U.S. Environmental Protection Agency
Region 2

FACT SHEET

For an OUTER CONTINENTAL SHELF AIR PERMIT

to Construct and Operate

Empire Offshore Wind, LLC
Empire Offshore Wind: Empire Wind Project

EPA Draft Permit Number: OCS-EPA-R2 NY 01

Date: December 1, 2023

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I. BACKGROUND

On August 10, 2022, Empire Offshore Wind, LLC ("Empire Wind") submitted an Outer Continental Shelf ("OCS") air permit application ("application") to the U.S. Environmental Protection Agency ("EPA") Region 2 office pursuant to section 328 of the Clean Air Act ("CAA" or the "Act"), 42 U.S.C. § 7627, and 40 C.F.R. part 55. In its application, Empire Wind requested an OCS air permit for the construction and operation of the Empire Offshore Wind: Empire Wind Project ("Empire Wind project," "project," or "facility") on the OCS approximately 12 and 17 nautical miles ("nm")[1] offshore New York and New Jersey, respectively. Subsequently, Empire Wind submitted updates to its application on various dates. The Empire Wind application was deemed complete on April 21, 2023. A copy of the application, along with additional supporting documents, are included in the administrative record and available in the docket for this permitting action (docket number EPA-R02-OAR-2023-0522) at regulations.gov. After reviewing the application, the EPA prepared the draft OCS air permit (or draft permit) for the Empire Wind project, which is subject to public notice and a 30-day public comment period. As discussed elsewhere in this Fact Sheet, in processing this application, the EPA has followed the administrative and public participation procedures of 40 C.F.R. part 124. The EPA developed this Fact Sheet, as required by 40 C.F.R. part 124 ("Procedures for Decision Making") and which follows the content prescribed at 40 C.F.R. § 124.8.[2] This Fact Sheet provides an overview of the project, the type and amount of air pollutants emitted by the project, a summary of the applicable requirements, an explanation of the legal and factual bases for draft permit conditions, and the EPA's brief analysis of key aspects of the application, such as the air quality impact analysis. Additional information can be found in the application and other documents that are referenced in this Fact Sheet and/or included in the docket for this rulemaking.

II. GENERAL INFORMATION

Applicant Information:

Empire Offshore Wind, LLC
600 Washington Blvd, Suite 800
Stamford, CT 06901

Project Location:

OCS Lease Area Number OCS-A 0512, located about 12 nm south of Long Island, New York, and 17 nm east of Long Branch, New Jersey.

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[1]All "miles" referenced in this Fact Sheet are nautical miles. One nautical or geographical mile is equal to 1.15 statute miles. Requirements under Section 328 of the CAA and 40 C.F.R part 55 differ depending on whether the project is located within or beyond 25 miles from a States' seaward boundaries (*see* Section VI of this Fact Sheet for further discussion), but do not specify whether these are statute miles or nautical miles. However, the Outer Continental Shelf Lands Act ("OCSLA") (43 U.S.C. § 1331 *et seq*.) refers to nautical or geographical miles. Thus, the 25 miles are considered nautical ("nm") or geographical miles. 25 nautical miles are equal to 28.8 statute miles.
[2]40 C.F.R. § 124.8 ("Fact Sheet") can be found at https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-124/subpart-A/section-124.8.

III. PROPOSED PROJECT OVERVIEW

Empire Wind proposes the installation of up to 147[3] wind turbines generators[4] ("WTGs") on the OCS across approximately 65,458 of the total 79,350 acres (26,490 out of 32,112 hectares) located on the Renewable Energy Lease Area OCS-A 0512 awarded by the Bureau of Ocean Energy Management ("BOEM"). Empire Wind proposes to develop two wind farms, EW1 and EW2 (collectively referred to as the "Empire Wind Offshore Wind Farm Project," the "Empire Wind project," the "project," or the "facility"), for which Empire Wind submitted a single application and which are both included in the draft OCS air permit. It is anticipated that the Empire Wind project will generate approximately 2,076 megawatts of electrical power that will be delivered to the State of New York. The WTGs use the energy of the wind, a source of renewable energy, and convert it to electricity. The project will be located about 12 nm south of Long Island, New York ("NY") and 17 nm east of Long Branch, New Jersey ("NJ"). *See* Figure 1 below.

The proposed project's offshore components include the WTGs, and two offshore substations ("OSSs") that will receive the electricity generated by the WTGs via interarray cables. The interarray cables will link the individual WTGs together to the OSSs, and the project will use up to 260 nm (481 kilometers ("km")) of interarray cables. Empire Wind will mount the WTGs on monopile foundations.[5] A transition piece would then be fitted over the monopile and secured via bolts or grout. The OSSs would be installed on piled jacket foundations.[6] Where required, scour protection would be placed around foundations to stabilize the seabed near the foundations. *See* Figure 2 below for diagrams of representative foundation types for the WTGs and OSSs. The OSSs would serve as the interconnection points between offshore and onshore components. Each OSS will include transformers, switchgears, and reactors to increase the voltage of the power captured from the interarray cables and control the flow through the export cables, so that the electricity can be efficiently transmitted onshore through submarine export cables that will stretch up to 66 nm (122 km).[7] These offshore components are on the OCS (with the exception that the portion of the offshore submarine export cables within 3 nm of the NY shore would be in state waters).

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[3]The proposed project action is for 147 WTGs positions. However due to the presence of glauconite in the seabed, there will likely be only 140 or less WTGs positions used.

[4]A wind turbine generator is equipment used to generate electricity from wind.

[5]A monopile foundation typically consists of a single tubular section. For more details, *see* BOEM's Draft Environmental Impact Statement ("DEIS") for Empire Wind, which can be found at https://www.boem.gov/renewable-energy/state-activities/empire-offshore-wind-deis-commercial-wind-lease-ocs-0512.

[6]Piled jacket foundations are formed by a steel lattice construction, composed of tubular steel members, and welded joints, and secured to the seabed by hollow steel pin piles attached to each of the jacket feet.
For more details, *see* BOEM's DEIS for Empire Wind, which can be found at https://www.boem.gov/renewable-energy/state-activities/empire-offshore-wind-deis-commercial-wind-lease-ocs-0512.

[7]Each OSS's topside will also include auxiliary equipment, uninterruptible power supplies, Supervisory Control and Data Acquisition, telecommunication systems, numerous monitoring systems, together with facilities, safety, and rescue equipment for personnel. For further description of the components of an OSS, *see* the Empire Wind Construction and Operations Plan submitted to BOEM, available at https://www.boem.gov/renewable-energy/state-activities/empire-wind-construction-and-operations-plan.

The proposed project's onshore components are not subject to the OCS air regulations and thus will not be covered by the OCS air permit. Those onshore components include components such as the following: up to three export cable landfall areas in NY state; up to three onshore export and interconnection cable routes; two onshore substations in NY state where electricity will be transmitted to the electric grid; an onshore staging port where project components and equipment will be staged; and one operation and maintenance facility with offices, control rooms, warehouses, workshop space, and pier space. Onshore components are being addressed in separate federal, state, and/or local permitting or government review processes that may have their own public comment processes, and are not a subject of the public review for this OCS air permit.

The Empire Wind project will consist of three phases: construction and commissioning ("C&C"), operations and maintenance ("O&M") and decommissioning. Offshore construction is anticipated to begin in 2024 and be completed within four years. The anticipated commercial lifespan of the project (which is the O&M phase) is 35 years.

The OCS air permit will cover the offshore portion of the C&C and O&M phases of the project located on the OCS. The decommissioning phase, which would be the reverse of the construction phase and will involve the use of various marine vessels and construction equipment, is not addressed in this permit. The OCS air permitting requirements for decommissioning will be determined at that time because it is expected that marine vessel technology will substantially change over the next 35 years.

Empire Wind proposes to use various marine vessels, which have onboard marine engines[8] and construction equipment, for the following purposes: (1) for the C&C phase to construct the above-described offshore project components; and (2) for the O&M phase to maintain and repair the offshore project components. The following is a list of the main activities that will occur in the C&C and O&M phases and the types of marine vessels (which will have propulsion and auxiliary marine engines) associated with each of those activities:

C&C:
(1) WTG Monopile and Transition Piece Installation (vessel types: Main Installation Vessel for WTGs Monopile and Transition Piece Installation (vessel name: Thialf); Heavy Transport Vessels; Fall Pipe Vessel – Seabed Filter Layer Installation; Fall Pipe Vessel – Scour Protection Installation; Anchor Handling Tug; Bubble Curtain Vessel; Primary Crew Transfer Vessel; Protected Species Observer Vessel);
(2) WTG Installation (vessel types: Main Installation Vessel for WTGs Towers, Nacelles, and Blades (vessel name: MAERSK); Tugs 1 and 2 for WTGs Towers, Nacelles, and Blades; Cargo Barge 1 (WTGs Blades/Nacelles/Towers); Cargo Barges 1, 2, 3 and 4 (WTGs Blades/Nacelles/Towers));

[8]40 C.F.R. § 1042.901 defines a "marine engine" as "a nonroad engine that is installed or intended to be installed on a marine vessel. This includes a portable auxiliary marine engine only if its fueling, cooling, or exhaust system is an integral part of the vessel. A fueling system is considered integral to the vessel only if one or more essential elements are permanently affixed to the vessel. There are two kinds of marine engines: (1) Propulsion marine engine means a marine engine that moves a vessel through the water or directs the vessel's movement. (2) Auxiliary marine engine means a marine engine not used for propulsion."

(3) OSSs Topside and Foundation Installation (vessel types: Heavy Transport Vessel (OSS Jacket); Heavy Transport Vessel (OSS Topside); Main Installation Vessel for WTGs (vessel name: Thialf) to be used for Topside Installation and in lieu of the Heavy Lift Vessel – OSS Jacket discussed in parts of the application; Anchor Handling Tug; Fall Pipe Vessel – Seabed Filter Layer; Fall Pipe Vessel – Scour Protection Installation; Primary Crew Transfer Vessel; Bubble Curtain Vessel);
(4) Export and Interarray Cable Installation (vessel types: Export Cable Lay Barge (Near-shore); Heavy Lift Vessel – Cable Spool Transport; Export Cable Lay Vessel (Mid-shore); Export Cable (Far-offshore); Tender Support Vessel; Interarray Cable Lay Vessel; Installation Support Vessel; Fall Pipe Vessel - Scour Protection; Pre-Sweep Dredger/Tug Combination; Pre-Trenching Barge; Pre-Trenching Tugs; Pre-Lay Grapnel Run Vessel; Export Cable Safety Vessel; Interarray Cable Safety Vessel); and
(5) Commissioning (vessel types: Service Operations Vessel; Primary Crew Transfer Vessel; Crew Transfer Vessels; Jack-up Accommodation Vessel for OSSs Hookup & Commissioning).

Empire Wind will also use marine engines that will be located onboard marine vessels to power construction equipment on those vessels during C&C or to power each WTG and OSS during commissioning. These marine engines are identified in the application as: motion compensated gripper frame generator engine[9], OSS commissioning generator engine[10], and WTG installation generator engine.[11]

O&M:
(1) Offshore Marine Operations (vessel types: Service Operations Vessel (Battery); Service Operations Vessel (Offshore Accommodations); Primary Crew Transfer Vessels; Survey Vessel); and
(2) Offshore Maintenance (vessel types: Heavy Lift Vessel; Tugs; Cargo Barge; Inter-Array Cable Lay Vessel; Export Cable Lay Vessel).

Empire Wind will not be the owner of the marine vessels used for C&C and O&M, except for the service operations vessel that Empire Wind is having purpose-built to use during O&M. For all other marine vessels, Empire Wind will enter into direct contracts with the vessels' owners. At the time of the application, Empire Wind had completed contracts for only a limited number of the marine vessels. Thus, for those marine vessels that have not yet been contracted and remained unknown at the time of the application, the application was based on marine vessels and marine engines that are representative of the types, configurations, and sizes that are anticipated to be used during C&C and O&M.

[9]This engine will be located on the Heavy Lift Main Installation Vessel for the WTG Monopile and Transition Piece Installation (vessel name: Thialf) and will provide power to the gripper frame that compensates for wave action to hold each monopile in a fixed position during installation.
[10]This engine will be located on the jack-up vessel for the OSS hookup and commissioning and will be used to provide power during commissioning to the OSS topside structure.
[11]This engine will be located on the WTG main installation vessel (vessel name: MAERSK) and will operate for about 9 hours at each WTG location to provide power during installation.

Each marine vessel of the types identified above may qualify as either a "harbor craft"[12] or an "ocean-going vessel"[13], and may be either a "U.S.-flagged vessel"[14] or a "foreign-flagged vessel"[15]. Details on each C&C and O&M activity, marine vessel types and their marine engines used for each activity can be found in the application.

[12]"Harbor craft" (also called "commercial harbor craft") means any private, commercial, government, or military marine vessel including, but not limited to, passenger ferries, excursion vessels, tugboats, ocean-going tugboats, towboats, push-boats, crew and supply vessels, work boats, pilot vessels, supply boats, fishing vessels, research vessels, U.S. Coast Guard vessels, hovercraft, emergency response harbor craft, and barge vessels that do not otherwise meet the definition of ocean-going vessels or recreational vessels. *See* 17 CCR § 93118.5.

[13]"Ocean-going vessel" means a commercial, government, or military vessel meeting any one of the following criteria:

a. a vessel greater than or equal to 400 feet in length overall (LOA) as defined in 50 C.F.R. § 679.2, as adopted June 19, 1996;
b. a vessel greater than or equal to 10,000 gross tons (GT ITC) per the convention measurement (international system) as defined in 46 C.F.R. 69.51-.61, as adopted September 12, 1989; or
c. a vessel propelled by a marine compression-ignition engine with a per-cylinder displacement of greater than or equal to 30 liters. *See* 17 CCR § 93118.5.

[14]"U.S.-flagged vessel" means a vessel of U.S. registry, or a vessel operated under the authority of the United States.

[15]"Foreign-flagged vessel" means a vessel of foreign registry, or a vessel operated under the authority of a country other than the United States. *See* 40 C.F.R. § 1043.20.

Figure 1. This figure is from the Empire Wind application and shows the location of the Empire Wind project relative to the New York and New Jersey shores, as well as the routes of the submarine export cables.

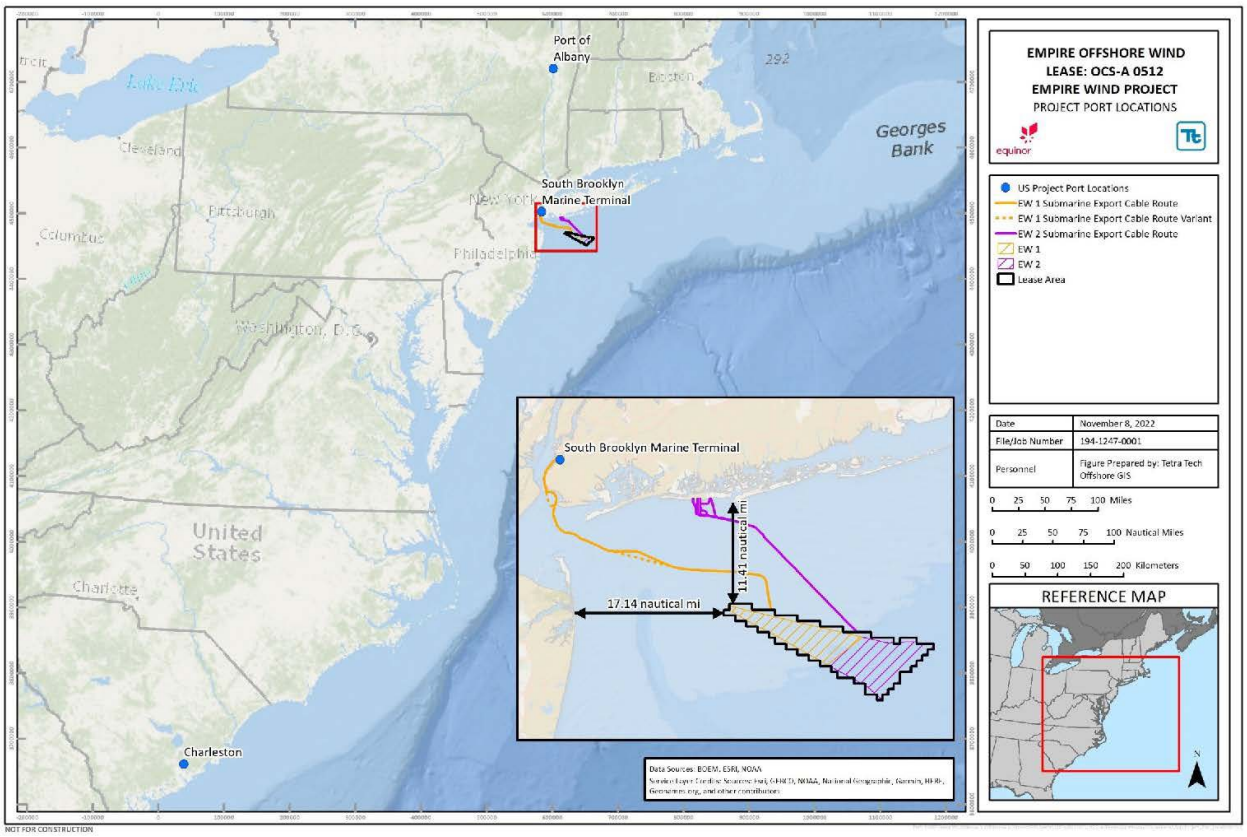
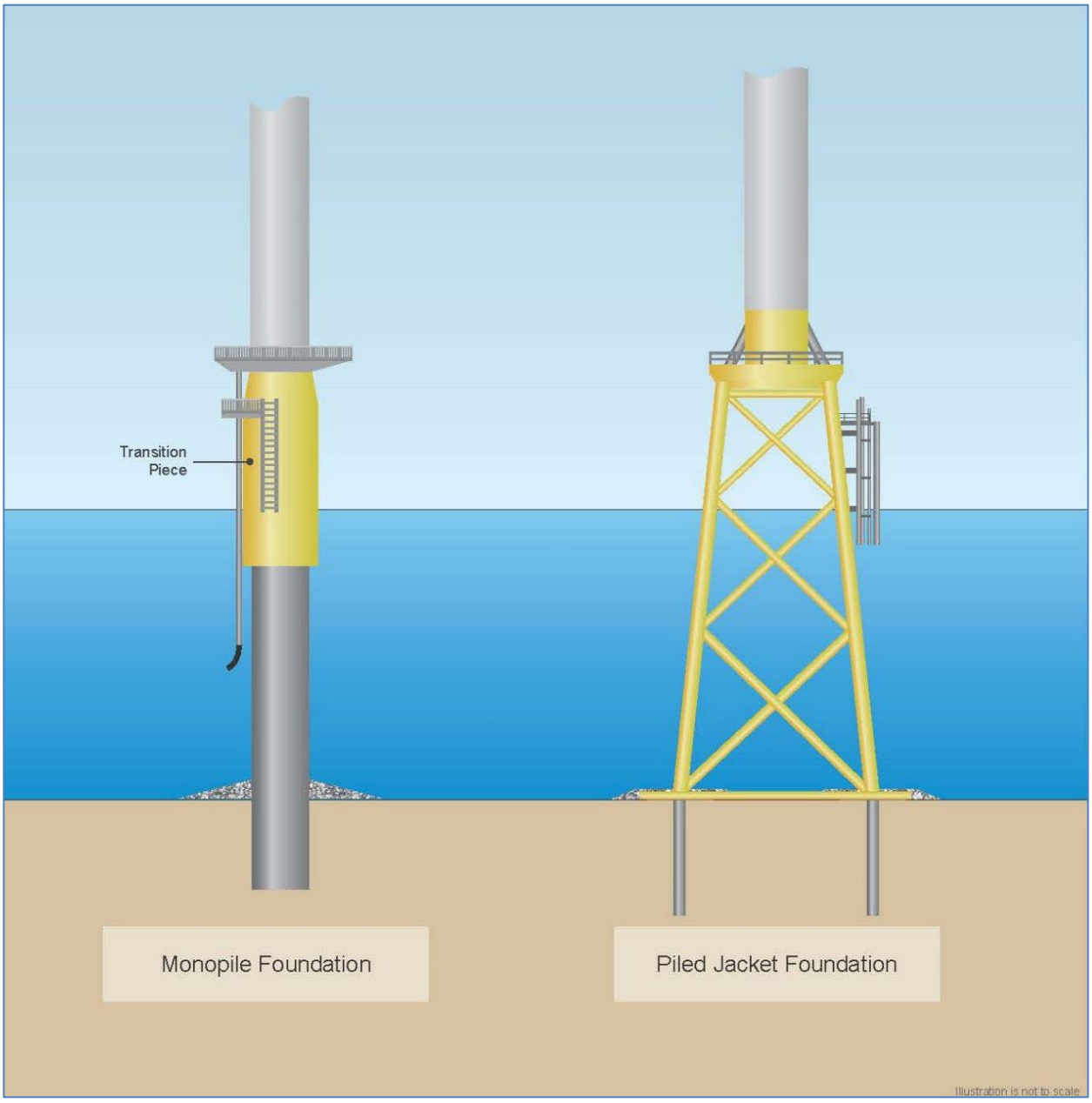


