p>Intervention Strategy</p>	<p>As described in a separate initiative to execute the Offshore Wind Master Plan, NYSERDA will develop and execute an OSW Master Plan that will include undertaking targeted pre-development initiatives including resource assessment, baseline environment studies and site characterization. This investment plan includes the execution of the pre-development activities called for in the OSW Master Plan including in-field resource assessments, site characterization and other environmental assessments. These activities will primarily consist of collecting and</p>

¹⁰ NREL. *Assessment of Offshore Wind Energy Resources for the United States*. Golden, Colorado: National Renewable Energy Laboratory, 2010.

¹¹ <http://www.boem.gov/New-York/>

	<p>analyzing field data that will reduce OSW project risks and costs in New York. The data from this pre-development work will be disseminated to the market in order to reduce project risks and overall development costs and increase interest and competition to develop NYS OSW sites at the lowest possible price. Initial data from this pre-development work will also be used to assist in identifying additional Wind Energy Areas in the Offshore Wind Master Plan. The confluence and interactions between the Offshore Wind Master Plan and this Pre-Development Activities plan are depicted in the “Offshore Wind Master Plan and Pre-Development Activities Schedule,” which can be found in Appendix B.</p> <p>For a visual representation of this strategy, please reference the flow chart entitled “Logic Model: Offshore Wind (OSW) Pre-Development Activities,” which can be found in Appendix A.</p>
Goals	To reduce overall project and ratepayer costs by undertaking pre-development work for NYS OSW sites that reduce the amount of expensive development capital required by private developers, reduce developer risk by providing site data, reduce required development timelines and ultimately enhance competition between developers.
State Energy Plan/Clean Energy Standard Link	This work is an essential and timely pre-cursor to developing OSW in NYS and meeting the State Energy Plan and CES goals for 2030 that mandates that half of New York State’s electricity will come from renewable resources. This pre-development effort aligns with NYSEERDA’s market development role in the CEF, while the ongoing CES Public Service Commission proceeding may ultimately provide a contractual mechanism for NYS to support an energy offtake agreement for these projects..

7.2.2 Target Market Characterization

Target Market Segment(s)	The target market is OSW developers, suppliers, contractors and market participants for large-scale renewable electricity generation in NYS.
Market Participants	<ul style="list-style-type: none"> • Wind and OSW Industry Representatives, • Government (Federal, State, Regional and Local), • Environmental Community, • Tribes, • Utilities, and • Economic Development Representatives.
Market Readiness	<ul style="list-style-type: none"> • Offshore wind is a significant source of renewable energy in Europe. In the United Kingdom, OSW currently provides approximately 5% of the country’s annual electricity requirements and expects this to grow to 10% by 2020¹². • The OSW industry in Europe is making significant progress in reducing the costs of offshore wind and expects further cost reductions over the next few years due to advances in turbines, foundations, grid connections, energy production, operations and maintenance and logistics. With targeted investments to reduce the costs further, OSW cost competitiveness for NYS will be expedited, leading to earlier availability of this resource to meet the state’s objectives. • Previous studies and analyses by NYS agencies and authorities in the OSW market serve as a logical starting point for this new effort; the market is prepared for further work to advance OSW for NYS. • The specific state, federal and industry responsibilities in advancing the development of OSW energy resources are unclear, and often overlap. The

¹² The Crown Estate, <http://www.thecrownestate.co.uk/energy-and-infrastructure/offshore-wind-energy/>

