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OVERSIGHT – OFFSHORE WIND POWER

I. INTRODUCTION

On November 24, 2020, the Committee on Environmental Protection, chaired by Council Member Costa Constantinides, will hold an oversight hearing on New York State's offshore wind power projects. The Committee expects to receive testimony from the Mayor's Office of Sustainability, wind industry representatives, environmental advocates, commercial fishing industry advocates, community advocates, and other interested parties.

II. BACKGROUND

Offshore winds tend to blow with greater velocity and uniformity than winds on land.[1] The energy potential of wind is directly proportional to the wind speed cubed (to the third power), meaning that an increase in velocity of only a few miles per hour can result in a significantly larger amount of electricity produced.[2] Practically, this means that a turbine at a site with an average wind speed of 16 mph would produce 50% more electricity than at a site with the same turbine and average wind speeds of 14 mph.[3] The annual average wind speed in the areas identified by NYSERDA for wind energy development are 8.5 to 9 meters per second,[4] or roughly 19-20 miles per hour.[5] In addition to blowing more consistently than onshore wind, offshore peak wind speeds tend to correlate very well with peak energy demand, with production peaks and demand peaks lining up during the afternoon and early evening hours. This correlation is also strongest during the summer months, when demand is highest.[6]

Since New York City's current means of energy production largely rely on high carbon emitting fossil fuel combustion based technology,[7] it is estimated that each megawatt hour of energy produced by offshore wind will avoid 800 kg of carbon emissions.[8] Using these figures,

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[1] University of Michigan Center For Sustainable Systems. Wind Energy fact sheet. http://css.umich.edu/factsheets/wind-energy-factsheet (last accessed 11/17/20)
[2] Id.
[3] Id.
[4] Conservation Biology Institute Databasin. Average annual offshore wind speed for the Atlantic Coast U.S. 90 meter height. https://databasin.org/maps/new#datasets=ff8b021f65c9442da3478530da345340 (last accessed 11/17/20)
[5]https://www.google.com/search?q=convert+meters+per+second+to+miles+per+hour&oq=convert+meters+per+second&aqs=chrome.0.0j69i57j0l4.3247j0j7&sourceid=chrome&ie=UTF-8
[6]Bailey, Bruce. Understanding Offshore Wind's Enhanced Peak Load Coincidence for East Coast Transmission Systems. Windpower 2013 Conference. https://aws-dewi.ul.com/assets/OffshoreLoadCoincidence-Bailey-AWST-Windpower2013.pdf (last accessed 11/17/20)
[7] New York City Mayor's Office of Sustainability. Greenhouse Gas Inventory 2017. https://www1.nyc.gov/assets/sustainability/downloads/pdf/GHG_Inventory_2017.pdf (last accessed 11/20/20)
[8] Buonocore et al. Health and climate benefits of offshore wind facilities in the Mid-Atlantic United States https://iopscience.iop.org/article/10.1088/1748-9326/11/7/074019/pdf (last accessed 11/20/20)

the 9,000 megawatts of offshore wind energy that New York expects to develop by 2035[9] would potentially avoid 27,300,000 metric tons of carbon dioxide (CO_2) annually, an equivalent to removing 6 million gasoline powered cars from the road.[10]

According to the New York State Energy Research and Development Authority (NYSERDA) Blueprint for Offshore Wind, New York has the potential to produce 39 gigawatts of wind energy off its coast, enough to power 15 million homes.[11] New York State's Climate Leadership and Community Protection Act of 2019 aims to achieve 100% zero emission electricity by 2040, and overall emissions reductions of at least 85% below 1990 levels.[12] Toward this goal, the State has set targets of 9,000 megawatts (MW) of offshore wind by 2035, 3,000 MW of energy storage by 2030, 6,000 MW of solar generation by 2025, and 22 million tons of carbon reductions through energy efficiency and electrification.[13]

There are currently three offshore wind projects under active development in New York State, with a combined total capacity of 1,826 MW.[14] The Empire Wind project has a capacity of 816 MW, and is being developed by Equinor Wind US LLC.[15] The site is approximately 14 miles

[9] New York State Energy Research and Development Authority. Offshore Wind Projects. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Focus-Areas/NY-Offshore-Wind-Projects#SouthForkWindFarm (last accessed 11/16/20)

[10] (The calculations from the following article were applied to New York's updated offshore wind commitments) Mike O'Boyle. Is Offshore Wind About to Hit Cost Competitiveness in New York and New England? Forbes Magazine, May 2, 2018. https://www.forbes.com/sites/energyinnovation/2018/05/02/is-offshore-wind-about-to-hit-cost-competitiveness-in-new-york-and-new-england/#1c41231e6720. (last accessed 11/17/20)