Figure 2. This figure is from the Bureau of Ocean Energy Management ("BOEM") Draft Environmental Impact Statement ("DEIS") for Empire Wind and shows the monopile and piled jacket foundation types. The DEIS can be found at https://www.boem.gov/renewable-energy/state-activities/empire-offshore-wind-deis-commercial-wind-lease-ocs-0512.



IV. AIR POLLUTANTS AND EMISSION SOURCES

A. Types of Air Pollutants

Air pollutant emissions generated from the project will include nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}), particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$)[16], volatile organic compounds (VOC)[17], lead (Pb), greenhouse gas (GHG), sulfuric acid mist (H_2SO_4), and hazardous air pollutants (HAPs)[18].

B. Emission Sources

Emission of the above listed air pollutants are associated with the following project components and/or activities.

1. Combustion of diesel fuel in the project's marine and non-marine engines

a. Marine Engines

The main emission sources of the Empire Wind project will be the marine engines (including both propulsion (or main) and auxiliary marine engines[19]) onboard various types of marine vessels, which will be used on a temporary basis during C&C and O&M. *See* Section III of this Fact Sheet for a summary of the types of marine vessels proposed to be used during C&C and O&M. Some of the marine engines will be located on marine vessels that will be OCS sources, while other marine engines will be located on vessels that will not be OCS sources.

The main and auxiliary marine engines on the marine vessels will be a mix of Category 1, Category 2, and Category 3 marine engines.[20] The marine engines will be compression ignition ("CI") internal combustion engines ("ICE") that will use ultra-low-sulfur diesel ("ULSD") fuel with a maximum sulfur content of 15 parts per million ("ppm"). For the Category 3 marine engines that will be fueled at overseas terminals, low sulfur diesel marine gas oil ("LSMGO") (or marine diesel fuel oil) with a maximum sulfur content of 1,000 ppm will be used. Details on the marine vessel types used for C&C and O&M and their marine engines can be found in the application and the draft permit.

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[16] NO_x and SO_2 are precursors for $PM_{2.5}$.
[17] NO_x and VOC are precursors to and the measured pollutants for the criteria pollutant ozone.
[18] The HAPs emissions that would result from the project are estimated to result from fuel combustion in engines.
[19] As noted earlier in this Fact Sheet, a propulsion marine engine is a marine engine that moves a vessel through the water or directs the vessel's movement, and an auxiliary marine engine is a marine engine not used for propulsion. *See* the "marine engine" definition in 40 C.F.R. § 1042.901.
[20] Under 40 C.F.R. § 1042.901 ("Definitions"), *Category 1* engines include marine engines with specific engine displacements below 7.0 liters per cylinder, *Category 2* engines include marine engines with specific engine displacements at or above 7.0 liters per cylinder but less than 30.0 liters per cylinder, and *Category 3* engines include reciprocating marine engines with specific engine displacements at or above 30.0 liters per cylinder.

There will also be marine engines that will be located onboard marine vessels and used to power construction equipment located onboard marine vessels during C&C or to provide power during commissioning to each of the WTGs and OSSs. Empire Wind anticipates that all of these engines will be Category 2 marine engines. Details on the marine engines used to power construction equipment onboard marine vessels can be found in the application and the draft permit.

b. Non-Marine Engines

Types of non-marine engines that will be emission sources of the project include:

i. Portable diesel generator engines used during C&C that will be temporarily located on either the OSSs or WTGs platforms to provide power for (1) construction equipment, lighting, and other tasks; (2) each WTG commissioning; and (3) to pull interarray or submarine export cables during commissioning.

ii. Portable diesel generator engines that will be temporarily located on the WTGs platforms and used to provide emergency power at individual WTGs during O&M. It is estimated that each of these engines will be needed for approximately 6 days at EW1 and 6 days at EW2, up to once every 10 years. .

iii. Permanent diesel generator engines that will be located on a permanent basis on the OSSs and will be used for both emergency and non-emergency purposes during O&M. Each engine operation will be limited to 2,000 hours per pear.

All non-marine engines will be CI ICE and will use ULSD as fuel. Details on the non-marine engines can be found in the application and the draft permit.

2. Other project emission sources

a. SF_6-Insulated Electrical Switchgears

Each WTG and OSS will be equipped with electrical equipment insulated with sulfur hexafluoride ("SF_6")[21], referred to in the draft permit as "SF_6-insulated electrical switchgears." This includes switches that will be installed in the WTGs' foundations and in the OSSs' topsides, as well as a gas-insulated bus duct on the OSS for EW2. The gas-insulated bus duct is a metal pipe with an internal bus consisting of a copper bar encapsulated in an aluminum enclosure. The bus duct is designed to transfer power more efficiently than cables. In addition, Empire Wind anticipates storing SF_6 material in some small containers at the project site[22] that will be used to

[21]Sulfur hexafluoride (SF_6) is a synthetic fluorinated compound with an extremely stable molecular structure. It is also the most potent greenhouse gas known to date. Over a 100-year period, SF_6 is 22,800 times more effective at trapping infrared radiation than an equivalent amount of carbon dioxide (CO_2). SF_6 is also a very stable chemical, with an atmospheric lifetime of 3,200 years.

[22]Empire Wind stated the following in its March 21, 2023 response to the EPA's December 22, 2022 comments, which can be found in Appendix A, Attachment A-6 of the application: "SF_6 storage tank(s) will be located at the project site(s), the exact location has not been determined at this point in the project's maturity. The exact quantity and locations of the storage and related equipment will be determined as part of detailed design.

facilitate refills of SF_6-insulated electrical switchgears during maintenance activities. The SF_6-insulated electrical switchgears will be emission sources of fugitive emissions[23] of SF_6, a GHG, during O&M, due to possible equipment leakage. Fugitive SF_6 emissions could also leak during refilling events throughout the life of the project.

b. ULSD Storage Tanks During C&C and O&M

During C&C, Empire Wind will use two ULSD storage tanks located temporarily on the OSSs' platforms. During O&M, Empire Wind will use two ULSD storage tanks located permanently on the OSSs' platforms.[24] Each of the storage tanks will have a capacity of 7,925 gallons. These storage tanks are potential emission sources of fugitive VOC emissions due to the VOC content of the diesel fuel.

c. Painting and Cleaning Activities

During C&C, Empire Wind anticipates conducting touch-up painting of the WTGs' and OSSs' components and using small amounts of various solvents to clean mechanical components on the WTGs and OSSs at the project location. During O&M, Empire Wind anticipates periodically conducting repainting and/or touch-up painting of the WTGs and OSSs, and periodically using small amounts of various solvents to clean mechanical components of the WTGs and OSSs. These activities, collectively referred to as painting and cleaning activities[25], are potential emission sources of fugitive VOC emissions due to the VOC content of the paints, solvents, and cleaners.

C. Estimated Amounts of Air Pollutants (Potential Emissions or Potential to Emit) in Tons Per Year ("tpy")

Table 1 below indicates the potential to emit ("PTE") that Empire Wind calculated in its application for each pollutant during each project phase. The information in Table 1 also appears in the draft permit, and each listed limit is in tons per year ("tpy"), on a 12-month rolling total basis. Actual emissions by the project must be limited to no more than these amounts.

Notionally, the scope includes one bottle of SF_6 for EW1 and EW2, approximately 90lbs (40kg) each, and a gas handling cart (recovery, processing, and refilling functions, or equivalent) that will store some additional volume of gas." (Note that Dilo is a type or brand of gas handling cart.)

[23]6 NYCRR 200.1(af), which is incorporated by reference into 40 C.F.R. part 55, defines "fugitive emissions" as "[e]missions of air contaminants which could not reasonably pass through a stack, vent, chimney, or other functionally equivalent opening."

[24]Empire Wind has also indicated that it anticipates each OSS using transformers/shunt reactors that use mineral oil. However, since the transformers/shunt reactors will be hermetically sealed, they will not have fugitive VOC emissions.

[25]In the application, Empire Wind asserts that the painting activities would qualify as trivial activities under paragraph 45 of 6 NYCRR 201-3.3 and thus exempt from permitting. However, the EPA notes that 6 NYCRR 201-3 is not incorporated by reference into 40 C.F.R. part 55.

Table 1 – OCS Facility Potential to Emit Limits (in tpy, on a 12-month rolling total basis)

Project Phase	NO_x	CO	VOC	PM	PM_{10}	$PM_{2.5}$	SO_2	GHGs (as CO_2e[26])
C&C	1,821.85	833.29	145.76	56.27	56.27	53.83	44.59	151,404
O&M	178.68	234.71	18.97	6.06	6.06	5.83	2.39	35,237

a. The C&C PTE limits (in tpy) listed in Table 1 represent the OCS Facility's maximum emissions of each air pollutant that are estimated to occur in any one of the 4 years anticipated for C&C. The O&M PTE limits (in tpy) listed in Table 1 represent the OCS Facility's maximum emissions of each air pollutant that are estimated to occur in any year of the 35 years of the anticipated commercial lifespan of the project. These tpy PTE limits are included in the draft permit.

b. The C&C and O&M PTE limits in Table 1 include 1) emissions occuring at the OCS Facility generated by all of the above-described emission sources, and 2) emissions from marine engines of vessels servicing or associated with the OCS Facility when the vessels are en route to and from the OCS Facility while within 25 nm of the OCS Lease Area boundaries[27], including those emissions that may be occuring within state waters (i.e., within 3 nm of the NY or NJ shoreline). *See* Figure 3 below for an illustration of the area located within 25 nm of the Lease Area Boundary. Details on the methods used to calculate the air pollutant amounts included in the above table can be found in the application, and the draft permit details how Empire Wind shall calculate the actual emissions of each of the air pollutants included in Table 1 to verify compliance with each of the PTE limits.

c. The draft permit defines "OCS Facility" as the entire wind development area once the first OCS source is established in the wind development area. The first OCS source is established once any equipment or activity that meets the definition of an OCS source is located within the wind development area. The wind development area, or WDA, for this project is the designated Renewable Energy Lease Area OCS-A 0512, awarded by BOEM, located on the OCS. See the draft permit for the full definition. Note that the

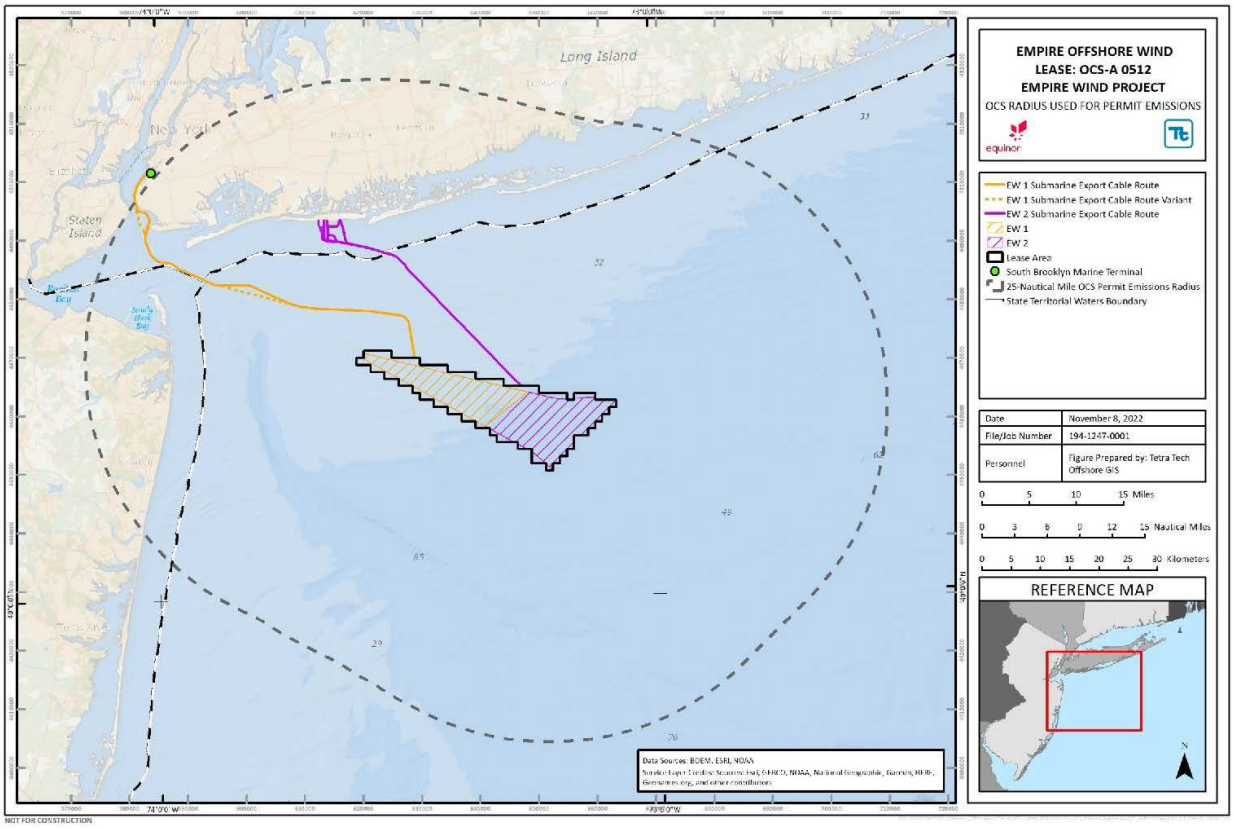
[26] CO_2e means carbon dioxide equivalent.

[27] The following justification supporting that measuring the 25 nm from the boundaries of the Lease Area is conservative was included by Empire Wind in Section 2.5 on page 10 of the application: "In accordance with the definition of 'potential emissions' in 40 CFR § 55.2, emissions from vessels have been included when they are within 25 nm of an OCS source and are traveling to or from that source. This 25 nm distance has conservatively been measured from the boundaries of the Lease Area (rather than from a central point), because it is possible that an OCS source could be present at any location within the Lease Area. Measuring the 25 nm distance from the Lease Area boundary ensures that for any location where an OCS source could be present, the associated vessel emissions within 25 nm of that source have been captured."

term WDA is used before an individual OCS source is established. Once the first OCS source is established in the WDA, the entire WDA is considered the OCS Facility.

d. The draft permit defines "OCS Lease Area" as the area within the designated Renewable Energy Lease Area OCS-A 0512, awarded by the BOEM and located about 12 nm south of Long Island, New York and 17 nm east of Long Branch, New Jersey. The boundaries of the lease area are those defined by the BOEM lease.

Figure 3. This figure is from the Empire Wind application and shows the area located within 25 nm of the OCS Lease Area boundaries.



V. OCS STATUTORY REQUIREMENTS

Section 328(a) of the CAA, 42 U.S.C. § 7627(a), required the EPA Administrator to establish, by rule, requirements to control air pollution from OCS sources to attain and maintain Federal and State ambient air quality standards and comply with the provisions of part C of title I of the Act.[28] These OCS sources are subject to the Outer Continental Shelf Lands Act ("OCSLA") and can be located in all areas of the OCS, except those located in the Gulf of Mexico west of 87.5 degrees longitude (near the border of Florida and Alabama).[29] On September 4, 1992, the EPA complied with this statutory mandate by promulgating OCS air regulations at 40 C.F.R. part 55,[30] which regulates federal and state criteria pollutants and precursors to those pollutants.[31] At that time, the covered OCS activity was primarily related to the exploration and recovery of oil and gas.