	<p>extent to which NYS chooses to accept a larger share of the responsibility in consultation with other involved agencies, the more refined the eventual development proposals and aggressive power contract pricing can be expected to be. Ultimately, modest and well-targeted NYS efforts and resources designed to reduce soft costs, hard costs and uncertainty will be recouped through a lower cost of renewable energy to ratepayers.</p> <ul style="list-style-type: none"> • Complementary near term actions expected on the part of both State and Federal authorities include the following: <ul style="list-style-type: none"> ○ NYSERDA and New York Department of Environmental Conservation (DEC): Two new multi-year wildlife projects are scheduled to begin in 2016 that will help to inform the orderly siting of offshore wind energy. In the first the New York State DEC is undertaking a marine mammal and sea turtle monitoring program to better document and understand the occurrence and distribution of large whales and sea turtles in the New York Bight. This work will be coordinated with another effort supported by NYSERDA which will collect spatial data on birds, mammals, and turtles in the same region using high-definition digital aerial surveys. Together, these two approaches will provide the high quality baseline wildlife data, helping policy makers to define specific Wind Energy Areas, and helping to reduce the time and costs necessary for developers to conduct surveys required for OSW development, reducing the cost of OSW energy. ○ New York Department of State (DOS): DOS will expand upon the DOS-initiated stakeholder engagement process addressing public and private interests in New York State Atlantic Ocean waters that consider multiple uses of the ocean for the development of an appropriate siting policy. DOS will therefore follow previous efforts with targeted infrastructure research and outreach initiatives coordinated among NYS entities.
Customer Value	<p>Pre-development activities that have been prioritized by the OSW Master Plan activities will provide New York energy consumers with the most cost effective, beneficial and responsible path for taking advantage of New York's large, untapped OSW resource; 39 GW of gross offshore wind capacity according to the National Renewable Energy Laboratory.</p> <p>The pre-development activities will reduce OSW project risks and costs in New York. According to the February 2015 New York Offshore Wind Cost Reduction Study prepared for NYSERDA by the University of Delaware Special Initiative on Offshore Wind, a \$10M investment in pre-development work can reduce the LCOE of NYS OSW projects by 1.3% or \$2.6/MWh¹³. For a 600 MW of offshore wind farm off NYS with a 46% capacity factor, \$10M of pre-development work will reduce the cost of energy by \$6.4M/year or \$160M over a project's 25-year lifetime resulting in a return on investment of over 16 times for the customer.</p>

7.2.3 Stakeholder/Market Engagement

Stakeholder/Market Engagement	<ul style="list-style-type: none"> • NYSERDA's team has engaged with OSW developers and suppliers, environmental organizations and other stakeholders, state agencies, Federal agencies such as BOEM and other regional states, to inform and optimize this investment plan to ensure its success. As part of this plan, and the OSW Master Plan, NYSERDA will continue to work with these groups and others to
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¹³ <http://www.nyserdera.ny.gov/-/media/Files/EERP/Renewables/New-York-Offshore-Wind-Cost-Reduction-Study-2014.pdf>

	<p>optimize the scope and timing of the pre-development activities that occur in parallel with and follow the OSW Master Plan.</p> <ul style="list-style-type: none"> • NYSERDA will also utilize the Clean Energy Advisory Council (CEAC) as a way to engage with stakeholders, as appropriate.¹⁴
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7.2.4 Theory of Change

Market Barriers Addressed	<ul style="list-style-type: none"> • High project development costs for potential project developers • High project costs resulting in high customer costs • Risk in developing OSW projects with respect to actual wind, wave and sea-bottom conditions as well as potential physical, biological and social impact factors
Testable Hypotheses	<ul style="list-style-type: none"> • For OSW to be deployed in New York, costs must be reduced. If NYSERDA reduces project risk and timelines through targeted pre-development initiatives, the cost of OSW projects in New York can be reduced.
Activities	<p>1. Support OSW siting and development activity</p> <p>This activity will support OSW siting and development activity by providing relevant and timely information to key stakeholders regarding the OSW resource, including an offshore area currently being considered by BOEM for leasing as well as potential future offshore wind development areas.</p> <p>Pre-development measurement programs, studies and other activities that advance the state’s interests in developing OSW in suitable sites will be undertaken. While theoretical and introductory studies have been completed in some areas of the New York Bight, a collection of site-specific data measurements, analysis and reporting is required to support detailed siting, design and permitting offshore wind projects. This work will include instituting studies, in collaboration with other State agencies and interested stakeholders, to characterize the meteorological and oceanographic conditions as well as the environmental and potential impact producing factors related to the applicable physical, biological, and social resources of possible project areas. This effort will follow the priorities set forth in the OSW Master Plan and proceed by intelligently selecting and executing in-field measurement programs and studies; a subset of these studies will commence before the OSW Master Plan is complete due to long lead times and/or near term clarity regarding their necessity.¹⁵ Such programs and studies will include:</p> <ul style="list-style-type: none"> • Metocean data measurements and analysis including, but not limited to, turbine hub-height wind speed and direction, wave and current measurements using met tower and/or floating buoy-mounted Light Detection and Ranging (LIDAR) technology deployed in one or more locations in the New York Bight • Acoustic surveys and studies – Buoy mounted sensors will measure and record above and under water acoustics to define baseline noise levels and to listen for birds, bats and marine mammals. Acoustic data will be used to determine effects of construction operations.