[11] New York State Energy Research and Development Authority. Blueprint for New York State Offshore Wind Master Plan. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/New-York-State-Offshore-Wind-Blueprint.pdf (last accessed 11/17/20)

[12] New York's Climate Leadership and Community Protection Act. https://climate.ny.gov/-/media/CLCPA/Files/CLCPA-Fact-Sheet.pdf (last accessed 11/16/20)

[13] New York State Climate Act. https://climate.ny.gov/ (last accessed 11/16/20)

[14] New York State Energy Research and Development Authority. Offshore Wind Projects. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Focus-Areas/NY-Offshore-Wind-Projects#SouthForkWindFarm (last accessed 11/16/20)

[15] Id.

from Jones Beach State Park in Nassau County at its closest point, and is expected to begin commercial operation in 2024.[16] The project will connect to the grid at the Gowanus Substation in Brooklyn,[17] and will feed energy directly into New York City's energy grid.[18] The Sunrise Wind project has a capacity of 880 MW, and is being developed by Sunrise Wind LLC.[19] The project is more than 30 miles east of Montauk, Long Island, at its closest point, and is expected to begin commercial operation in 2024.[20] The project will connect to the grid at the Holbrook Substation in central Long Island.[21] The Empire and Sunrise projects are expected to power more than 1 million homes statewide, provide a combined economic impact of 3.2 billion dollars statewide, and support the creation of over 1,600 jobs.[22]

[16] Id.
[17] Id.
[18] EnergyWatch. 1,700 MW of Offshore Wind Capacity Approved for Construction. July, 2019. https://energywatch-inc.com/1700-mw-of-offshore-wind-capacity-approved-for-construction/ (last accessed 11/20/20
[19] Id.
[20] Id.
[21] Id.
[22] Id.

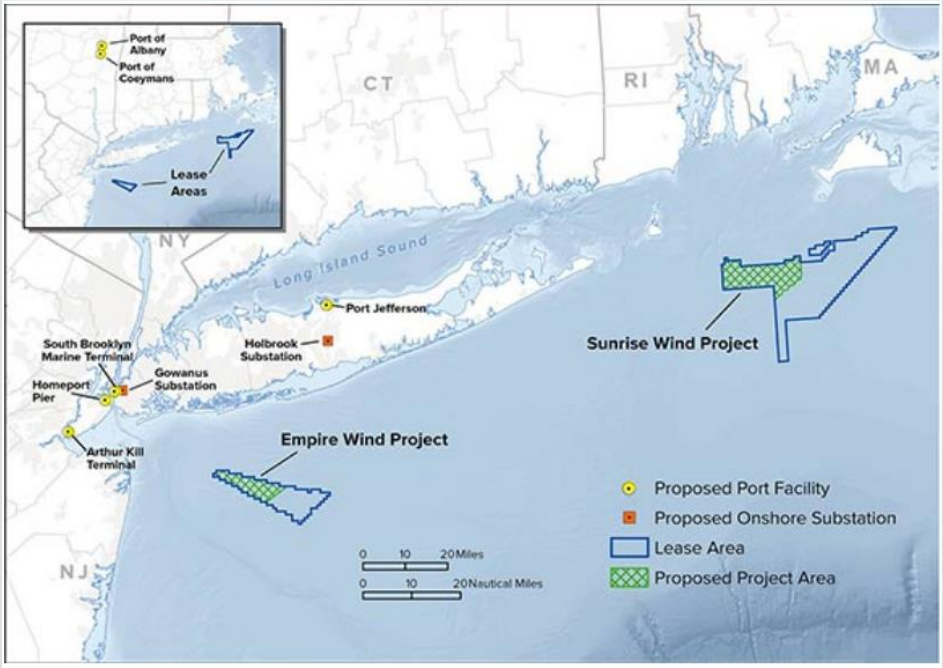

Figure 1: This map shows the locations of the Empire and Sunrise wind projects in relation to the coast of Long Island, with Empire to the south of Nassau County and Sunrise to the east of Suffolk County.

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The South Fork offshore wind farm has a capacity of 130 MW and is located 35 miles east of Montauk,[24] directly north of the Sunrise Wind offshore wind farm.[25] It is expected to provide enough renewable energy for 70,000 homes, and offset 300,000 tons of carbon emissions annually, statewide.[26] In July of 2020, Governor Cuomo announced solicitation for up to 2,500 additional

[23] Id.
[24] Long Island Power Authority. South Fork Wind Farm Fact Sheet. https://www.lipower.org/wp-content/uploads/2019/10/LIPA-First-Offshore-Wind-Farm-Doc-V19_102819-FINAL.pdf (last accessed 11/16/20)
[25] Bureau of Ocean Energy Management. South Fork Area Map. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/DW-South-Fork-Area-Map.pdf (last accessed 11/20/20)
[26] Id at 21

megawatts of offshore wind projects, potentially bringing the State to nearly halfway of its goal of 9,000 MW by 2035.[27]