The Energy Policy Act of 2005, Pub. L. No. 109-58, amended the OCSLA to grant the Secretary of the Department of Interior ("DOI") the authority to issue leases, easements, or rights-of-way on the OCS for the purpose of renewable energy development, including wind energy development.[32] Since renewable energy development, including wind energy development, was then authorized under OSCLA, renewable energy development projects could qualify as OCS sources under CAA Section 328 and be subject to the OCS statutory and regulatory requirements, as explained in more detail in later sections of this Fact Sheet.

DOI delegated the authority to issue leases, easements and rights-of-way on the OCS to the former Minerals Management Service (MMS), now BOEM. On April 22, 2009, BOEM announced final regulations for the OCS Renewable Energy Program. These BOEM regulations, codified at 30 C.F.R. part 585, provide a framework for issuing leases, easements, and rights-of-way for OCS activities that support production and transmission of energy from sources other than oil and natural gas.

For wind energy projects, BOEM issues commercial leases, reviews construction and operation plans ("COPs") and approves, approves with modifications, or disapproves those COPs, under OCSLA's authority. Thus, projects such as the Empire Wind Offshore Wind Farm Project are authorized by the OCSLA. BOEM approved the Empire Wind project's COP on [insert date later] [or BOEM is in the process of approving the Empire Wind project's COP in the next [insert date].

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[28]Part C of title I of the Act contains the Prevention of Significant Deterioration of Air Quality ("PSD") requirements.
[29]Public Law 112-74, enacted on December 23, 2011, amended CAA § 328(a) to add an additional exception from EPA regulation for OCS sources "located offshore of the North Slope Borough of the State of Alaska."
[30]*See* Outer Continental Shelf Air Regulations; Final Rule, 57 Fed. Reg. 40792 (Sept. 4, 1992) (finalizing OCS regulations at 40 C.F.R. part 55).
[31]Outer Continental Shelf Air Regulations; Proposed Rule, 56 Fed. Reg. 63774, 63786 (Dec. 5, 1991).
[32]*See* 43 U.S.C. § 1337(p)(1)(C).

VI. 40 C.F.R. Part 55 – OCS AIR REGULATIONS

Pursuant to CAA § 328(a), the EPA established two different regulatory authorities in 40 C.F.R part 55: one for OCS sources located beyond 25 miles of a state's seaward boundary[33] ("outer OCS sources"), and another for OCS sources located within 25 miles of a state's seaward boundary ("inner OCS sources"). Section 328(a) of the CAA requires that for sources located within 25 miles of a State's seaward boundary, such as the Empire Wind project, the requirements shall be the same as would be applicable if the sources were located in the corresponding onshore area ("COA"), which is typically the state geographically closest to the OCS source.

A. OCS Source Requirements for Sources Located Within 25 Miles of States' Seaward Boundaries

OCS sources located within 25 miles of a state's seaward boundary, such as the Empire Wind project, are required to comply with all federal requirements for such OCS sources listed in 40 C.F.R. § 55.13[34], and with any applicable state and/or local air emissions requirements in effect in the COA which the EPA has incorporated by reference at 40 C.F.R. § 55.14, and are listed in 40 C.F.R. part 55, Appendix A. In the event of conflict between the federal OCS source requirements contained at 40 C.F.R. § 55.13 and the state/local OCS source requirements incorporated by reference in 40 C.F.R. § 55.14 and listed in Appendix A of 40 C.F.R. part 55, the more stringent requirement shall apply. *See* 40 C.F.R. § 55.14(a). Thus, the location of an inner OCS source determines the applicable OCS regulatory requirements, and the applicable state and/or local air emissions requirements vary depending on an inner OCS source's COA. Also, OCS sources are subject to all CAA monitoring, reporting, inspection, compliance, and enforcement requirements, as well as the monitoring, reporting, and inspection requirements of 40 C.F.R. §§ 55.13 and 55.14, pursuant to 40 C.F.R. §§ 55.8 and 55.9.

B. OCS Air Regulation Permitting Requirements

Pursuant to 40 C.F.R § 55.6(b), no OCS source to which federal requirements specified at 40 C.F.R. § 55.13 or state requirements specified at 40 C.F.R. § 55.14 apply shall begin actual construction without a permit. The Empire Wind Offshore Wind Farm Project is such an OCS source. Further, 40 C.F.R § 55.6(a)(4) states that construction or operation of an OCS source subject to 40 C.F.R. part 55 prior to receiving approval shall constitute violation of 40 C.F.R. part 55.[35]

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[33] In general, a coastal state seaward boundary is a line three nautical miles distant from its coastline. For Texas and Florida, the state seaward boundary is a line nine nautical miles distant from their coastline.

[34] A given inner OCS source would be subject to 40 C.F.R. § 52.21 and 40 C.F.R. parts 60, 61, 63, and 71 requirements in the same manner as in the COA, to the extent that these federal regulations are applicable to that inner OCS source. *See* 40 C.F.R. §§ 55.13(a), (c), (d)(1), (e), and (f)(1).

[35] 40 C.F.R. § 55.6(a)(4) states, in relevant part, "[A]ny owner or operator of a source subject to the requirements of this part who commences construction after the effective date of this part without applying for and receiving approval under this part, shall be in violation of this part." 40 C.F.R. § 55.6(a)(4).

C. Notice of Intent

For inner OCS sources, 40 C.F.R. § 55.4(a) requires applicants to submit a notice of intent ("NOI")[36] to the appropriate EPA regional office and the state agency (or agencies) of the nearest onshore area ("NOA")[37] and onshore areas adjacent to the NOA. The NOI must be submitted before performing any physical change or change in method of operation that results in an increase in emissions, but not more than 18 months prior to submitting an application for a preconstruction permit. Empire Wind submitted an NOI on March 10, 2022.

D. Corresponding Onshore Area Designation

40 C.F.R. § 55.2 states that the "Corresponding Onshore Area (COA) means, with respect to any existing or proposed OCS source located within 25 miles of a State's seaward boundary, the onshore area that is geographically closest to the source or another onshore area that the Administrator designates as the COA, pursuant to [40 C.F.R. § 55.5]." One of the purposes of the NOI requirements of 40 C.F.R. part 55 is to allow an applicable state agency that believes it has more stringent air pollution control requirements than the NOA to submit a request that the EPA designate its state as the COA instead of the NOA. Information in Empire Wind's NOI supported that the State of New York ("NY") is the NOA, and the EPA did not receive a request from another state to be designated as the COA for this proposed project. Thus, NY is the COA. *See* 40 C.F.R. § 55.5(b)(1).

E. Consistency Update

CAA section 328(a) requires that for inner OCS sources, the applicable air requirements shall be the same as would be applicable if the sources were located in the COA. To comply with this statutory mandate, the EPA must incorporate by reference into part 55 the applicable state rules for onshore sources.[38] To comply with this statutory mandate, the EPA must incorporate by reference into part 55 the applicable state rules for onshore sources.[39] Because the requirements for the inner OCS sources are based on onshore requirements, and onshore requirements may change, CAA § 328(a)(1) requires that the EPA update the OCS requirements as necessary to maintain consistency with onshore requirements. As discussed in this Fact Sheet, the COA for

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[36]Among other elements, the NOI must include an estimate of the proposed OCS source's potential emissions (in tons per year) of any air pollutant, information necessary to determine the applicability of onshore requirements, and information necessary to determine the source's impact on onshore areas. *See* 40 C.F.R. § 55.4(b).

[37]"*Nearest Onshore Area (NOA)* means, with respect to any existing or proposed OCS source, the onshore area that is geographically closest to that source." 40 C.F.R. § 55.2.

[38]The EPA has limited flexibility in deciding which requirements will be incorporated into 40 C.F.R. part 55 and cannot make substantive changes to the requirements it incorporates. As a result, the EPA may be incorporating rules into 40 C.F.R. part 55 that do not conform to all of the EPA's state implementation plan ("SIP") guidance or certain requirements of the CAA. Inclusion in the OCS rules does not imply that a rule meets the requirements of the CAA for SIP approval, nor does it imply that the rule will be approved by the EPA for inclusion in the SIP.

[39]40 C.F.R. § 55.12 specifies certain times at which part 55's incorporation by reference of a state's rules must be updated. One time a consistency update must occur is when any OCS source applicant submits a NOI under 40 C.F.R. § 55.4 for a new or modified OCS source. The OCS source applicant cannot then submit an application for a preconstruction permit to the EPA until the EPA proposes any necessary consistency update. 40 C.F.R. §§ 55.6(b)(2) and 55.12(f).

the proposed Empire Wind project is the State of NY. Therefore, on September 14, 2022,[40] the EPA updated the New York air pollution control rules incorporated by reference into 40 C.F.R. § 55.14, and the "New York" section of Appendix A to 40 C.F.R. part 55 which lists rules, to reflect those rules currently in effect, and, thus, applicable to OCS sources.[41]

F. OCS Air Regulations and Delegation of Authority

Pursuant to CAA § 328(a)(3) and 40 C.F.R. § 55.11(a), States adjacent to OCS sources subject to the requirements of 40 C.F.R. part 55 may submit a request to the EPA for delegation of the authority to implement and enforce the OCS air emission requirements for those OCS sources.[42] If there is no delegated agency in the COA for sources located within 25 miles of a State's seaward boundary, the EPA will permit, implement and enforce the 40 C.F.R. part 55 requirements.[43] EPA is the permitting authority for the proposed Empire Wind project.

G. Administrative Procedures and Public Participation

40 C.F.R. § 55.6(a)(3) requires the EPA to follow the applicable administrative and public participation procedures of 40 C.F.R. part 71, or the applicable procedures of 40 C.F.R. part 124 for issuing Prevention of Significant Deterioration ("PSD") permits, when processing OCS permit applications under 40 C.F.R. part 55. The EPA has elected to follow the applicable PSD administrative procedures of 40 C.F.R. part 124 for processing this application. These administrative procedures, among other things, require public notice of permit actions, a public comment period, and the preparation of a Fact Sheet.[44] *See* more details on public participation in Section XVIII of this Fact Sheet.

VII. AIR QUALITY IN THE COA

As noted elsewhere in this Fact Sheet, the COA for the proposed project is the State of NY. The nearest county to the project location is Nassau County, Long Island, NY. Nassau County is currently designated as in severe nonattainment for ozone and as in attainment with or unclassifiable for the National Ambient Air Quality Standards ("NAAQS") for the following air

[40]"Outer Continental Shelf Air Regulations; Consistency Update for New York," 87 Fed. Reg. 56277 (September 14, 2022).

[41]The EPA evaluated the proposed regulations to ensure that they are rationally related to the attainment or maintenance of Federal or state ambient air quality standards (AAQS) or part C of title I of the Act, that they are not designed expressly to prevent exploration and development of the OCS, and that they are applicable to OCS sources. *See* 40 C.F.R. § 55.1. The EPA also evaluated the rules to ensure they are not arbitrary and capricious. 40 C.F.R. § 55.12(e). The EPA excluded New York's administrative or procedural rules, and requirements that regulate toxics which are not related to the attainment and maintenance of Federal and State AAQS.

[42]The OCS delegation authority will only be delegated to a state if the EPA determines that the state provisions are adequate, based on specific criteria. *See* 40 C.F.R. § 55.11(b). The authority to implement and enforce 40 C.F.R. §§ 55.5, 55.11, and 55.12 will not be delegated. *Id.*

[43]*See* 40 C.F.R. § 55.11(j).

[44]*See* 40 C.F.R. §§ 124.10, 124.4 & 124.8.

pollutants: SO_2, NO_2[45], CO, PM_{10}, $PM_{2.5}$, and Pb.[46] The nearby counties, specifically the five counties of New York City and Suffolk County of Long Island, have the same attainment and nonattainment status as Nassau County, except that the county of Manhattan is a moderate nonattainment area for PM_{10}.

VIII. APPLICABILITY OF PART 55 REQUIREMENTS

A. What is an OCS Source?

CAA section 328(a)(4)(C) defines "OCS source" as: "any equipment, activity, or facility which—

(i) emits or has the potential to emit any air pollutant,
(ii) is regulated or authorized under the Outer Continental Shelf Lands Act [43 U.S.C. 1331 et seq.], and
(iii) is located on the Outer Continental Shelf or in or on waters above the Outer Continental Shelf."

The CAA definition goes on to say that "[s]uch activities include, but are not limited to, platform and drill ship exploration, construction, development, production, processing, and transportation. . . ."

The regulatory definition of "OCS source" at 40 C.F.R. § 55.2 repeats the three prongs of the statutory definition and further clarifies that:

> "This definition shall include vessels only when they are:
>
> 1. Permanently or temporarily attached to the seabed and erected thereon and used for the purpose of exploring, developing, or producing resources therefrom, within the meaning of section 4(a)(1) of OCSLA (43 U.S.C. §1331 et seq.); or
> 2. Physically attached to an OCS facility, in which case only the stationary sources [*sic*] aspects of the vessels will be regulated."

Under 40 C.F.R. § 55.2, "'[o]uter continental shelf' shall have the meaning provided by section 2 of the OCSLA (43 U.S.C. § 1331 *et seq.*)," which in turn defines "outer continental shelf" as "all submerged lands lying seaward and outside of the area of lands beneath navigable waters as defined in section 1301 of this title, and of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control."

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[45] NO_2 means nitrogen dioxide.

[46] The EPA has developed National Ambient Air Quality Standards ("NAAQS") for the following air contaminants (or air pollutants), known as criteria pollutants, for the protection of public health and welfare: SO_2, CO, NO_2, PM_{10}, $PM_{2.5}$, Lead, and Ozone (O_3). Typically, ozone is not emitted directly into the air but rather primarily forms from the reaction of VOC and NO_x in sunlight. VOC and NO_x are often emitted directly into the air and are commonly referred to as ozone precursors. Therefore, emissions of the precursors to ozone are quantified instead of ozone. In addition to the NAAQS, NY has adopted state ambient air quality standards ("NYAAQS") for SO_2, fluoride, and hydrogen sulfide. Details on the NAAQS and NYAAQS can be found at Section 3.2 on pages 24 through 26 of the application.

Once a facility, vessel, equipment, or activity is considered an OCS source, then the emission sources of that OCS source become subject to the requirements of 40 C.F.R part 55, which include: (1) obtaining an OCS air permit, as required by 40 C.F.R. § 55.6(b); (2) complying with the applicable federal regulatory requirements specified at 40 C.F.R. § 55.13; (3) for an OCS source located within 25 miles of a state's seaward boundary, complying with the COA's state or local air emissions requirements specified at 40 C.F.R. § 55.14; (4) monitoring, reporting, inspection and enforcement requirements specified at 40 C.F.R. §§ 55.8 and 55.9; and (5) permit fees as specified under 40 C.F.R § 55.10.

Under 40 C.F.R. § 55.2, "[n]ew source or new OCS source" shall have the meaning given in the applicable requirements of 40 C.F.R. §§ 55.13 and 55.14.

B. Scope of the OCS Source for the Empire Wind Project

The EPA is treating the Empire Wind project as a single OCS source because all such equipment and activities are integral components of a single industrial operation that emits or has the potential to emit any air pollutant, is regulated or authorized under the OCSLA, and is located on the OCS or in or on waters above the OCS. For clarity, both this Fact Sheet and the draft permit use the term "OCS Facility" to refer to the entire wind development area (i.e., the area included in Renewable Energy Lease Area OCS-A 0512) once the first OCS source is established in the WDA. The OCS Facility is comprised of all offshore WTGs and their foundations, each OSS, and its foundation, the interarray cables, and vessels when they meet the definition of an OCS source in 40 C.F.R. § 55.2. Emissions from any vessel "servicing or associated with" any component of the OCS Facility (including any WTG or OSS) while at the OCS Facility and while en route to or from the OCS Facility within 25 nautical miles of it must be included in the project's potential to emit, consistent with the definition of "potential emissions" in 40 C.F.R. § 55.2.

The draft permit includes terms related to the following components of the OCS Facility:

- All of the Empire Wind project's OSS and WTG structures (e.g., foundations, platforms, topsides) with their associated emission sources. These associated emission sources include: (1) non-marine engines (including portable diesel generator engines located on the OSSs or WTGs during C&C and O&M and permanent diesel generator engines on the OSSs during O&M); (2) SF_6-insulated electrical switchgears and associated refilling activities; (3) ULSD storage tanks; and (4) painting and cleaning activities. The emission sources listed above will be subject to the applicable requirements of 40 C.F.R. part 55.

- All of the marine vessels used during C&C and O&M that would meet the "permanently or temporarily attached to the seabed..." OCS source criterion in the above-listed regulatory OCS source definition, and those vessels' onboard marine engines, during the times they are permanent or temporarily attached. These marine engines, which constitute the vessels' emission sources, include propulsion and auxiliary marine engines operated during times the vessel meets the OCS source definition, and marine engines onboard the vessels that meet the OCS source definition and used for the purpose of providing power for OSSs and WTGs during C&C. These emission sources would be subject to the

applicable requirements of 40 C.F.R. part 55.

- All of the marine vessels that would attach to WTGs, OSSs, or to other marine vessels that are OCS sources. The "stationary source aspects" of these vessels (e.g., non-propulsion marine engines) would constitute the emission sources and will be regulated under 40 C.F.R. part 55.

  Empire Wind, in its application, identified several marine vessels associated with the proposed project (both harbor craft and ocean-going types of vessels) that would meet the OCS source criteria during C&C and O&M. *See* the application for details. The EPA agrees with the assertion Empire Wind made in its application that additional marine vessels beyond those already anticipated to meet the OCS source criteria could potentially meet such criteria. Thus, the list included in the application is not meant to be exhaustive. In the event additional marine vessels associated with the Empire Wind project would meet the OCS source criteria, their marine engines would become subject to the applicable requirements of 40 C.F.R. part 55. The draft permit specifies how those situations should be handled.

Marine engines onboard vessels may meet the definition of "nonroad engine" in section 216(10) of the CAA, 42 U.S.C. § 7550. However, certain marine engines on vessels that meet the definition of an OCS source are regulated as stationary sources and subject to the applicable OCS source requirements of 40 C.F.R. part 55. In addition, based on the specific requirements of CAA section 328, emissions from engines onboard other vessels that are nonroad engines are considered direct emissions from the OCS source if the vessels are servicing or associated with an OCS source, for the purposes of calculating potential emissions of that OCS source.