¹⁴ The Clean Energy Advisory Council was established by the Public Service Commission through an Order in the Clean Energy Fund Proceeding (Case 14-M-0094. et al, Proceeding on Motion of the Commission to Consider a Clean Energy Fund, Order Authorizing the Clean Energy Fund Framework, filed January 21, 2016).

¹⁵ The confluence and interactions between the two OSW Investment Plans are depicted in Appendix B.

	<ul style="list-style-type: none"> • Oceanographic surveys and analysis –Data in the NY Bight will be collected regarding depth, currents, sediment transport, turbidity, sea surface temperature, etc. • Geophysical and geotechnical surveys and analysis – Geophysical surveys will be undertaken by a survey vessel towing sonar equipment and other sensors to map seabed and sub-seabed conditions, detect geohazards and locate existing cables and underwater structures. Geophysical surveys include seabed soil sampling, penetration testing and coring using specialized vessels and offshore drill rigs. Geotechnical surveys will be completed once WEAs are established as this information is highly site-specific. • Electromagnetic surveys – Sensors are towed behind a survey vessel to measure the earth magnetic field to determine sediment properties and sub-seabed structure. • Onshore surveys and land use studies for areas of potential cable shore landings, onshore transmission and onshore substations – Surveys include utility surveys, soil measurements and borings as required. • Marine and terrestrial biological resource assessments – Ship and airborne visual and digital surveys to determine the distribution and abundance of fish, marine mammals, sea turtles, birds and bats. • Avian, bat, threatened and endangered species assessments • Archeological surveys, historic site and cultural resource assessments of potential offshore and onshore sites • Land use and existing infrastructure assessments • Socioeconomic resource, recreational resource, public health and safety assessments • Wetland, waterbodies and land-use assessments • Cumulative effects assessments <p>This activity may also include the preparation and submittal of site assessment plans and all federal, state and local permits, approvals and consultations required for the work to be performed.</p> <p>A market advisory group will be convened to review the scope and timing of the pre-development activities. All pre-development activities considered in this investment plan will be screened to make certain they serve the needs of multiple developers, suppliers, state and federal agencies and other stakeholders, will not ultimately have to be repeated by developers or others when an OSW project proceeds. This consultation will also ensure that the CEF efforts will reduce the overall costs of OSW in NYS.</p> <p>The final deliverable of all surveys and analysis will be a series of reports for public consumption including downloadable data available on the web and/or other dissemination methods.</p> <p>2. <u>Collaboration efforts to reduce costs</u> All of these initiatives may be co-funded to the extent possible by utilizing state, federal and private funding to leverage the program’s impact. NYSERDA will collaborate with other state agencies, states, industry and others to undertake baseline environmental studies, benefits analyses and other research or supply chain/workforce efforts focused on reducing OSW costs. A joint industry RD&D program to reduce costs and accelerate deployment, similar to what has been used successfully in Europe, will be explored and created if warranted. This work</p>
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	will reduce the cost of developing OSW sites and provide details to additional methods to reduce costs.
Key Milestones	<p><u>Milestone 1</u></p> <ul style="list-style-type: none"> • Reports resulting from pre-development work validating NYS OSW resource and proposing potential additional wind energy areas for development. <p><u>Milestone 2</u></p> <ul style="list-style-type: none"> • Reports providing site-specific data needed to support detailed siting, design, and permitting of offshore wind project(s). <p>All reports and data to be available to stakeholders via web platform and/or other dissemination methods.</p>
Goals Prior to Exit	The development of a significant, public data set that will facilitate the creation of a large, robust OSW industry in NYS that can make a significant contribution to achieving the State Energy Plan renewable energy targets and the CES mandate.

7.2.5 Relationship to Utility/REV

Utility Role/Coordination Points	<ul style="list-style-type: none"> • Key utility coordination points will be with PSEG-Long Island (LIPA), Con Edison, and NYPA, as these entities have the most impactful connection with OSW for New York State. These utilities will be engaged to identify preferred locations where OSW projects can provide grid support and other details relevant to utility planning including ongoing collaboration with DPS staff. • NYSERDA will also take advantage of the CEAC Clean Energy Implementation and Coordination Working Group to coordinate planning and implementation with the New York State utilities.
Utility Interventions in Target Market	<ul style="list-style-type: none"> • Pre-development assessments have been completed for the site of the Long Island-New York City Offshore Wind Collaborative Project.^{16 17} • Additionally, feasibility studies were completed for OSW in the Great Lakes.¹⁸

7.2.6 Budgets & Expenditures

An annual commitment budget for all activities included in this chapter is shown in Table 4. The annual expenditure projection is included in Table 5. Budgets and expenditures do not include Administration, Evaluation, or Cost Recovery Fee; these elements are addressed in the Budget Accounting and Benefits chapter filing. The budget as presented in the Budget Accounting and Benefits Chapter will serve as the basis for any subsequent reallocation request. The additional level of detail presented within the table below is intended for informational purposes only.