Potential Economic Impacts on New York City

The logistical challenges of transporting pre-assembled wind turbine components for offshore installation necessitates significant buildout of new port infrastructure capable of handling the size and scale of the pieces. In 2019, NYSERDA issued a request for qualifications for public-private investments aimed at upgrading port infrastructure for this purpose, and to which New York State has committed 200 million dollars in public funds.[28] In February of 2020, Mayor Bill de Blasio pledged to invest 57 million dollars into the South Brooklyn Marine Terminal port facility toward supporting future offshore wind production.[29] Equinor intends to locate operations and maintenance facilities for its Empire Wind project in South Brooklyn, and is reportedly considering the South Brooklyn Marine Terminal.[30] Additionally, because Staten Island's Arthur Kill Terminal is the only port between Connecticut and Virginia with unfettered access to the open ocean, it is well positioned to become the Mid-Atlantic base for the assembly of offshore wind turbine components, which can be difficult to navigate around bridges and other height

[27] New York State Energy Research and Development Authority. Governor Cuomo Announces Largest Combined Solicitations for Renewable Energy Ever Issued in the U.S. to Combat Climate Change. https://www.nyserda.ny.gov/About/Newsroom/2020-Announcements/2020-07-21-Governor-cuomo-announces-largest-combined-solicitations-for-renewable-energy-ever-issued-in-the-us-to-combat-climate-change (last accessed 11/17/20)

[28] New York State Energy Research and Development Authority. Port Infrastructure. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Focus-Areas/Supply-Chain-Economic-Development/Port-Infrastructure (last accessed 11/20/20)

[29] Richard Cappel. Capalino Clean Energy and Sustainability Group. State of the Environmental City: Making New York City the Hub of New York's Offshore Wind Industry. https://www.capalino.com/state-of-the-environmental-city-making-new-york-city-the-hub-of-new-yorks-offshore-wind-industry/ (last accessed 11/20/20)

[30] Karl-Erik Stromsta. Offshore wind jobs and factories are coming to American shores. Here's Why New York Is counting on a big slice. Green Tech Media. January, 2020. https://www.greentechmedia.com/articles/read/inside-new-yorks-push-to-be-center-of-gravity-for-us-offshore-wind (last accessed 11/20/20)

restrictions.[31] An increase in offshore wind generation would also provide New York City buildings, that are subject to the emissions reductions standards outlined in the Climate Mobilization Act, with a source of renewable electricity with which to meet reductions goals; while also assisting New York City as a whole, with meeting its emissions reduction commitments under the state's Climate Leadership and Community Protection Act.[32]

Environmental Impacts of Offshore Wind Development

Studies published by NYSERDA as part of New York State's offshore wind plan have identified a number of marine species likely to be present in the wind project areas that are subject to federal protections,[33] specifically the U.S. Marine Mammal Protection Act of 1972 (MMPA),[34] and the Endangered Species Act of 1973 (ESA).[35] Cetaceans such as blue whales, fin whales, sei whales, North Atlantic right whales, sperm whales, and multiple dolphin species, sea turtles such as Loggerheads, Leatherbacks, Kemp's Ridley and Green,[36] fish such as Atlantic sturgeon, and elasmobranchs such as oceanic white tip sharks, great white sharks, and manta rays,[37] are all known to inhabit or transit through the wind project areas.

[31] Deepali Srivastava. Putting New York City's Waterfront at the Heart of a Renewable Energy Revolution. Next City. November, 2019. https://nextcity.org/features/view/new-york-citys-waterfront-at-the-heart-of-a-renewable-energy-revolution (last accessed 11/20/20).
[32] Id.
[33] New York State Energy Research and Development Authority. Offshore Wind Plans for New York State Completed Studies and Surveys. https://www.nyserda.ny.gov/About/Publications/Offshore-Wind-Plans-for-New-York-State (last accessed 11/17/20)
[34] United States Fish and Wildlife Service. Marine Mammal Protection Act. https://www.fws.gov/international/laws-treaties-agreements/us-conservation-laws/marine-mammal-protection-act.htm (last accessed 11/17/20)
[35] Id.
[36] New York State Energy Research and Development Authority. Offshore Wind Plans for New York State. Marine Mammals and Sea Turtles Study. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25L-Marine-Mammals-and-Sea-Turtles-Study.pdf (last accessed 11/17/20)
[37] New York State Energy Research and Development Authority. Offshore Wind Plans for New York State. Fish and Fisheries Study. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25j-Fish-and-Fisheries-Study.pdf (last accessed 11/17/20)