C. Definition of the OCS Source Potential Emissions

Under 40 C.F.R. § 55.2, the potential emissions (or potential to emit or PTE) of an OCS source is defined as follows:

> *"Potential emissions* means the maximum emissions of a pollutant from an OCS source operating at its design capacity. Any physical or operational limitation on the capacity of a source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as a limit on the design capacity of the source if the limitation is federally enforceable. Pursuant to section 328 of the Act, emissions from vessels servicing or associated with an OCS source shall be considered direct emissions from such a source while at the source, and while enroute to or from the source when within 25 miles of the source and shall be included in the 'potential to emit' for an OCS source. This definition does not alter or affect the use of this term for any other purposes under (40 C.F.R. §§ 55.13 or 55.14], except that vessel emissions must be included in the 'potential to emit' as used in [40 C.F.R. §§ 55.13 and 55.14]."

Empire Wind has determined its PTE consistent with the definition of "potential emissions" in 40 C.F.R. § 55.2 and with the above-described scope of the "OCS source." The Empire Wind project's emissions consist almost entirely of emissions from marine engines.

IX. SCOPE OF STATIONARY SOURCE

The Clean Air Act's New Source Review ("NSR") program requirements for major sources are implemented by the State of NY through its Nonattainment New Source Review ("NNSR") and PSD air quality regulations contained in 6 New York Codes, Rules, and Regulations ("NYCRR") Part 231 and approved by the EPA into the NY State Implementation Plan ("SIP").[47] The PSD regulations apply in areas that meet the NAAQS, or attainment areas, and the NNSR regulations apply in areas that do not meet one or more of the NAAQS, or nonattainment areas. NY's NSR permitting program applies to new major facilities[48] such as the Empire Wind project. NY also has an EPA-approved title V permitting program, discussed later in this Fact Sheet, which also applies to major facilities.

The NY State regulations define "major stationary source or major source or major facility" as "Any stationary source or any group of stationary sources, any source or any group of sources, or any facility or any group of facilities, that is located on one or more contiguous or adjacent properties and is under common control, belonging to a single major industrial grouping and that are described in subparagraph (i), (ii), (iv) or (v) of this [definition]. . . ."[49] The regulations in turn define a "stationary source" as "[a]ny building, structure, facility or installation, excluding nonroad engines, that emits or may emit any air pollutant."[50]

Based on the above-described definitions in the NY State regulations, and consistent with the EPA's previous "scope of stationary source" determinations for OCS wind-to-energy projects, all components of the Empire Wind project OCS Facility are part of *one stationary source* for NSR and title V permitting purposes.

X. 40 C.F.R. § 55.13 – APPLICABLE FEDERAL REQUIREMENTS

As explained previously, once any equipment, activity, or facility is considered an OCS source, the 40 C.F.R. part 55 regulations require the source to obtain an OCS air permit. An OCS air permit may contain, but is not limited to, NSR and title V air permitting requirements, federal standards, and state air requirements. For sources locating in the inner OCS, such as the Empire Wind project, these requirements include but are not limited to: New Source Performance Standards, National Emissions Standards for Hazardous Air Pollutants, Prevention of Significant Deterioration ("PSD'), Nonattainment New Source Review (NNSR), Title V and any other state/local requirements applicable in the COA. This section summarizes the federal requirements applicable to the Empire Wind project. The next section, Section XI, summarizes COA requirements applicable to the Empire Wind permit.

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[47]The EPA has found the approved versions of New York's NNSR and PSD regulations contained in 6 NYCRR Part 231 to be consistent with the requirements of 40 C.F.R. § 51.165 and 40 C.F.R. § 51.166, respectively.
[48]NY's NSR permitting program also applies to major modifications to existing major facilities, but that aspect is not relevant to the discussion here.
[49]*See* 6 NYCRR 201-2.1(b)(21) which can be found at https://govt.westlaw.com/nycrr/Document/I4e8c6ad9cd1711dda432a117e6e0f345?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)&bhcp=1.
[50]*See* 6 NYCRR 200.1(cz) which can be found at https://govt.westlaw.com/nycrr/Document/I4e8c1ca4cd1711dda432a117e6e0f345?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default).

A. Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Pursuant to 40 C.F.R. § 55.13(c), New Source Performance Standards, such as 40 C.F.R. Part 60, Subpart IIII ("NSPS IIII"), shall apply to OCS sources in the same manner as in the COA.

1. Summary of NSPS IIII Applicability Criteria and Requirements

NSPS IIII applies to owners and operators of stationary CI ICE that both commence construction[51] after July 11, 2005, and were manufactured after April 1, 2006, as well as those engines modified or reconstructed after July 11, 2005. NSPS IIII establishes emission standards, compliance methods and other requirements that vary depending upon each engine's function (emergency or non-emergency), power (in kW or horsepower ("HP")), model year, and engine displacement (L/cyl). Based on the application, all of the proposed project marine and non-marine engines would be non-emergency engines, For non-emergency engines (like those of the Empire Wind project) with a displacement of less than 30 L/cyl, NSPS IIII requires compliance with the emission standards and other requirements specified in 40 C.F.R. part 1039 ("Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines") ("part 1039"), in 40 C.F.R. part 1042 ("Control of Emissions from New and In-Use Marine Compression-Ignition Engines and Vessels") ("part 1042"), or within NSPS IIII itself.[52] For certain non-emergency engines with a displacement of less than 10 L/cyl, 40 C.F.R. § 60.4201(f) provides that if these non-emergency engines will be used solely at marine offshore installations, they may be certified[53] to the Tier standards in part 1042 for marine engines, instead of the more stringent emission standards in part 1039.[54] For non-emergency engines with a displacement of ≥ 30 L/cyl, NSPS IIII requires compliance with the emission standards and other requirements within NSPS IIII itself.[55] Other NSPS IIII requirements that apply to non-emergency engines, besides the emission standards include:

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[51] "Commence construction" is the date the engine is ordered by the owner or operator. *See* 40 C.F.R. § 60.4200(a).
[52] *See* 40 C.F.R. §§ 60.4201 and 60.4204.
[53] *See* 40 C.F.R. § 1042.901 ("*Certification* means relating to the process of obtaining a certificate of conformity for an engine family that complies with the emission standards and requirements in this part.").
[54] *See* 40 C.F.R. § 60.4201(f), which states that "Notwithstanding the requirements in paragraphs (a) through (c) of this section, stationary non-emergency CI ICE identified in paragraphs (a) and (c) of this section may be certified to the provisions of 40 CFR part 1042 for commercial engines that are applicable for the engine's model year, displacement, power density, and maximum engine power if the engines will be used solely in either or both of the following locations: (2) Marine offshore installations". *See* also 40 C.F.R. § 60.4201(a) ("Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later non-emergency stationary CI ICE with a maximum engine power less than or equal to 2,237 kilowatt (KW) (3,000 horsepower (HP)) and a displacement of less than 10 liters per cylinder to the certification emission standards for new nonroad CI engines in 40 CFR 1039.101, 1039.102, 1039.104, 1039.105, 1039.107, and 1039.115 and 40 CFR part 1039, appendix I, as applicable, for all pollutants, for the same model year and maximum engine power."); and 40 C.F.R. § 60.4201(c) ("Stationary CI internal combustion engine manufacturers must certify their 2011 model year and later non-emergency stationary CI ICE with a maximum engine power greater than 2,237 KW (3,000 HP) and a displacement of less than 10 liters per cylinder to the certification emission standards for new nonroad CI engines in 40 CFR 1039.101, 40 CFR 1039.102, 40 CFR 1039.104, 40 CFR 1039.105, 40 CFR 1039.107, and 40 CFR 1039.115, as applicable, for all pollutants, for the same maximum engine power.").
[55] For engines with a displacement of ≥ 30 L/cyl (the same type of engines that are category 3 marine engines in part 1042), NSPS IIII establishes emission standards (in g/kW-hr) for NO_x and PM. *See* 40 C.F.R. § 60.4204(c). NSPS

- 40 C.F.R. § 60.4206 requires that engines meeting the emission standards in 40 C.F.R. § 60.4204 are required under NSPS IIII to comply with those standards over the entire life of an engine.

- 40 C.F.R. § 60.4207 establishes the fuel requirements that the engines subject to NSPS IIII must comply with.

- 40 C.F.R. § 60.4209 establishes monitoring requirements for those engines equipped with diesel particulate filter.

- 40 C.F.R. § 60.4211 prescribes the compliance requirements for owner or operators of engines subject to NSPS IIII.

- 40 C.F.R. §§ 60.4212 and 60.4213 prescribe the test methods and procedures.

- 40 C.F.R. § 60.4214 includes the notification, reporting and recordkeeping requirements.

- 40 C.F.R. § 60.4218 addresses the parts of the general provisions in 40 C.F.R. §§ 60.1 through 60.19 that apply to certain engines subject to NSPS IIII.

2. Summary of NSPS IIII Requirements that Apply to the Empire Wind Project's Engines

a. Marine Engines

i. A number of marine vessels that Empire Wind anticipates will be OCS sources have Category 1 and Category 2 marine engines (which are CI ICE) that will meet the NSPS IIII applicability criteria. In addition, there will be other Category 2 marine engines onboard Empire Wind vessels anticipated to be OCS sources that will be used during C&C to power construction equipment onboard vessels and to provide power during commissioning of each WTG and OSS; these marine engines will also meet the NSPS IIII applicability criteria. Therefore, and consistent with 40 C.F.R. § 55.13(c), all of these Category 1 and Category 2 marine engines shall comply with the NSPS IIII emission standards and other requirements. These engines will comply with NSPS IIII by being certified by the EPA to comply with the applicable Tier 2, Tier 3, or Tier 4[56] marine engines emission standards in part 1042, as provided at 40 C.F.R. §§ 60.4201(f) and 60.4211(c). *See* draft permit for the NSPS IIII emission standards and other NSPS IIII

IIII requires that compliance with these NO_x and PM emission standards be demonstrated through conducting initial and annual performance testing. *See* 40 C.F.R. § 60.4211(d). The specific NO_x emission standards that apply to each engine are based on the date when the engine was installed and maximum engine speed (in revolutions per minute or RPM).

[56]40 C.F.R. § 1042.901 defines "*Tier 2"* as relating to the Tier 2 emission standards, as shown in 40 C.F.R. § 1042.104 and Appendix I to 40 C.F.R. Part 1042, "*Tier 3*" as relating to the Tier 3 emission standards, as shown in 40 C.F.R. §§ 1042.101 and 1042.104, and "*Tier 4*" as relating to the Tier 4 emission standards, as shown in 40 C.F.R. § 1042.101.

requirements that apply to each of the Category 1 and 2 marine engines of the Empire Wind project[57].

ii. The ocean-going vessels that Empire Wind anticipates will be OCS sources – the Main Installation Vessel for WTGs Towers, Nacelles, and Blades (MAERSK) (used for C&C) and the Heavy Lift Vessel (used for O&M) – have Category 3 marine engines (which are CI ICE) that will meet the NSPS IIII applicability criteria. Therefore, and consistent with 40 C.F.R. § 55.13(c), all of these Category 3 marine engines shall comply with the NSPS IIII emission standards and other requirements. These engines will be subject to the NSPS IIII NO_x and filterable PM emission standards at 40 C.F.R. §§ 60.4204(c)(3) and (4). Compliance with these emission standards must be verified via initial and annual performance tests. NSPS IIII requires that the Permittee must also establish operating parameters to be monitored continuously to ensure that the engines continue to meet the emission standards according to the provisions specified in 40 C.F.R. § 60.4211(d)(2). *See* draft permit for the NSPS IIII emission standards and other NSPS IIII requirements that apply to each of the Category 3 marine engines of the two above-mentioned ocean-going vessels of the Empire Wind project. In addition, the Category 3 marine engines of the Main Installation Vessel for WTGs Towers, Nacelles, and Blades (MAERSK) will be certified to the Tier III NO_x emission standard in Annex VI of MARPOL, and the Category 3 marine engines of the Heavy Lift Vessel will be certified to the Tier 3 NO_x, hydrocarbons (HC), and CO emissions standards in part 1042.

b. Non-Marine Engines

All of the Empire Wind project's non-marine engines (the portable diesel generator engines located on OSSs or WTGs during C&C and O&M, and the permanent diesel generator engines on OSSs during O&M, all of which are CI ICE) will meet the NSPS IIII applicability criteria. These engines will be subject to the NSPS IIII emission standards in 40 C.F.R. § 60.4204(b). For each of the non-marine engines, Empire Wind has proposed to use engines that will meet the NSPS IIII emission standards by meeting the part 1039 Tier 4 emission standards, which are the most stringent Tier emission standards for these types of engines. Compliance with these emissions standards will be demonstrated by ensuring that each of the non-marine engines is certified by the EPA to the part 1039 emissions standards for Tier 4 engines, consistent with 40 C.F.R. § 60.4211(c). *See* draft permit for the NSPS IIII emission standards and other NSPS IIII requirements that apply to each non-marine engine of the Empire Wind project.

[57]Note that the majority of the Empire Wind project's Category 1 and 2 marine engines are Tier 3 and Tier 4 marine engines.

B. Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Pursuant to 40 C.F.R. § 55.13(e), National Emission Standards for Hazardous Air Pollutants promulgated under section 112 of the CAA, such as 40 C.F.R. Part 63, Subpart ZZZZ ("NESHAP ZZZZ"), shall apply to OCS sources "if rationally related to the attainment and maintenance of Federal or State ambient air quality standards or requirements of part C of title I of the Act."

NESHAP ZZZZ applies to new and existing stationary reciprocating internal combustion engines ("RICE")[58] that are located at a major or area source[59] of HAP emissions. NESHAP ZZZZ establishes requirements based on whether an engine is a non-emergency or emergency engine and on an engine's horsepower ("HP") rating.[60] NESHAP ZZZZ outlines emission limits and other requirements for RICE, and 40 C.F.R. § 63.6665 lists the general provisions in 40 C.F.R. §§ 63.1 through 63.15 that apply to sources regulated under NESHAP ZZZZ.

The Empire Wind project is an area source of HAP emissions ("area source") and all of its engines are non-emergency engines. The Empire Wind project's non-marine engines qualify as stationary CI RICE, and its marine engines of marine vessels qualify as stationary CI RICE while the vessels will be OCS sources. For purposes of NESHAP ZZZZ, a RICE located at an area source is "new" if its construction or reconstruction commenced[61] on or after June 12, 2006 and is "existing" if its construction or reconstruction commenced before June 12, 2006.

According to 40 C.F.R. § 63.6590(c)(1), a new or reconstructed RICE located at an area source meets the NESHAP ZZZZ requirements by meeting the requirements of NSPS IIII. There are no additional NESHAP ZZZZ requirements that apply to those engines. All of the Empire Wind project's non-marine engines and the project's marine engines of marine vessels that will be OCS sources will be new RICE. These new RICE engines are not subject to any further requirements under NESHAP ZZZZ. The draft permit includes conditions requiring Empire Wind to comply with the requirements of NESHAP ZZZZ by meeting the requirements of NSPS IIII, and by complying with the general provisions of 40 C.F.R. part 63, subpart A that are listed in Table 8 of NESHAP ZZZZ.

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[58] "Stationary reciprocating internal combustion engine (RICE)" means any reciprocating internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. Stationary RICE differ from mobile RICE in that a stationary RICE is not a non-road engine as defined at 40 C.F.R. § 1068.30, and is not used to propel a motor vehicle or a vehicle used solely for competition. 40 C.F.R. § 63.6675.

[59] Under NESHAP ZZZZ, a major source of HAP emissions emits or has the potential to emit any single HAP at a rate of 10 tpy or more or any combination of HAP at a rate of 25 tpy or more, with exceptions not relevant here. *See* 40 C.F.R. § 63.6585(b). An area source of HAP emissions is a source that is not a major source. *See* 40 C.F.R. § 63.6585(c).

[60] NESHAP ZZZZ requirements also differ for non-compression ignition (non-CI) engines, but the Empire Wind project uses only compression ignition (CI) engines.

[61] "Commenced" means, with respect to construction or reconstruction of an affected source, that an owner or operator has undertaken a continuous program of construction or reconstruction or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or reconstruction. *See* 40 C.F.R. § 63.2.

XI. 40 C.F.R. § 55.14 – APPLICABLE COA REQUIREMENTS

A. 6 NYCRR Part 231, Subpart 231-5 ("New Major Facilities and Modifications to Existing Non-Major Facilities in Nonattainment Areas, and Attainment Areas of the State Within the Ozone Transport Region") ("Subpart 231-5")

As discussed in this Fact Sheet, the nearest COA county to the Empire Wind project, Nassau County in New York, is in the Ozone Transport Region and is designated as severe nonattainment for ozone. The NY major source threshold for severe ozone nonattainment areas is 25 tpy. NO_x and VOC are ozone precursors. The Empire Wind project emissions estimates of NO_x (1,821.85 tpy) and VOC (145.76 tpy) exceed the major source threshold for ozone nonattainment areas of 25 tpy. *See* 6 NYCRR 231-13.1. Thus, the Empire Wind project is a major facility subject to the requirements of 6 NYCRR Subpart 231-5[62], which requires Empire Wind to:

1. Provide certification that all emission sources at any major New York facility owned or controlled by Empire Wind are in compliance or are on a schedule for compliance with all New York air regulation requirements. *See* 6 NYCRR 231-5.2(a).

   Empire Wind meets this requirement as it does not own or control any other facility located in New York state. A certification statement on this matter was included in the application and is available in the administrative record for this permitting action.

2. Provide an analysis of alternative sites, sizes, production processes, and environmental control techniques that demonstrates the benefits of the proposed project significantly outweigh the environmental and social costs imposed as a result of location or construction of the proposed project. *See* 6 NYCRR 231-5.2(b).

   In its analysis,[63] Empire Wind indicates that the project's location,[64] general project size, and its use of wind turbine technology to produce power (which will be delivered to NY) are dictated by the terms of the lease agreement awarded by BOEM to Empire Wind. In addition, Empire Wind indicates that its project's power generation will replace fossil-fuel generated power, and the wind turbines themselves will have no air emissions.

   The EPA is aware that the OCS Lease area location for the Empire Wind proposed project was the result of a multi-year effort by federal and state regulatory agencies to identify OCS areas suitable for offshore wind energy development. Once the OCS lease was granted to Empire Wind, there was an extensive review by the regulatory agencies of site characterization data, and an assessment of potential impacts (including environmental,

[62] 6 NYCRR Subpart 231-5 is available at https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=Ie92543a0334f11deb24981dc49d16207&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default). Note that throughout this document, web links provided for New York's regulations lead to unofficial copies of the regulations, but are provided for the convenience of the public.

[63] *See* Section 3.10.5.2 on page 38 of the application.