¹⁶ <http://www.nyserda.ny.gov/Cleantech-and-Innovation/Power-Generation/Wind/Offshore-Wind>

¹⁷ <http://www.linycoffshorewind.com/>

¹⁸ <http://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/offshore-wind-energy-development.pdf>

Table 4: Annual Market Development Budget Allocation – Commitment Basis

Commitment Budget	2016	2017	2018	Total
Research and Technology Studies/Development/Demos	\$9,250,000	-	-	\$9,250,000
Implementation Support	\$750,000	-	-	\$750,000
Total	\$10,000,000	-	-	\$10,000,000

Table 5: Annual Expenditures Projection

Expenditures	2016	2017	2018	Total
Total	20%	40%	40%	100%

7.2.7 Progress and Performance Metrics

Table 6 provides program Activity/Output indicators representing measurable, quantifiable direct results of activities undertaken in the initiative. Outputs are a key way of regularly tracking progress, especially in the early stages of an initiative, before broader market changes are measurable. Outcome indicators can encompass near-term through longer-term changes in market conditions expected to result from the activities/outputs of an intervention. Outcome indicators and progress will be measured periodically.

Table 6. Initiative Specific Metrics

Indicators¹⁹		Baseline (Before/Current)	2019 (Cumulative)
Activity/Outputs	Report validating NYS OSW wind resource	0	1
	Reports providing site-specific data needed to support detailed siting, design, and permitting of an offshore wind project	0	3
Outcomes	Reduction of site assessment time required for a developer (the Site Assessment Term in BOEM's typical Commercial Leases for Renewable Energy Development on the Outer Continental Shelf).	5 years	4 years

This investment will not have any direct, near-term benefits in energy efficiency, renewable energy generation or CO2 emission reductions. This investment in offshore wind pre-development and collaboration work will increase private investment and competition and reduce the costs of future NYS offshore wind projects resulting in customer savings.

Benefits shown in Table 7 represent the estimated indirect market effects expected to accrue over the longer term as a result of this investment and follow on market activity. The indirect benefits that accrue from this investment will be quantified and reported based on periodic Market

¹⁹ A 0 (zero) denotes that the actual value is currently believed to be zero for baseline/market metrics.

Evaluation studies to validate these forecasted values. Market Evaluation may occur within one year (-/+) of the years noted in the table and projected future indirect benefits and/or budgets necessary to achieve them may be updated based on the results of market evaluation. Indirect impact across NYSERDA initiatives may not be additive due to multiple initiatives operating within market sectors. The values presented below are not discounted, however NYSERDA has applied a discount of 50% to the overall portfolio values in the Budget Accounting and Benefits chapter.

This investment will advance the development of NYS OSW sites and lower the costs of OSW for the state. This will enable developers to ultimately construct and operate OSW farms on these sites at competitive rates which will lead to benefits to NYS consumers in terms of renewable energy generation and reduced CO2 emissions.

Table 7. Estimated Indirect Market Impact

Indirect Impact		2020	2025	2030
Energy Efficiency	MWh Cumulative Annual	-	-	-
	MMBTu Cumulative Annual	-	-	-
Renewable Energy	MWh Cumulative Annual	-	-	4,275 MWh / MW installed capacity
	MW	-	-	1,000
CO2e Emission Reduction (metric tons) Cumulative Annual		-	-	2,249 metric tons CO2 / MW installed capacity