Pile driving noise is one of the construction factors likely to have a major impact on the marine wildlife population in the area.[38] Considering water's superior ability to transmit noise over long distances, as well as the exceptional hearing capabilities of the native cetacean population, the effects of this phase of construction are likely to resonate far beyond the immediate construction area.[39] The effect of pile driving noise on these species is twofold in the sense that it masks the sounds they use for hunting, communication, and courtship, and also has the potential to cause long term hearing loss, affecting their ability to perform these vital functions even after the source of the disturbance has been removed.[40]

Other potential risks associated with the construction phase are the destruction of the local habitat in the areas where the piles for the turbine structures must be installed, issues related to disturbing sediment into the water column, increasing turbidity and the likelihood of re-suspending sediment bound pollutants, potentially affecting the spawn of certain fish species, and a temporary increase in boat strike risk correlated with the increase of boat traffic in the area.[41]

Additionally, the cables required for transporting energy back to the land based distribution hubs will have to be trenched in order to protect them from trawl nets and boat anchors.[42] This

[38] New York State Energy Research and Development Authority. Offshore Wind Plans for New York State. Consideration of Potential Cumulative Effects. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25g-Consideration-of-Potential-Cumulative-Effects.pdf (last accessed 11/17/20)

[3939] New York State Energy Research and Development Authority. Offshore Wind Plans for New York State. Advancing Environmentally Responsible Development of Offshore Wind Energy in New York State. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Environmental/Advancing-Environmental-Response-Development-Off-Shore-Wind-New-York.pdf (last accessed 11/17/20)

[40] New York State Energy Research and Development Authority. Offshore Wind Plans for New York State. Marine Mammals and Sea Turtles Study. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25L-Marine-Mammals-and-Sea-Turtles-Study.pdf (last accessed 11/17/20)

[41] Id at 28

[42] New York State Energy Research and Development Authority. Offshore Wind Plans for New York State. Cables Pipelines and Other Infrastructure Study. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25f-Cables-Pipelines-and-Other-Infrastructure.pdf (last accessed 11/17/20)

aspect of construction is likely to result in temporary disturbance of the sea floor ecosystem, coupled with potentially wider ranging effects of sediment disturbance.[43]

On shore, wind farms have been found to have deleterious effects on bird populations, particularly when sited in areas overlapping migratory routes,[44] however, there are indications that this is less of a concern for offshore wind projects.[45] A study conducted by Denmark's National Environmental Research Institute (Institute), using infrared video cameras and radar tracking to monitor turbines at the Horns Rev wind farm off Denmark's North Sea Coast, and the Nysted Wind farm in the Baltic Sea, found that seafaring birds were either avoiding the farms altogether, or successfully navigating the gaps between rows.[46] In nearly 3 years of monitoring, the Institute recorded only a single strike.[47]

Benefits of Switching to Offshore Wind

A screening-level analysis of the air quality benefits of 2,400 MW of offshore wind energy showed that deployment would lead to emissions reductions of more than 1,800 tons of nitrogen oxides,780 tons of sulfur dioxide, and 180 tons of particulate matter smaller than 2.5 micrometers, compared to a scenario without the development of this offshore wind energy.[48] These reductions would provide health benefits valuing between $73 and 165 million annually, as well as a

[43] New York State Energy Research and Development Authority. Offshore Wind Plans for New York State. Consideration of Potential Cumulative Effects. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25g-Consideration-of-Potential-Cumulative-Effects.pdf (last accessed 11/17/20)

[44] Loss, Scott R., et al. "Estimates of Bird Collision Mortality at Wind Facilities in the Contiguous United States." *Biological Conservation*, vol. 168, 2013, pp. 201–209.,

[45] Peter Fairley. Massive Offshore Wind Farms Safe for Birds. MIT Technology Review. February, 2007. https://www.technologyreview.com/s/407299/massive-offshore-wind-turbines-safe-for-birds/ (last accessed 11/17/20)

[46] Id.

[47] Id.

[48] New York State Energy Research and Development Authority. Offshore Wind Master Plan. https://www.nyserda.ny.gov/-/media/files/publications/research/biomass-solar-wind/master-plan/offshore-wind-master-plan.pdf (last accessed 11/17/20)

projection of eight to 18 fewer premature deaths every year.[49] The monetized benefits of the estimated public health improvements could total up to 400 million dollars, depending on the size of the offshore facility, and the types of electricity generation being replaced.[50] In addition to assisting New York City and New York State in meeting climate goals and emissions reductions targets, decreasing reliance on fossil fuel based means of energy production with offshore wind energy stands to have significant positive public health impacts for New York residents.

[49] Id.
[50] Id.