[64] As stated previously, the Empire Wind project is within the Renewable Energy Lease Area OCS-A 0512.

economic, cultural, and visual resources) and use conflicts for all offshore and onshore components of the Empire Wind project.

Therefore, Empire Wind has adequately made the demonstration required by 6 NYCRR 231-5.2(b).

3. For a new facility, 6 NYCRR 231-5.2(c) and 5.4 require a Lowest Achievable Emission Rate ("LAER") analysis for each emission source which emits a nonattainment contaminant for which the new facility is major. The Empire Wind project is major for the nonattainment contaminants NO_x and VOC. Therefore, a LAER analysis is required for NO_x and VOC emissions from the marine engines located on the vessels that will be OCS sources, and from all of the project's non-marine engines. A LAER analysis is also required for VOC emissions from the project's ultra-low sulfur fuel oil storage tanks, and painting and cleaning activities. Such a LAER analysis has been submitted by Empire Wind. *See* Section XI.C of this Fact Sheet for details on the LAER analysis.

4. Obtain NO_x and VOC emission reductions (i.e., offsets) in actual emissions to offset the potential to emit of each nonattainment air contaminant that equals or exceeds the major source threshold. *See* 6 NYCRR 231-5.2(d) and 5.5(a). As indicated in Tables 1 and 3 at 6 NYCRR 231-13.1 and 13.3, NO_x and VOC emission increases from projects located in severe ozone nonattainment areas must be offset at a ratio of 1.3:1.

   Empire Wind has documented compliance with the above-described offset requirements by obtaining 232.3 tpy of NO_x emission reductions and 24.7 tpy of VOC emission reduction to offset the NO_x and VOC potential to emit of its O&M phase. As determined by the EPA in previously issued OCS air permits, emission offsets are only required for emissions resulting from the operation and maintenance phases of offshore wind projects.[65] The emission reductions secured by Empire Wind are from sources located in a severe nonattainment area.[66]

5. Establish, in the permit, LAER emission limitations for each emission source which emits a nonattainment contaminant for which a new facility (such as the Empire Wind project) is major. *See* 6 NYCRR 231-5.3(c) and 5.4(a). Empire Wind is major for the nonattainment contaminants NO_x and VOC. Based on 6 NYCRR 231-5.3(c), NO_x and VOC LAER emission limits must be included in the OCS air permit for each of the Empire Wind project's marine engines located on marine vessels that will be OCS sources, as well as all of the project's non-marine engines (all of which will be OCS sources). VOC LAER also applies to the project's ultra-low sulfur fuel oil storage tanks and painting and cleaning activities. These LAER emission limits and other LAER requirements for the Empire Wind project are specified in the draft permit.

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[65] *See* the EPA's Fact Sheet for South Fork Wind, LLC, available at https://www.epa.gov/system/files/documents/2021-10/sfw-supplemental-fs-10-20-2021.pdf, and the EPA's Fact Sheet for Revolution Wind, LLC, available at https://www.epa.gov/system/files/documents/2023-03/fact-sheet-draft-revolution-wind-ocs-air-permit-ocs-r1-05.pdf.

[66] For details, *see* Section 3.10.5.3 ("Emission Offsets") on page 38 of the application.

B. 6 NYCRR Part 231, Subpart 231-7 ("New Major Facilities and Modifications to Existing Non-major Facilities in Attainment Areas (Prevention of Significant Deterioration)")

The NY PSD program applies to new major sources[67] in attainment areas. The COA for the proposed Empire Wind project, as previously stated, is in attainment for all pollutants for which NAAQS exist, except for ozone. Note that because the project location area is in nonattainment for ozone, and NO_x is an ozone precursor, NO_x is both an attainment and a nonattainment pollutant.[68] Empire Wind is considered a major source because its potential to emit any regulated NSR contaminant is equal to or greater than the applicable major facility threshold of 250 tpy. *See* 6 NYCRR 231-7.1(a)(1) and Table 5 of 6 NYCRR 231-13.5[69]. Thus, the Empire Wind project is subject to the requirements of the PSD regulations in 6 NYCRR 231-7[70], which can be summarized as follows:

1. Air Quality Impact Analyses

   See Section XIII of this Fact Sheet for a discussion of the air quality impact analysis conducted for the Empire Wind project.

2. Additional Impact Analyses

   See Section XIV of this Fact Sheet for a discussion of the additional impact analyses conducted for the Empire Wind project.

3. Best Available Control Technology ("BACT") Review

   A BACT review must be conducted for each emission source of the proposed new facility (in this case the Empire Wind project) for all regulated New Source Review ("NSR") contaminants to be emitted by the proposed facility which equal or exceed the applicable project threshold listed in Table 6 at 6 NYCRR 231-13.6.[71] *See* 6 NYCRR 231-7.3(c) and 7.6. In the case of the Empire Wind project, BACT review is required for NO_x, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, and GHGs emissions from the marine engines located on vessels that will be OCS sources, and from all of the project's non-marine engines. A BACT review is also required for

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[67] New York's NSR permitting program also applies to major modifications to existing major facilities, but that aspect is not relevant to this project.

[68] The COA is in attainment for the NAAQS pollutant NO_2, which is a subset of nitrogen oxide or NO_x. However, the COA is in nonattainment for the NAAQS pollutant ozone, and NO_x is a nonattainment pollutant for the COA as an ozone precursor.

[69] Table 5 of 6 NYCRR 231-13.5 is available at https://govt.westlaw.com/nycrr/Document/I24b7e1983fd811de8906ba08b5314c1c?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default).

[70] 6 NYCRR 231-7 is available at https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=Ie95ca750334f11deb24981dc49d16207&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default).

[71] Table 6 of 6 NYCRR 231-13.6 is available at https://govt.westlaw.com/nycrr/Document/I24b7e19b3fd811de8906ba08b5314c1c?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default).

GHGs emissions from the SF_6-insulated electrical switchgears. Such a BACT review has been submitted by Empire Wind. *See* Section XI.C of this Fact Sheet for details on the BACT review or analysis.

4. Establish BACT Limitations

For a new major source, the permit must establish BACT emission limits for each emission source and for each NSR contaminant air pollutant that will be emitted in an amount equal to or greater than the significant project threshold listed in Table 6 at 6 NYCRR 231-13.6. *See* 6 NYCRR 231-7.5(c) and 7.6. In the case of the Empire Wind project, the permit must include BACT emission limits for (1) NO_x, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, and GHG emissions from each marine engine located on the marine vessels that will be OCS sources, and each of the project's non-marine engines; and (2) GHG emissions from the project's SF_6-insulated electrical switchgears. All BACT emission limits and other BACT requirements for the Empire Wind project are specified in the draft permit.

C. Summary - BACT and LAER Analysis

1. BACT and LAER Definitions

As defined in 6 NYCRR 231-4.1(b)(9), "BACT" means the following:

> **"**An emissions limitation based on the maximum degree of reduction for each air pollutant subject to regulation under the [Clean Air Act] which would be emitted from or which results from any proposed major facility or NSR major modification which the department, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such proposed major facility or NSR major modification through application of production processes or available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of such air pollutant. In no event shall application of BACT result in emissions of any air pollutant which would exceed the emissions allowed by any applicable standard established pursuant to section 7411 or 7412 of the act. Emissions from any source utilizing clean fuels, or any other means, to comply with this paragraph shall not be allowed to increase above levels that would have been required under this paragraph as it existed prior to enactment of the Clean Air Act amendments of 1990."

As defined in 6 NYCRR 200.1(ak), LAER means the following:

> "The most stringent emission limitation achieved in practice, or which can reasonably be expected to occur in practice for a category of emission sources taking into consideration each air contaminant which must be controlled. In no event shall the application of this term permit a proposed new source or modification to emit any air contaminant in excess of the amount permitted under any applicable emission standard established under 6 NYCRR or 40 CFR."

2. BACT and LAER Analysis Methodology

In the application, Empire Wind followed the EPA's top-down BACT approach (for all of its emission sources and their associated air pollutants subject to BACT) which provides that all available control technologies be ranked in descending order of control effectiveness. Each alternative is then evaluated, starting with the most stringent, until BACT is determined. The top-down approach consists of the following steps:

Step 1: Identify all available control technologies.

Step 2: Evaluate technical feasibility of options from Step 1 and eliminate options that are technically infeasible based on physical, chemical, and engineering principles.

Step 3: Rank the remaining control technologies from Step 2 by control effectiveness, in terms of emission reduction potential.

Step 4: Evaluate the most effective controls from Step 3, considering the economic, environmental and energy impacts of each control option. If the top option is not selected, evaluate the next most effective control option.

Step 5: Select BACT (the most effective option from Step 4 not rejected).

3. BACT and LAER Analysis for the Project's Marine and Non-Marine Engines

Based on available information, the BACT and LAER emission limits that Empire Wind has proposed in its application for its marine and non-marine engines meet the criteria for such standards in the applicable regulations. The BACT and LAER analysis in the application uses the methodology recommended by EPA to determine limits that satisfy the applicable criteria for BACT and LAER. The applicant's BACT and LAER analysis considers a complete range of available pollution controls techniques, is well-reasoned, and supports its conclusions in the application and supplementary materials. EPA has included the limits proposed by the applicant in the draft permit and adopts the reasoning in the applicant's BACT analysis as EPA's basis for these permit conditions.

Under the BACT definition, technically feasible control technologies can be eliminated based on economic, energy, or environmental factors, while under the LAER definition the same technically feasible control technologies cannot be eliminated based on these factors. LAER consists of the most stringent emission limitations that have been achieved in practice, and thus the application of LAER controls also satisfies the BACT requirements. For example, in the case of the Empire Wind project, since NO_x is a pollutant subject to both LAER and BACT, the LAER requirements for NO_x would also satisfy the BACT requirements for NO_x. Steps 1 and 2 of the 5 step top-down BACT approach also apply to the LAER determination process.

Empire Wind's BACT and LAER analysis identified potential control options or technologies by consulting and evaluating several sources of information such as: (1) federal (NSPS IIII, NESHAP ZZZZ) and state emission standards for stationary diesel engines; (2) federal emission

standards for marine engines (part 1042), and state emission standards for marine engines (CA SIP-approved regulation titled "Airborne Toxic Control Measure for Diesel Engines on Commercial Harbor Craft Operated Within California Waters and 24 nautical miles of the California Baseline" ("17 CCR § 93118.5")); (3) the EPA's RACT/BACT/LAER Clearinghouse; (4) the California Air Resource Board BACT Clearinghouse; and (5) previously issued OCS air permits.

a. Step 1 – Identify all Available Control Technologies

In Step 1 of its BACT analysis, Empire Wind identified the following categories of available control technologies that are generally available for CI ICE (such as the project's marine and non-marine engines), which may represent both BACT and LAER, and which have the potential to reduce or minimize more than one air pollutant resulting from CI ICE subject to either BACT or LAER. *See* Sections 4.5.1, 4.6.1, 4.7.1, and 4.8.1 of the application for a detailed description of each of the control technologies listed below. Based on our review, it appears that the Empire Wind's control technologies list includes all of the relevant current control technologies.

Add-on pollution controls - For NO_x[72], CO[73], VOC[74], SO_2[75], PM[76], and GHG[77]: Selective Catalytic Reduction (SCR) for NO_x; Nonselective Catalytic Reduction (NSCR) for NO_x, CO, and VOC; Selective Noncatalytic Reduction (SNCR) for NO_x; NO_x Adsorber/Scrubber for NO_x; Lean NOx Catalysts/DeNO_x Catalyst/Hydrocarbon SCR for NO_x, CO, and VOC; SO_x Scrubber for SO_2; Diesel Particulate Filter (DPF) for PM[78]; Diesel Oxidation Catalyst (DOC) for CO and VOC; and Carbon Capture and Storage of GHGs.[79]

[72]The majority of the NO_x emissions found in diesel engine exhaust are formed by the oxidation of the elemental nitrogen present in the combustion air, during the combustion process, into NO_x; NO_x formed this way is referred to it as "thermal NO_x." A small fraction of the NO_x emissions may be formed by the oxidation of nitrogen-containing compounds in the fuel oil itself, referred to as "fuel NO_x."

[73]CO in diesel engine exhaust is formed due to incomplete combustion of fuel in the combustion chamber of the engine.

[74]VOCs in diesel engine exhaust is formed due to incomplete combustion of fuel in the combustion chamber of the engine.

[75]SO_2 is produced in diesel engine exhaust by the oxidation of sulfur contained in the fuel.

[76]PM emissions, for the purposes of the BACT analysis evaluating control technology for the Empire Wind project, covers PM_{10} and $PM_{2.5}$ as well. PM is produced in diesel engine exhaust by incomplete combustion of fuel, and also by the presence in the fuel of trace quantities of ash (non-combustible materials).

[77]The primary component of the GHGs in diesel engine exhaust is carbon dioxide (CO_2), which is formed in the combustion chamber when the carbon content of the fuel is converted to CO_2. Other GHG components are methane (CH_4), which is formed by incomplete combustion of fuel, and nitrous oxide (N_2O), which is formed by oxidation of nitrogen present in the combustion air.

[78]A DPF would also reduce PM_{10} & $PM_{2.5}$.

[79]All of the add-on pollution controls listed here were identified as potentially feasible control options listed for the project marine engines. SCR, DPF and DOC were also identified as a potentially feasible control options for those marine engines that power construction equipment onboard vessels or provide power to the WTGs and OSSs during C&C and for some of the project non-marine engines, specifically for portable diesel generator engines located on OSSs or WTGs during C&C and O&M.

Work practices and engine tuning - For all BACT and LAER air pollutants: good combustion practices[80]; and ignition timing retard[81].

Use of lower-emitting fuels - For SO_2, PM and GHG: Liquified Natural Gas (LNG)[82]; Natural Gas (NG)[83]; Propane[84]; ULSD fuel oil[85]; Low-Sulfur Marine Gas Oil (LSMGO)[86]; Biodiesel[87]; Methanol[88]; and Water-in-Fuel Emulsions[89].

Inherently lower-emitting practices or designs - For all BACT and LAER air pollutants: Use of Battery-Powered Electric Motors[90]; Use of Higher-Tier Diesel Engines; Replacement of Older Engines with Newer, Higher Tier Engines; Turbocharger with Aftercooler; High Injection Pressure, Direct Water Injection; Exhaust Gas Recirculation; and Intake Air Humidification/Cooling.[91]

b. Step 2 – Eliminate Technically Infeasible Control Technologies

In Step 2 of the BACT analysis, Empire Wind eliminated from the list of control technologies identified in Step 1, those control technologies (for all pollutants) that were determined to be technically infeasible for its marine and non-marine engines.

1. Marine Engines

   i. The following add-on pollution controls and inherently lower-emitting practices or designs were determined to be infeasible for the project's marine engines[92]:

      SCR; NSCR; SNCR; NO_x Adsorber/Scrubber; Lean NO_x Catalyst/DeNO_x Catalyst/Hydrocarbon SCR; SO_x Scrubber; DPF; DOC; Replacement of Older Engines

[80]Good combustion practices were identified as potentially feasible control options for all of the project engines.
[81]Ignition timing retard was identified as a potentially feasible control option only for marine engines.
[82]LNG was identified as a potentially feasible control option for the marine engines and the permanent generator engines on the OSSs during O&M.
[83]NG was identified as a potentially feasible control option only for the permanent generator engines on the OSSs during O&M.
[84]Propane was identified as a potentially feasible control option only for the permanent generator engines on the OSSs during O&M.
[85]ULSD fuel oil was identified as a potentially feasible control option for all project engines.
[86]LSMGO was identified as a potentially feasible control option only for the marine engines of ocean-going marine vessels.
[87]Biodiesel was identified as a potentially feasible control option for all project engines.
[88]Methanol was identified as a potentially feasible control option for the vessels' marine engines (propulsion, auxiliary) and for the permanent diesel generator engines.
[89]The use of water-in-fuel emulsion and methanol were identified as potentially feasible control options for the project marine engines and the permanent generator engines on OSSs during O&M.
[90]The use of battery power was identified as a potentially feasible control option for all of the project engines.
[91]The following inherently lower-emitting practices or designs were identified as potentially feasible control options only for the project marine engines: Turbocharger with Aftercooler; High Injection Pressure, Direct Water Injection; Exhaust Gas Recirculation; Intake Air Humidification/Cooling.
[92]Marine engines in this context refer to the marine engines of the marine vessels that are OCS sources, as well as the marine engines located onboard vessels that are OCS sources to provide power to the WTGs and OSSs during C&C.

with Newer, Higher Tier Engines; Turbocharger with Aftercooler; High Injection Pressure; Direct Water Injection; Exhaust Gas Recirculation; Intake Air Humidification/Cooling, Use of Battery-Powered Electric Motors, and Carbon Capture and Storage.

Most of these control technologies were eliminated because they would require retrofits or upgrades to be performed on marine engines that were already installed on vessels (unless vessels that are already equipped with such controls were available) or replacement of the already-installed marine engines. Empire Wind articulated that it will not be the owner of the marine vessels and their marine engines, with the possible exception of the service operations vessel (used during O&M). Instead, these vessels and engines will be leased from other owners. Empire Wind also stated that not all of the marine vessels listed in the application have been contracted yet, and the ability to retrofit unknown vessels not belonging to Empire Wind cannot be relied upon.

Empire Wind explained that it would be extremely costly to replace, retrofit, or upgrade leased vessels in order to use add-on pollution controls or implement inherently lower-emitting practices or design. Retrofitting or upgrading existing marine vessels would involve taking those vessels, over which Empire Wind has no control, out of service. Marine engine replacements might require substantial modifications to a vessel's layout or structure, technical barriers which support a technically infeasible determination.

Empire Wind also asserted that it would not always be possible to use existing marine vessels with marine engines that are pre-equipped with add-on pollution controls and inherently lower-emitting practices or designs. There are a limited number of specialized vessels worldwide of the types needed for the project, and they are in high demand. Given the specifics of the proposed project's construction schedule, Empire Wind may not be able to wait for the lowest-emitting marine vessels to be available to perform a given task.

Although Empire Wind determined that the use of SCR, DPF, and/or DOC as add-on pollution controls is technically infeasible for the project's marine engines, Empire Wind proposes to use many marine engines certified by EPA to Tier 3 or Tier 4 in part 1042 or have a MARPOL ANNEX VI certification to Tier III NO_x. Where Empire Wind is able to obtain access to vessels that use such engines, those marine engines may already incorporate, as integral part of the engine design, one or more of the above listed controls (SCR, DPF, and/or DOC).