7.2.8 Fuel Neutrality

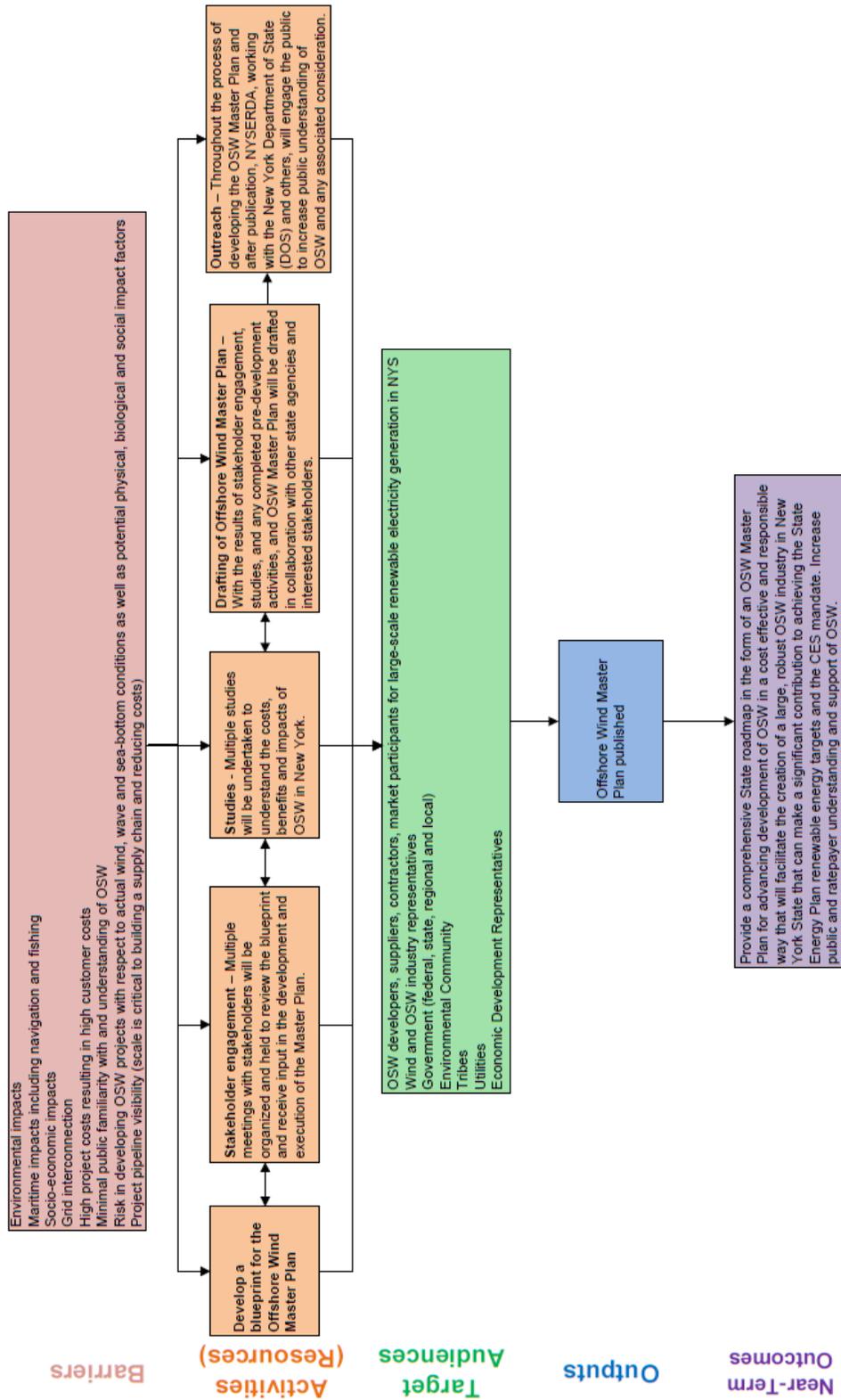
Fuel Neutrality	This initiative is not being delivered on a fuel neutral basis.
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7.2.9 Performance Monitoring and Evaluation Plans

Performance Monitoring & Evaluation Plan	<p>NYSERDA’s approach to monitoring and assessing the effectiveness of the initiative and overall market development is described below.</p> <p><u>Test-Measure-Adjust Strategy</u></p> <ul style="list-style-type: none"> • Routine reporting on progress including measurement of campaigns, analysis, studies and results publication. Redirecting (as needed) to ensure continued progress against goals. <p><u>Market Evaluation</u></p> <ul style="list-style-type: none"> • A formal Market Evaluation is not planned for this specific initiative, beyond aspects addressed in the Test-Measure-Adjust Strategy. • NYSERDA will more broadly address overall wind market development progress using available data from BOEM and other sources, and potentially survey developers to identify outcomes associated with NYSERDA’s strategy to support this market. <p><u>Impact Evaluation/Field Verification</u></p> <p>Impact evaluation/field verification is not planned for this initiative.</p>
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Appendix A – Logic Models

LOGIC MODEL: Offshore Wind Master Plan



LOGIC MODEL: Offshore Wind (OSW) Pre-Development Activities