Regarding the option of using battery-powered electric motors, Empire Wind stated that the ability to power vessels using only electric powered motors in lieu of marine engines is currently limited to short trips near shore because of the limitations of current battery storage technology. For longer trips, battery-powered vessels must switch to diesel engines. Empire Wind indicated that, for the O&M phase, it intends to use a dedicated service operations vessel (that will be purpose-built for Empire Wind) that will operate on battery power alone for the first 7 nm it travels after leaving Empire Wind's NY

onshore port during O&M (at which point it will still be within NY state waters, given the trajectory it will take), and will switch to diesel engines beyond that distance.

The application also eliminated carbon capture and storage, a GHG control option involving capturing and storing CO2 emissions contained in engine exhaust, as technically infeasible for engines located onboard marine vessels.

ii. The following work practice was determined to be technically infeasible: ignition timing retard.

The application explained that although ignition timing retard should not require any retrofits or upgrades, it is technically infeasible because Empire Wind may need to hire vessels on short notice, without time to perform the needed engine adjustments before work begins. In addition, adjustment of the ignition timing also may not be consistent with the manufacturer's recommendations for a particular engine, which is not possible to know in advance of hiring a given vessel.

iii. The following lower-emitting fuels were determined to be technically infeasible: LNG, Biodiesel, Methanol, and Water-in-Fuel Emulsion.

The application explained that the use of LNG requires significant retrofits for any vessel not already specifically designed to burn LNG, and the existing number of LNG-capable offshore wind vessels is currently too small to guarantee their availability for the Project. For biodiesel, no marine fuel terminals are known to exist that could supply biodiesel fuel in the quantities required by the Project. For methanol and water-in-fuel emulsions, significant retrofits are required for any vessel not already specifically designed to use these fuels. No methanol-capable offshore wind vessels are currently known to be in service, and Empire Wind is not aware of any vessels equipped to use water-in-fuel emulsions that are suitable for performing the tasks required by the project. *See* the application for more details.

2. Non-Marine Engines: Portable Diesel Generator Engines

i. The following add-on pollution controls and inherently lower-emitting practices or designs were determined to be infeasible for the portable diesel generator engines that will be used during C&C and O&M: SCR, DPF, DOC, and Use of Battery-Powered Electric Motors (which is an inherently lower-emitting practice or design).

Empire Wind determined that the use of SCR, DPF, and/or DOC as add-on pollution controls is technically infeasible for the project's portable diesel generator engines for the same reasons discussed for marine engines above. Nevertheless, Empire Wind proposes to use portable diesel generator engines certified by the EPA to the Tier 4 emission standards in part 1039, and thus these engines may already incorporate, as integral part of the engine design, one or more of the above listed controls (SCR, DPF, and/or DOC).

The application explained that the use of battery-powered electric motors is technically infeasible because Empire Wind will lease rather than own the portable generators, and it could not identify any electric portable generators for lease that were the types needed for relevant project tasks.

ii. The following lower-emitting fuel was determined to be technically infeasible: Biodiesel.

The application explained that the use of biodiesel as fuel for the temporary portable generators is technically infeasible because Empire Wind will lease rather than own the portable generators, and it could not identify any biodiesel-fueled portable generators for lease that were the types needed for relevant project tasks.

3. Non-Marine Engines: Permanent Diesel Generator Engines

i. The following inherently lower-emitting practice or design was determined as infeasible for the permanent diesel generator engines: Use of Battery-Power.

The application explains that these engines will be operated for both emergency and non-emergency uses, and using batteries to supply electrical power to the offshore substations during an emergency is technically infeasible because they cannot provide as much runtime in an emergency situation as a diesel generator engine.

ii. The following lower-emitting fuels were determined to be technically infeasible: Natural gas, LNG, Propane, Biodiesel, Methanol, and Water-in-Fuel Emulsions.

The application explained that the use of natural gas is technically infeasible for the permanent diesel generator engines because of the need to ensure a reliable fuel supply in emergency situations and the risk that a necessary dedicated subsea natural gas line could be compromised. The application found the use of LNG technically infeasible because the offshore substations' permanent diesel generator engines are expected to be used infrequently, and maintaining LNG fuel (which vaporizes easily) in the proper form would be resource-intensive and create excessive waste emissions. It found the use of propane technically infeasible due to the logistic difficulty of refilling propane storage tanks located on the offshore substations. The use of biodiesel was found technically infeasible due to the uncertainty of locating a reliable supplier for the Project. Finally, the use of methanol or water-in-fuel emulsions was found technically infeasible because Empire Wind is not aware of any real-world instances where either has been demonstrated in practice as a fuel for stationary generator engines. *See* the application for more details.

c. Step 3 – Rank of Remaining Control Options

In Step 3 of the BACT analysis, Empire Wind ranked, by effectiveness, the following remaining technically feasible control options or technologies (for all pollutants) from its marine and/or non-marine engines:

- Use of Higher-Tier Engines
- Good Combustion Practices
- Use of ULSD Fuel oil (for all Category 1 and 2 marine engines, and all non-marine engines)
- Use of LSMGO (for all Category 3 marine engines)

As indicated in the application, the higher-tier engines and good combustion practices are control options that can be employed together, so no ranking was performed for those two control options.

d. Step 4 – Evaluation of Most Effective Controls

As provided in the EPA's guidance for top-down BACT analysis, if the top-ranked technology is chosen as BACT, the analysis need not review economic, environmental, and energy impacts. Empire Wind proposed the top ranked control option(s) as BACT, and thus economic, environmental, and energy impacts were not considered in the project's BACT analysis.

Note that while the application ranks use of ULSD higher than use the LSMGO, some of the project's ocean-going vessels will need to be fueled at overseas terminals, which may not always offer ULSD. Thus, the use of LSMGO was retained as the most effective control option for the Category 3 marine engines of the project's ocean-going vessels.

e. Step 5 – Select BACT for All Pollutants, and LAER for NO_x and VOC

The control technologies that were selected as BACT (for all pollutants) in Step 5 of the BACT analysis for each of the project's relevant marine and non-marine engines are summarized below. The BACT control technologies and emission limits for each relevant marine and non-marine engine are also discussed in detail at Section XI.C.3.e.1 of this Fact Sheet.

- Use of Higher-Tier Engines
- Good Combustion Practices
- Use of ULSD Fuel Oil (for all Category 1 and 2 marine engines, and all non-marine engines)
- Use of LSMGO (for all Category 3 marine engines)

The available control technologies identified as LAER for NO_x and VOC emissions for the project's marine and non-marine engines are summarized below. The LAER control technologies and emission limits for each relevant marine and non-marine engine are also discussed in detail at Section XI.C.3.e.1 of this Fact Sheet.

- Use of Higher-Tier Engines
- Good Combustion Practices

For the project's marine engines, the use of higher-Tier engines means using marine engines that meet the highest (i.e., most stringent) Tier standards in part 1042 that could apply to the marine engine based on the actual engine's model year, displacement, and maximum engine power. For the project's non-marine engines, the use of higher-Tier engines means using engines that meet the most stringent Tier standards for such engines, which are the Tier 4 standards in part 1039.

The EPA notes that for each marine engine for which it establishes BACT/LAER, for many air pollutants the BACT and LAER emission limits established by the EPA in the draft permit are equal to the corresponding applicable NSPS IIII emission standards. This approach is consistent with the BACT and LAER definitions, which provide that the BACT and LAER emission limits cannot be less stringent than the applicable NSPS emission standards. Likewise, for all of the project's non-marine engines, Empire Wind proposed as BACT and LAER the use of the most stringent NSPS IIII emission standards, which are the Tier 4 requirements of part 1039.

For Category 1 and 2 marine engines of those marine vessels which are OCS sources and that qualify as harbor craft vessels, as the term is defined in the CA SIP approved regulation[93], Empire Wind established NO_x and VOC LAER emission limits that are at least as stringent as the corresponding Tier 2 or Tier 3 emission standards[94] in part 1042 and, in some instances, are at Tier 4. The CA SIP requires compliance with the Tier 2 or Tier 3 emission standards of part 1042 for Category 1 and 2 marine engines of harbor craft marine vessels. Thus, Empire Wind's NO_x and VOC emission limits are no less stringent than the most stringent state SIP emission limits for the same class or category of sources and may also be considered the most stringent emission limitation achieved in practice or which can reasonably be expected to occur in practice for such sources, and thus qualify as LAER.[95] For Category 1 and 2 marine engines with a maximum engine power of less than 600 kW, the most stringent possible Tier is Tier 3 in part 1042 for NO_x +HC, CO and PM. For Category 1 and 2 marine engines with a maximum engine power at or above 600 kW, the most stringent possible Tier is Tier 4. For 10 (out of 16) harbor craft vessels anticipated to be OCS sources, Empire Wind has proposed to use Category 1 and 2 marine engines that meet Tier 3 and Tier 4, the most stringent Tiers for the given maximum engine power engine. For the other 6 harbor craft vessels anticipated to be OCS sources, Empire Wind has proposed to use Tier 2 marine engines.

[93] *See* 17 CCR § 93118.5. This CA SIP-approved regulation is the only SIP-approved regulation directly addressing marine engine emission limits.

[94] A particular marine engine could be subject to Tier 2 or Tier 3 of part 1042 based on several criteria established in part 1042.

[95] CAA § 171 defines the term "lowest achievable emission rate" as, for any source, that rate of emissions which reflects: (1) the most stringent emission limitation which is contained in the implementation plan of any State for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable, or (2) the most stringent emission limitation which is achieved in practice by such class or category of source, whichever is more stringent. In no event shall the application of this term permit a proposed new or modified source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance. The LAER definition in New Yorks' regulations at 6 NYCRR 200.1(ak), which applies to this project, differs somewhat, defining LAER as "the most stringent emission limitation achieved in practice, or which can reasonably be expected to occur in practice for a category of emission sources..."

For Category 3 marine engines, the most stringent possible Tier is Tier 3 in part 1042 for NO_x, CO, and HC, and Tier III in Annex VI for NO_x. For the ocean-going vessels anticipated to be OCS sources, Empire Wind has proposed to use Tier 3 and Tier III Category 3 marine engines.

As previously stated in this Fact Sheet, Empire Wind has used representative vessels and marine engines for those marine vessels that have not been contracted yet. In order to represent worst-case emissions (to show that even with such assumption, the project will not violate NAAQS or increment requirements), the chosen representative marine vessels' engines are only required to meet lower Tier (higher emissions) emission standards in part 1042. As a result, in some cases, the BACT and LAER emission limits included in the draft permit represent the minimum acceptable emission limit. If possible, Empire Wind may use newer engines certified to a higher Tier (lower emissions). This would result in lower overall emissions than those presented in the application and draft permit. We note that, for vessels for which Empire Wind has contracted already, many marine engines already do meet the highest Tier engines possible. And all of the project's non-marine engines will be Tier 4, the highest Tier engine.

The EPA would also like to highlight the uniqueness of offshore wind projects, such as the proposed project, which only require the use of many marine vessels on a temporary basis, until the project is constructed. After that time, a much smaller group of marine vessels will be used, and only for limited periods of time (e.g., days or hours/years), throughout O&M.

The BACT and LAER requirements are discussed further below:

1. Summary of BACT and LAER Control Technologies and BACT and LAER Emission Limits for Each of the Relevant Project Marine and Non-Marine Engines

   In the draft permit, the EPA established BACT and LAER emission limits for each applicable air pollutant, except for CO_2e, in the form of g/kW-hr, for each marine and non-marine engine. For CO_2e, BACT emission limits were established in the form of tpy, for a combination of engines.

   i. Category 1 and 2 Marine Engines: BACT and LAER Control Technologies

      BACT and LAER for NO_x, LAER for VOC, and BACT for CO, PM, PM_{10}, $PM_{2.5}$[96], and GHG[97] is: (1) the level of control resulting from reducing each of the above applicable air pollutant as provided in Tiers 2 through 4 of part 1042, with the majority of engines being required to comply with Tiers 3 or 4. As previously discussed in this Fact Sheet, Category 1 and Category 2 marine engines of marine vessels used during either the C&C or O&M phases of the project, will be subject to NSPS IIII while the vessels are OCS. These engines can comply with NSPS IIII by being certified by the EPA to comply with the applicable Tier standards of part 1042; (2) good combustion practices; and (3) for PM, PM_{10}, and $PM_{2.5}$ BACT is also the use of ULSD fuel oil.

[96]Each PM_{10} and $PM_{2.5}$ (g/kW-hr) BACT emission limit specified in the draft permit for marine or non-marine engines include both filterable and condensable fractions of PM.

[97]Empire Wind noted that the use of higher Tier engines has the potential to minimize CO_2 emissions because of advances in fuel-efficient engine design.

ii. Category 1 and 2 Marine Engines: BACT and LAER Emission Limits

- The BACT emission limits for CO and PM (in grams per kilowatt-hour or g/kW-hr) established by the EPA and included in the draft permit are the part 1042 CO and PM Tier 2 through Tier 4 emission standards (g/kW-hr) that apply to each engine.
- The BACT and LAER emission limits for NO_x (g/kW-hr) and the LAER emission limit for VOC (g/kW-hr) for many marine engines were derived from the applicable part 1042 NO_x + HC[98], NO_x + NMHC[99], or NO_x + THC[100] Tier 2 through Tier 3 emission standards (g/kW-hr).
- The BACT and LAER emission limits for NO_x (g/kW-hr) for those marine engines certified to Tier 4 in part 1042, are the part 1042 NO_x Tier 4 emission standards (g/kW-hr) that apply to each engine.
- The LAER emission limits for VOC (g/kW-hr) for those marine engines certified to Tier 4 in part 1042, were derived from the applicable part 1042 HC Tier 4 emission standards (g/kW-hr).
- The BACT emission limits for PM_{10} and $PM_{2.5}$ (g/kW-hr)[101] were derived from the part 1042 PM Tier 2 through Tier 4 emission standards (g/kW-hr) that apply to each engine.

iii. Category 3 Marine Engines: BACT and LAER Control Technologies

1. For the Category 3 marine engines of the Main Installation Vessel for WTGs Towers, Nacelles and Blades (MAERSK) (used for C&C), which will be a foreign-flagged ocean-going vessel, while the vessel is an OCS source:

   - BACT and LAER for NO_x is (1) the level of control that is provided in Tier III of Annex VI of the MARPOL Protocol (which is incorporated in 40 C.F.R. part 1043); (2) the level of control required by NSPS IIII at 40 C.F.R. § 60.4204(c)(3); and (3) good combustion practices.

   - BACT for CO and LAER for VOC is good combustion practices.

2. For the Category 3 marine engines of the Heavy Lift Vessel (used for O&M), a U.S.-flagged ocean-going vessel, while the vessel is an OCS source:

   - BACT and LAER for NO_x is (1) the level of control that is provided in Tier 3 of part 1042; (2) the level of control required by NSPS IIII at 40 C.F.R. § 60.4204(c)(3); and (3) good combustion practices.

   - BACT for CO and LAER for VOC is (1) the level of control that is provided in Tier 3 of part 1042; and (2) good combustion practices.

[98]HC means hydrocarbons.
[99]NMHC means non-methane hydrocarbons.
[100]THC means total hydrocarbons.
[101]PM_{10} and $PM_{2.5}$ represent the sum of filterable + condensable particulates.

3. For the Category 3 marine engines of the Main Installation Vessel for WTGs Towers, Nacelles and Blades (MAERSK) (used for C&C), and the Heavy Lift Vessel (used for O&M), while the vessels are OCS sources:

   - BACT for PM, PM_{10}, and $PM_{2.5}$ is (1) the level of control required by NSPS IIII at 40 C.F.R. § 60.4204(c)(4); (2) the use of marine engines certified to Tier III of Annex VI and Tier 3 of part 1042, respectively; (3) the use of diesel fuel oil with a maximum sulfur content of 1,000 ppm; and (4) good combustion practices.

4. For the Category 3 marine engines of the Main Installation Vessel for WTGs Towers, Nacelles and Blades (MAERSK) (used for C&C), and the Heavy Lift Vessel (used for O&M), while the vessels are OCS sources:

   - BACT for GHG is (1) the use of engines certified to Tier III of Annex VI, and Tier 3 of part 1042, respectively; and (2) good combustion practices.

iv. Category 3 marine engines: BACT and LAER Emission Limits

1. For the Category 3 marine engines of the Main Installation Vessel for WTGs Towers, Nacelles and Blades (MAERSK) (used for C&C) and the Heavy Lift Vessel (used for O&M), while the vessels are OCS sources:

   - The BACT and LAER emission limits for NO_x (g/kW-hr) and the BACT emission limit for filterable PM (g/kW-hr) are (1) the NSPS IIII NO_x emission standard(s) at 40 C.F.R. § 60.4204(c)(3)[102]; and (2) the NSPS IIII PM emission standard of 0.15 g/kW-hr[103] at 40 C.F.R. § 60.4204(c)(4).

   - The BACT emission limits for PM_{10} and $PM_{2.5}$[104] for each category 3 marine engine of the above-mentioned vessels were derived from the PM BACT emission limits.

   - The BACT emission limit for CO (g/kW-hr) and LAER emission limit for VOC (g/kW-hr) for each category 3 marine engine of the above-mentioned vessels are: 5 g/kW-hr for CO, and 2.1 g/kW-hr for VOC. The CO emission limit equals the Tier 3 CO emission standard in part 1042 for Category 3 marine engines. The VOC emission limit is derived from the Tier 3 HC emission standard in part 1042 for Category 3 marine engines (after applying a conversion factor). The CO and VOC

[102]The NSPS IIII NOx emission standards (g/kW-hr) are 2.4 g/kW-hr for the category 3 marine engines of the Main Installation Vessel for WTGs Towers, Nacelles and Blades (MAERSK), and 2.6 g/kW-hr for the category 3 marine engines of the Heavy Lift Vessel.
[103]The NSPS IIII PM emission standard (g/kW-hr) is the same for all engines with a displacement greater than 30 L/cyl.
[104]PM_{10} and $PM_{2.5}$ represent the sum of filterable + condensable particulates.

emission limits are also supported by actual stack test data[105] provided by Empire Wind.

v. BACT for SO_2 Control Technologies: Category 1, 2, and 3 marine engines

BACT for SO_2 was determined to be the level of control provided by the use of (1) ULSD fuel oil (no more than 15 ppm sulfur content in fuel by weight) for all category 1 and 2 marine engines; and (2) LSMGO fuel oil (or marine diesel fuel oil) with no more than 0.1% (or 1,000 ppm) sulfur content by weight for all category 3 marine engines of ocean-going vessels. Empire Wind anticipates that only those category 3 marine engines of ocean-going vessels that will be fueled at overseas terminals will use fuel oil with 0.1% sulfur content. However, for purposes of establishing BACT for SO_2, since at this time it is not clear which category 3 marine engines will be fueled at overseas terminals, Empire Wind has conservatively assumed that all category 3 marine engines will use fuel oil with 0.1% sulfur content.

vi. BACT Emission Limits for SO_2 (g/kW-hr):

- Category 1 and 2 marine engines: The BACT emission limit for SO_2 (g/kW-hr) was determined based on a sulfur content in fuel oil of 15 ppm by weight.[106]

- Category 3 marine engines: The BACT emission limits for SO_2 (g/kW-hr) was determined based on a sulfur content in fuel oil of 1,000 ppm by weight.[107]

vii. BACT Emission Limit for GHG expressed as CO_2e: Category 1, 2, and 3 marine engines

The CO_2e (tpy) BACT emission limits included in the draft permit for marine engines (*see* the draft permit) were derived from the equations and emission factors (g/kW-hr) for each individual GHG from the 2022 EPA Ports Emission Inventory Guidance[108], which in turn are based on the emision factors (g/kW-hr) for each individual GHG from Tables C-1 and C-2 of 40 C.F.R. part 98, subpart C.

viii. Non-Marine engines: Control Technologies

- BACT and LAER for NO_x, LAER for VOC, and BACT for CO, PM, PM_{10}, $PM_{2.5}$, and GHG is: (1) the level of control resulting from reducing each applicable air pollutant as provided in Tier 4 of part 1039. As previously discussed in this Fact Sheet, all non-marine engines of the proposed project will be subject to the NSPS IIII. NSPS IIII provides that some engines, such as the OCS Facility's non-marine engines, may demonstrate compliance with the NSPS IIII emission standards by using engines certified

[105] *See* summary of stack test report included in the Supplemental Information to Application in the administrative record.
[106] It was assumed that 97.753% of sulfur in the fuel is converted to SO_2, consistent with the 2022 EPA Ports Emission Inventory Guidance.
[107] It was assumed that 97.753% of sulfur in the fuel is converted to SO_2, consistent with the 2022 EPA Ports Emission Inventory Guidance.
[108] *See* https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1014J1S.pdf.

to the applicable Tier emission standards in part 1039; (2) for PM, PM_{10}, and $PM_{2.5}$ BACT, the use of ULSD fuel oil; and (3) good combustion practices.

- BACT for SO_2 was determined to be the level of control provided by the use of ULSD fuel oil (no more than 15 ppm sulfur content in fuel by weight).

ix. Non-Marine engines: BACT and LAER Emission Limits

- The BACT emission limits for CO and PM (g/kW-hr) included in the draft permit were equal to the applicable part 1039 CO and PM Tier 4 emission standards (g/kW-hr).
- The BACT emission limits for PM_{10} and $PM_{2.5}$[109] were derived from the PM (g/kW-hr) BACT emission limits.
- The BACT and LAER emission limits for NO_x (g/kW-hr) included in the draft permit were 1) equal to the applicable NO_x Tier 4 emission standards in part 1039, for those engines for which the Tier was expressed as "NO_x", or 2) derived from the applicable part 1039 Tier 4 (NO_x + NMHC) emission standards, for the remaining engines.
- The LAER emission limits for VOC (g/kW-hr) were derived from the applicable part 1039 NMHC or (NO_x + NMHC) Tier 4 emission standards (g/kW-hr).
- The BACT emission limit for SO_2 (g/kW-hr) is 0.00625 g/kW-hr for each non-marine engine, which corresponds to a sulfur content in fuel oil of 15 ppm by weight.
- The CO_2e (tpy) BACT emission limits were derived from the emision factors (g/kW-hr) for each individual GHG from Tables C-1 and C-2 of 40 CFR part 98, subpart C.

4. BACT Analysis for SF_6 Fugitive Emissions - SF_6-Insulated Electrical Switchgears

The Empire Wind project is expected to have the following SF_6-insulated electrical switchgears during O&M: about 147 switches, each rated at 72.5 kilovolts ("kV"), for each one of their WTGs. The following SF_6-insulated electrical switchgears will be used for the 2 OSSs:

- EW1 OSS: 2 switches, each rated at 245 kV; 18 switches, each rated at 72.5 kW; 2 switches, each rated at 13.8 kV.
- EW2 OSS: 2 switches, each rated at 362 kV; 26 switches, each rated at 145 kW; 2 switches, each rated at 13.8 kV; and one gas-insulated bus duct[110] at 66 kV.

Each of the SF_6-insulated electrical switchgears listed above will contain small amounts of SF_6 as an insulating medium. In addition, Empire Wind anticipates storing SF_6 material in some small containers to facilitate switchgears refilling, as needed. The SF_6-insulated electrical switchgears will be emission sources of fugitive emissions of SF_6, which is a GHG, due to the possible equipment leakage of SF_6 from the gas-tight switchgear compartments. Fugitive SF_6 emissions could also leak during refilling events throughout the life of the project. Empire Wind estimated its annual SF_6 potential emissions at 1,393 tpy.

[109] PM_{10} and $PM_{2.5}$ represent the sum of filterable + condensable particulates.

[110] The gas-insulated bus duct is a metal pipe with an internal bus consisting of a copper bar encapsulated in an aluminum enclosure containing SF_6 for proper insulation. A bus duct is designed to transfer power more efficiently than cables.

Empire Wind, in step 1 of the BACT analysis, has identified the use of SF_6-free switchgears and the use of enclosed pressurized switchgears with low pressure alarms for leak detection as the potentially technically feasible control technologies for the electrical switchgears' SF_6 emissions. However, SF_6-free switchgears compatible with Empire Wind's project-specific WTG and OSS designs are not currently available and will not be available until, at the earliest, 2025 for the OSSs and 2027 for the WTGs. Thus, this control technology option has been determined to be technically infeasible for the proposed project.

BACT for control of SF_6 fugitive emissions from the switchgears has been determined to be:

- the use of SF_6-insulated electrical switchgears with an enclosed-pressure system to minimize leaks with a manufacturer guaranteed leak rate of (1) 0.1% or less per year by weight of the SF_6 material stored in each 13.8 kV switches installed on each offshore substation; and (2) 0.5 % or less per year by weight of the SF_6 material stored in each of the switches installed on each of the wind turbines, each of the 362 kV, 245 kV, 145 kV, and 72.5 kV switches installed on the offshore substations, and the gas-insulated bus duct; and
- the implementation of a SF_6 leak detection alarm system with low pressure alarms.

The EPA notes that there are no SF_6 emission standards contained in any NSPS applicable to the SF_6-insulated electrical switchgear equipment.

The draft permit includes a SF_6 BACT emission limit of 1,393 tpy on a 12-month rolling total basis, along with corresponding monitoring, recordkeeping, and reporting requirements. The draft permit also requires the use of enclosed-pressure systems, and an SF_6 leak detection alarm system that triggers alarms based on pressure readings in the switchgears so that the leaks can be detected before a substantial portion of SF_6 is lost. Further, it requires that, upon a detectable pressure drop that is 10% of the original pressure (accounting for ambient conditions), the Permittee performs maintenance on the switchgears to fix seals within 14 days. It also requires that if an event requires removal of SF_6, the affected major components will be replaced with new components.

5. <u>LAER for VOC Fugitive Emissions – ULSD Storage Tanks</u>

Empire Wind anticipates using two storage tanks, each with a maximum volume of 7,925 gallons, to be located on the OSSs (one tank per each OSS) during C&C and O&M, designated for storing only ULSD fuel. The fuel from these storage tanks may generate VOC fugitive emissions as breathing and loading losses. LAER control for the VOC fugitive emissions from the ULSD storage tanks has been determined to be:

- Use of light color tanks
- Good tank design
- Good operating and maintenance practices
- Submerged fill pipe

The draft permit requires Empire Wind to implement all of the above measures that constitute LAER and includes VOC LAER emission limits of 0.17 tpy for C&C and for O&M, on a 12-month rolling total basis, along with the corresponding monitoring, recordkeeping, and reporting requirements. *See* the draft permit.

The EPA notes that there are no VOC emission standards in any NSPS that would apply to the two ULSD storage tanks.

6. LAER for VOC Fugitive Emissions – Painting and Cleaning Activities

Empire Wind anticipates conducting touchup painting on WTGs' and OSSs' components during C&C and small amounts of periodic repainting and touchups of the WTGs and OSSs during O&M. Also, during both C&C and O&M, Empire Wind will use small amounts of various solvents to clean of mechanical components of the WTGs and OSSs. These activities are referred to in the draft permit as "painting and cleaning activities," and they will have the potential to generate small amounts of VOC fugitive emissions, given the VOC content of paints and solvents.

LAER control for the VOC fugitive emissions from the painting activities and cleaning activities has been determined to be the use of low-VOC materials (paints and solvents); the use of best management practices to minimize or prevent the airborne particulates generated in the process of painting from drifting into the atmosphere; and ensuring proper storage of paint and solvents in non-leaking, properly sealed containers.

The draft permit requires Empire Wind to implement all of the above-listed LAER control measures and includes a LAER emission limit for VOC fugitive emissions from painting and cleaning activities of 0.17 tpy on a 12-month rolling total basis, for each of C&C and O&M, along with the corresponding monitoring, recordkeeping, and reporting requirements.

7. LAER and BACT – 6 NYCRR 231-5.4(b) and 7.6(c) Requirements

The draft permit includes certain LAER and BACT emission limitations, which are discussed in this Fact Sheet. However, as provided at 6 NYCRR 231-5.4(b) and (c) and 6 NYCRR 231-7.6(c) and (d), in establishing final LAER and BACT limits the EPA may consider any new relevant information (including recent permit decisions, or public comments received) subsequent to the submittal of a complete application. As such, LAER and BACT emission limits will not be established in final form until the final permit is issued.

D. 6 NYCRR 201-6 ("Title V Facility Permits")

As incorporated by reference into 40 C.F.R. § 55.14, the requirements of a state's EPA-approved CAA title V operating permit program – in the case of New York, the requirements of 6 NYCRR 201-6 ("Title V Facility Permits") ("title V") – apply to OCS sources located within 25 nm of a state's seaward boundaries that are major sources under the PSD or Nonattainment NSR regulations, such as the Empire Wind project. 6 NYCRR 201-6.2(a)(1) requires that an owner or operator of a new major source or facility, such as the Empire Wind project, submit a complete application for an initial title V operating permit prior to the commencement of construction of

the new facility. Thus, Empire Wind's OCS air permit application also includes the pertinent information for a title V permit application for the O&M phase of the proposed project, the phase which requires an initial title V operating permit. The draft OCS air permit addresses all of the title V operating permit requirements.

E. 6 NYCRR 225 ("Fuel Composition and Use-Sulfur Limitations")

The 0.0015% sulfur by weight limitation for distillate fuel oil found at 6 NYCRR 225-1.2(d) applies to the ULSD fuel oil that will be used by the project.

F. 6 NYCRR 227 ("Stationary Combustion Installations")

The following provisions of 6 NYCRR 227 apply to the project:

1. The opacity requirements at 6 NYCRR 227-1.4(a) and (b)(1) for stationary combustion installations would apply to each marine engine of marine vessels that are OCS sources, and to each non-marine engine, included in the draft permit.

2. The particulate emission limit of 0.1 lb/MMBTU at 6 NYCRR 227-1.3(a)(2) applies to oil-fired stationary combustion installations with a heat input equal to or greater than 50 MMBTU/hr, except for those stationary combustion installations that are subject to an equal or more stringent NSPS and/or NESHAP PM emission standard. *See* 6 NYCRR 227-1.2(a). The Category 3 marine engines of the Heavy Lift Vessel (used during O&M), which is anticipated to be an OCS source, will have a heat input of 50.7 MMBTU/hr. However, these engines will be subject to a NSPS IIII PM emission standard of 0.15 g/kW-hr, which converts to about 0.04 lb/MMBTU. Since the NSPS IIII PM emission limit is more stringent than the 6 NYCRR 227-1.3(a)(2) emission limit, the PM limit of 0.1 lb/MMBTU does not apply to the Category 3 marine engines of the Heavy Lift Vessel.

3. Each of the two permanent diesel generator engines on OSSs will be subject to the NO_x emission limit of 2.3 grams/brake horsepower hour specified at 6 NYCRR 227-2.4(f)(3) and the NO_x performance test requirement at 6 NYCRR 227-2.6 that apply to stationary internal combustion engines.

G. 6 NYCRR 211 ("General Prohibitions")

1. The opacity requirements at 6 NYCRR 211.2[111] apply to all marine engines of vessels that are OCS sources and all non-marine engines of the Empire Wind project. However, the opacity requirements at 6 NYCRR 227-1.4(a), which also apply to the project's marine engines of vessels that are OCS sources and the project's non-marine engines, are more stringent than the 6 NYCRR 211.2 opacity requirements. Thus, the draft permit doesn't include the 6

[111] 6 NYCRR 211.2 states that "[e]xcept as permitted by a specific part of this Subchapter and for open fires for which a restricted burning permit has been issued, no person shall cause or allow any air contamination source to emit any material having an opacity equal to or greater than 20 percent (six minute average) except for one continuous six-minute period per hour of not more than 57 percent opacity."

NYCRR 211.2 opacity requirements.

2. Under 6 NYCRR 211.1, "No person shall cause or allow emissions of air contaminants to the outdoor atmosphere of such quantity, characteristic or duration which are injurious to human, plant or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life or property. . . ." This provision prohibiting air pollution at 6 NYCRR 211.1 applies to the entire Empire Wind project, and is included in the draft permit.

H. Other COA Air Regulations

The following is a list of other COA air regulations which have provisions that apply to the entire project:

1. 6 NYCRR 200.6 ("Acceptable Ambient Air Quality")
2. 6 NYCRR 200.7 ("Maintenance of Equipment")
3. 6 NYCRR 201-1.4 ("Malfunction Start-up/Shutdown Activities")
4. 6 NYCRR 202-1.1 ("Required Emission Tests")
5. 6 NYCRR 202-2 ("Emission Statements")
6. 6 NYCRR 215.2 ("Open Fires")

I. Project Potential to Emit (TPY) Emission Limitations

For nonattainment areas or areas in the Ozone Transport Region, New York's regulations at 6 NYCRR 231-5.3(a)(1) ("Permit content and terms of issuance") provide that a permit shall establish and include emission limitations on the potential to emit of all applicable nonattainment contaminants of a proposed facility. For attainment areas, 6 NYCRR 231-7.5(a) ("Permit content and terms of issuance") provides that a permit shall establish emission limitations on a proposed facility's potential to emit for each regulated NSR contaminant with emissions greater than the applicable significant project threshold listed in Table 6 at 6 NYCRR 231-13.6. In line with these requirements, the Empire Wind draft permit establishes potential to emit ("PTE") limitations for NO_x, VOC, CO, SO_2, PM, PM_{10}, $PM_{2.5}$ and GHG emissions for the OCS Facility. The emissions included in this PTE would be those covered in the definition of PTE at 40 C.F.R. § 55.2. *See* draft permit for the PTE emission limits, along with the corresponding monitoring, recordkeeping, and reporting requirements.

XII. COMPLIANCE METHODOLOGY

The draft permit proposes that the permittee show compliance with the various permit requirements for marine and non-marine engines mainly based on each engine being certified to the corresponding Tier engine emission standards (g/kW-hr) specified in the draft permit, daily monitoring of each engine's hours of operation, daily monitoring of fuel use, and daily monitoring of the actual emissions (tons/day) from all marine and non-marine engines.

In addition, the draft permit requires the Permittee to conduct (1) daily visible emissions surveys for each of the marine engines of the ocean-going vessels that will be OCS sources, and annual opacity determinations for the permanent non-marine engines of the OSSs; (2) NO_x performance

testing (initially and every five years thereafter) for the two permanent diesel generator engines on the OSSs during O&M; (3) initial and annual NO_x and PM performance tests for Category 3 marine engines of the Main Installation Vessel for WTGs Towers, Nacelles, and Blades (MAERSK) (used for C&C) and the Heavy Lift Vessel (used during O&M); and (4) establishing operating parameters to be monitored continuously for the Category 3 marine engines of the Main Installation Vessel for WTGs Towers, Nacelles, and Blades (MAERSK) (used for C&C) and the Heavy Lift Vessel (used during O&M). Further, the draft permit requires that compliance with the sulfur content in fuel limits established in the permit be demonstrated by obtaining the fuel supplier's certificate that documents the fuel's sulfur content.

The draft permit also requires that Empire Wind (1) maintain and operate each marine and non-marine engine according to the manufacturer's written instructions; (2) use good combustion practice for all marine and non-marine engines; and (3) implement maintenance, management, and work practices standards for marine and non-marine engines.

For the SF_6-insulated electrical switchgears, an emission source of fugitive GHG emissions, the draft permit requires that compliance be demonstrated through methods such as: (1) tracking the amount of SF_6 material added and/or consumed; (2) installing and maintaining a SF_6 leak detection alarm system as prescribed by the manufacturer; and (2) taking appropriate corrective actions to minimize or prevent SF_6 leaks.

For other emission sources, such as ULSD storage tanks, and painting and cleaning activities, which are sources of fugitive VOC emissions, the draft permit requires that compliance be demonstrated through methods such as: (1) tracking the amount of the relevant materials stored or consumed; (2) good tanks design (including the use of light color tanks), storage, operating, filling and maintaining procedures to minimize emissions from tanks; (3) storing only ULSD fuel; and (4) using only low-VOC paint and solvents and employing best management practices to prevent and minimize the emissions from painting activities.

The draft permit also requires recordkeeping and reporting for all of Empire Wind's emission sources.

XIII. AIR QUALITY IMPACT ANALYSES

The regulations at 40 C.F.R. part 51, Appendix W[112] ("Guideline on Air Quality Models") ("the *Guideline*") provide the requirements for analyses of ambient air quality impacts. The *Guideline* specifies the EPA's preferred models and other techniques, as well as guidance for their use in regulatory applications in estimating ambient concentrations of air pollutants in support of PSD permits. The analyses of ambient air impacts in this section were conducted in accordance with the *Guideline* and supplemented by additional New York State Department of Environmental Conservation ("NYSDEC") guidance, including DAR-10: NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis.[113]

[112]Appendix W to 40 C.F.R. part 51 can be found at https://www.epa.gov/scram/2017-appendix-w-final-rule.
[113] NYSDEC DAR-10 can be found at https://www.dec.ny.gov/docs/air_pdf/dar10.pdf.

The ambient air impact analysis for this project was conducted to account for two periods: the C&C phase and the O&M phase.[114] The C&C emissions account for the highest annual emissions from the source. The O&M phase emissions are considerably lower than the C&C emissions. The modeling analysis has been conducted for CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2 to demonstrate compliance with the NAAQS and applicable PSD increments. The modeling analysis uses NOx source emission rates that are higher than those in the permit application, thus taking a conservative approach that overestimates NO_2 impacts.

A. Modeling Methodology

Empire Wind conducted a modeling analysis using the American Meteorological Society/Environmental Protection Regulatory Model ("AERMOD") version 22112, combined with the AERCOARE meteorological data preprocessor program. AERCOARE uses the Coupled Ocean Atmosphere Response Experiment ("COARE") air-sea flux code to read overwater measured hourly meteorological data and addresses conditions in the marine environment. The use of AERCOARE-AERMOD is considered an alternative model as per the *Guideline*. In accordance with the requirements of section 3.2.2(e) of the *Guideline*, Empire Wind has satisfactorily demonstrated that it meets the requirements of the aforementioned section and has received concurrence from EPA Region 2 and the EPA's Model Clearinghouse ("MCH") to proceed with this approach.[115] All information associated with the alternative model approval are included with the permit record. The meteorological data used with AERMOD was collected at Buoy Station #44065 (New York Harbor Entrance/Ambrose Light) from 2015-2019 to create overwater meteorological files for input to AERMOD. The Building Profile Input Program (BPIPPRM) was used to evaluate the impacts of building downwash on pollutant concentrations. The exhaust stacks for the various vessels and other project equipment were included in the analysis to determine if they can cause downwash. Tier 2 ARM2 conversion methodology is used for the 1-hour NO_2 dispersion modeling with the default minimum (0.5) and maximum (0.9) NO_2/NO_x ratios. Secondarily formed $PM_{2.5}$ and ozone impacts are evaluated using the EPA's guidance "Photochemical Model Estimated Relationships Between Offshore Wind Energy Project Precursor Emissions and Downwind Air Quality (O_3 and $PM_{2.5}$) Impacts" (2022).[116] Since the emissions associated with the construction of the project will vary both temporally and spatially, an hourly emissions file was developed to represent the various overlapping activities as they occur during the project. The anticipated construction schedule is used to allocate the varying emissions along the numerous construction locations through the project area. A temporally and spatially varying hourly emissions file is also developed for the O&M activities which accounts for the various O&M activities occuring simultaneously.

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[114]Other OCS projects have been exempted under 40 C.F.R. § 52.21(i)(3) from modeling C&C phase emissions in the nearfield since their emissions (i) would impact no Class I area and no area where an applicable increment is known to be violated, and (ii) would be temporary. Empire Wind does not qualify for this exemption since the New Source Review program in New York only considers a source temporary for this purpose if it would emit for less than one year. *See* 6 NYCRR 231-3.3(d). The Empire Wind project's C&C phase will extend for more than one year during and hence cannot be considered temporary.

[115]The concurrence memos for the alternative model request can be found at: https://cfpub.epa.gov/oarweb/mchisrs/index.cfm?fuseaction=main.resultdetails&recnum=22-II-01.

[116]The EPA's guidance for estimating secondarily formed $PM_{2.5}$ and ozone impacts offshore can be found at: https://www.epa.gov/system/files/documents/2023-01/EPA454-R-22-007%2029DEC2022.pdf.

Receptors were placed at various offshore and on-land locations, including Class I areas, to determine project impacts at these locations. For the near-field modeling, a two-step process was used. First, areas of maximum predicted concentrations were identified with a coarse grid of receptors with 400-meter spacing. The grid extends to 3,000 meters from the source locations. Next, AERMOD was run again with a refined 800 m by 800 m grid with 50-meter spacing in the areas identified as maximum impact in the first step. Discrete receptors were also placed on land, approximately every 500 meters along the shorelines of New Jersey, New York City, and Long Island and they extend inland in New York and New Jersey within a 50 km radius of any corner of the wind farm. Empire Wind will be implementing a 500-meter safety exclusion zone surrounding construction and maintenance activities. This precludes the general public from being within 500 meters of the activities. In addition, an expanded exclusion zone of 650 meters will be used for the infrequent inter-array cable maintenance activities at the project turbines, which will occur for up to 14 days per year (up to 336 total hours) for EW1 and up to 28 days per year (up to 672 total hours) for EW2.[117] For both 500 meters and 650 meters exclusion zones, Empire Wind will have guard ships that will patrol the area to prohibit entry in the safety exclusion zone and will inform the United States Coast Guard (USCG) if any trespassing occurs. No exclusion zone will be in place during operation.

Ambient background data is used from the nearest ambient air quality monitoring sites to the project. There are no monitoring stations offshore, hence the closest land monitors were used. These monitors are part of the State and Local Air Monitoring Stations network and are operated by NYSDEC or NJDEP, and they all comply with the EPA's quality assurance and quality control requirements. The most recent data from 2018-2020 is used as the background concentration to determine final project impacts. For NO_2 only, seasonal hourly background concentrations are used, in accordance with EPA guidance. To address the pre-construction ambient monitoring requirement, Empire Wind used the above-mentioned representative ambient monitored data to characterize existing ambient air quality in the area.

B. Ambient Air Quality Impact Analysis Results

NAAQS have been set by the EPA for six principal pollutants, called "criteria pollutants," that are common in outdoor air and considered harmful to public health and the environment. These include CO, Pb, PM, O_3, NO_2, and SO_2. Primary NAAQS standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary NAAQS standards provide public welfare protection, including protecting against decreased visibility and damage to animals, crops, vegetation, and buildings. PSD increment is the amount of pollution an area is allowed to increase above a baseline concentration after its associated baseline date. Increments prevent the air quality in clean areas from deteriorating to the level set by the NAAQS while allowing for economic growth. It is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant. The EPA has established increment standards for various

[117] The 500-meter exclusion zone is authorized by the U.S. Coast Guard. *See* 33 CFR 147.10. Empire Wind has represented it is working with the U.S. Coast Guard on an understanding regarding the specifics of the 650-meter exclusion zone.

pollutants for Class I, Class II, and Class III areas.[118] The EPA has also set Significant Impact Levels ("SILs") to evaluate whether a proposed new or modified major source could potentially cause or contribute to a NAAQS or PSD increment violation when combined with existing concentrations. For any pollutant and averaging period, where the project shows impacts greater than the SILs, a NAAQS and/or PSD increment analysis is conducted.

As part of the air quality assessment, Empire Wind initially compared the maximum modeled concentrations to the SILs. These results are shown in Table 2 for the C&C phase and Table 3 for the O&M phase. For the C&C phase, all pollutants and averaging periods are greater than the corresponding SILs, except annual PM_{10}, annual $PM_{2.5}$ (NAAQS assessment ranking), 1-hour CO, and annual SO_2. For the O&M phase, all pollutants and averaging periods are greater than the corresponding SILs, except annual PM_{10}, annual $PM_{2.5}$ (NAAQS and PSD increment assessment ranking), 1-hour CO, and SO_2 (3-hour and annual). The results of the NAAQS and PSD increment assessment are provided in Table 4 and Table 5, respectively.

[118]Areas that are in attainment with the NAAQS are categorized as either "Class I", "Class II," or "Class III," which determines the increment of air quality deterioration allowed. Under the PSD program, all international parks, national wilderness areas and national memorial parks that exceed 5,000 acres, and national parks that exceed 6,000 acres are designated as mandatory federal Class I areas in order to preserve, protect and enhance air quality. These areas are subject to more stringent NAAQS and PSD increment standards. All other areas that attain the NAAQS are initially designated as Class II. *See* 42 U.S.C. §§ 7472 and 7474.

Table 2 - Maximum AERMOD Modeled Concentrations as Compared to the SILs for the C&C Phase

Pollutant	Averaging Period	Modeled Concentration (µg/m^3)	SIL (µg/m^3)
NO_2	1-hour	342.2	7.5
	Annual	6.2	1
CO	1-hour	1063.9	2,000
	8-hour	670.2	500
PM_{10}	24-hour	12.5	5
	Annual	0.25	1
$PM_{2.5}$	24-hour (NAAQS)	3.2	1.2
	Annual (NAAQS)	0.08	0.2
	24-hour (PSD)	12.2	1.2
	Annual (PSD)	0.23	0.2
SO_2	1-hour	18.3	7.9
	3-hour	30.2	25
	24-hour	11.1	5
	Annual	0.12	1

Table 3 - Maximum AERMOD Modeled Concentrations as Compared to the SILs for the O&M Phase

Pollutant	Averaging Period	Modeled Concentration (µg/m^3)	SIL (µg/m^3)
NO_2	1-hour	671.7	7.5
	Annual	2.5	1
CO	1-hour	1346.0	2,000
	8-hour	898.1	500
PM_{10}	24-hour	12.6	5
	Annual	0.10	1
$PM_{2.5}$	24-hour (NAAQS)	5.6	1.2
	Annual (NAAQS)	0.07	0.2
	24-hour (PSD)	12.1	1.2
	Annual (PSD)	0.11	0.2
SO_2	1-hour	7.6	7.9
	3-hour	10.8	25
	24-hour	2.7	5
	Annual	0.04	1

Table 4 - AERMOD Modeled Concentrations as Compared to the NAAQS for the C&C and O&M Phases.

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)	Ambient Background ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
C&C Phase					
NO_2	1-hour	183.9	SEASHR*	183.9	188
	Annual	6.2	27.1	33.3	100
CO	1-hour	1,014.7	2,405	3,419.7	40,000
	8-hour	365.2	1,832	2,197.2	10,000
PM_{10}	24-hour	6.7	29	35.7	150
$PM_{2.5}$	24-hour	0.5	17.7	18.2	35
	Annual	0.08	6.5	6.6	12
SO_2	1-hour	8.1	28.8	36.9	196
	3-hour	26.7	64.7	91.4	1,300
O&M Phase					
NO_2	1-hour	182.8	SEASHR*	182.8	188
	Annual	2.5	27.1	29.6	100
CO	1-hour	1273.4	2,405	3,678.4	40,000
	8-hour	798.8	1,832	2,630.8	10,000
PM_{10}	24-hour	8.1	29	37.1	150
$PM_{2.5}$	24-hour	1.2	17.7	18.9	35
	Annual	0.07	6.5	6.6	12
SO_2	1-hour	3.9	28.8	32.7	196
	3-hour	9.2	64.7	73.9	1,300

*SEASHR: seasonal hourly background concentration

Table 5 - AERMOD Modeled Concentrations as Compared to the Class II PSD Increment for the C&C and O&M Phases.

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)	Class II PSD Increment ($\mu g/m^3$)
C&C Phase			
NO_2	Annual	6.2	25
PM_{10}	24-hour	6.7	30
	Annual	0.2	17
$PM_{2.5}$	24-hour	6.5	9
	Annual	0.2	4
SO_2	3-hour	26.7	512
	24-hour	8.8	91
	Annual	0.1	20
O&M Phase			
NO_2	Annual	2.5	25
PM_{10}	24-hour	8.1	30
	Annual	0.10	17
$PM_{2.5}$	24-hour	7.8	9
	Annual	0.11	4
SO_2	3-hour	9.2	512
	24-hour	2.0	91
	Annual	0.04	20

C. Modeled Emission Rates as Permit Limits

The draft permit includes daily emission limits (in tons per day, or "tpd") for CO, NO_x, PM_{10}, $PM_{2.5}$, and SO_2[119] for the OCS Facility for both the C&C and O&M phases. 6 NYCRR Subpart 231-12.2(c) requires that a proposed new facility demonstrate that allowable emissions[120] from the facility would not cause or contribute to air pollution in violation of the NAAQS or PSD increment. Empire Wind submitted a modeling analysis that showed the project will comply with the NAAQS and PSD increment. In order to conduct this modeling, Empire Wind made certain assumptions in determining the allowable emissions (which represent the OCS Facility emissions that were modeled) that were used to calculate the air quality impacts. As determined by Empire Wind, the allowable emissions of the modeled emission sources of the OCS Facility do not represent the maximum rated capacity of the OCS Facility in any given day. As a result, in order to ensure that the Empire Wind project is conducted in a manner that aligns with its modeling and, consequently, will not violate the NAAQS or PSD increment as required at 6 NYCRR 231-12.2 (c), the OCS air permit establishes the following tpd emission limits (*See* Table 6 below) for the OCS Facility at the level of the allowable emissions that were modeled. *See* draft permit for the tpd emission limits, as well as the corresponding monitoring, recordkeeping, and reporting requirements.

Table 6 – OCS Facility Daily Emissions Limits (in tpd)

Project Phase	NO_x	CO	PM_{10}	$PM_{2.5}$	SO_2
C&C	464.09	148.28	11.35	10.85	11.78
O&M	68.54	56.52	2.20	2.14	1.57

D. 6 NYCRR Part 231, Subpart 231-12 ("Ambient Air Quality Impact Analysis")

6 NYCRR Subpart 231-12 requires a demonstration that emissions of a nonattainment pollutant will not cause ambient air concentrations of that pollutant to increase by more than the SIL in nonattainment area. Empire Wind used the EPA's guidance "Photochemical Model Estimated Relationships Between Offshore Wind Energy Project Precursor Emissions and Downwind Air Quality (O_3 and $PM_{2.5}$) Impacts" (2022) to demonstrate that the project's ozone impact is below the SIL for all onshore receptors.

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[119]The annual emission limits for CO, NO_x, PM_{10}, $PM_{2.5}$, and SO_2 (along with other air pollutants), measured in tpy on a 12-month rolling total basis, were also established in the draft permit under the authority of 6 NYCRR 231-5.3(a)(1) and 6 NYCRR 231-7.5(a). *See* Section XI.I of this Fact Sheet for details.

[120]6 NYCRR 231-4.1(b)(3) "(3) *Allowable emissions.* This definition applies only for the purposes of determining the baseline concentration and the calculation of air quality impacts according to section 231-12.2 of this Part. The emission rate of a facility calculated using the maximum rated capacity of the facility (unless the facility is subject to permit conditions which restrict the operating rate, or hours of operation, or both) and the most stringent of the following:
(i) the applicable standards as set forth in 40 Code of Federal Regulations (CFR) parts 60 and 61; or
(ii) the applicable State implementation plan emissions limitation, including those with a future compliance date; or
(iii) the emission rate specified in a permit condition, including those with a future compliance date."

E. Class I Area

In addition to the air quality impacts analyzed above, Empire Wind also addressed project impacts on the Class I areas, as required by PSD regulations. The nearest Class I areas to the project are the E.B. Forsythe (Brigantine) National Wilderness Area in New Jersey (108 km from the nearest project boundary) and the Lye Brook National Wilderness Area in Vermont (299 km from the nearest project boundary).

For the Class I PSD increment analysis, AERMOD was initially used to compare the maximum predicted project concentrations with the Class I area SILs at 50 km. Since AERMOD is only appropriate out to 50 km from the source, for any pollutants and averaging periods that exceeded the corresponding SILs, long range transport modeling using CALPUFF was conducted to ensure impacts below the SILs at the Brigantine Class I area distance for those pollutants. The CALPUFF modeling was conducted for annual NO_2, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and 3-hour and 24-hour SO_2. As indicated in Table 8 and Table 9 below, the AERMOD and CALPUFF modeling results indicate that the project concentrations will be less than the Class I area SILs for all pollutants and averaging times.

Table 8 - Maximum AERMOD Modeled Concentrations at 50 km as Compared to the Class I PSD Increment for the C&C and O&M Phases.

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)		Class I SIL ($\mu g/m^3$)	Class I PSD Increment ($\mu g/m^3$)
		C&C	O&M		
NO_2	Annual	0.68	0.21	0.1	2.5
PM_{10}	24-hour	0.47	0.14	0.3	8
	Annual	0.022	0.006	0.1	4
$PM_{2.5}$	24-hour	0.52	0.13	0.27	2
	Annual	0.027	0.006	0.05	1
SO_2	3-hour	1.19	0.46	1	25
	24-hour	0.31	0.09	0.02	5
	Annual	0.014	0.004	0.1	2

Table 9 - Maximum CALPUFF Modeled Concentrations at Brigantine Wilderness as Compared to the Class I PSD Increment for the C&C and O&M Phases.

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)		Class I SIL ($\mu g/m^3$)	Class I PSD Increment ($\mu g/m^3$)
		C&C	O&M		
NO_2	Annual	0.022	0.006	0.1	2.5
PM_{10}	24-hour	0.070	0.018	0.3	8
$PM_{2.5}$	24-hour	0.141	0.028	0.27	2
SO_2	3-hour	0.059	0.014	1	25
	24-hour	0.019	0.005	0.02	5

Empire Wind conducted modeling to assess the Air Quality Related Values ("AQRVs"), including visibility and deposition, in the Class I areas. This has been reviewed and approved by the Federal Land Manager ("FLM"), in this case the U.S. Fish and Wildlife Service ("USFWS"), and no additional concerns have been raised by them.

A screening procedure, as described in the FLM's Air Quality Related Work Group ("FLAG") guidance (2010)[121], was initially used to determine the potential impacts in the Class I areas and whether a Class I area AQRV analysis was required. The emissions are conservatively based on the "worst-case" short-term emission rates for the project during the C&C and O&M phases. Since the screening impacts for the O&M phase are below the threshold, a Class I AQRV analysis was not required for O&M. An AQRV analysis using CALPUFF was conducted for the C&C phase. The results indicate that the project impacts will be less than the applicable thresholds for both visibility and deposition.

F. The EPA's Assessment of Empire Wind's Air Quality Impact Analysis

The EPA has assessed the analyses submitted by Empire Wind related to the ambient air impacts during the C&C and O&M phases. The EPA concludes that the emissions in either of these phases will not cause or contribute to any violations of the NAAQS or PSD Increment. Empire Wind has satisfactorily met the ambient air quality impact requirements of the PSD regulations.

[121]The FLAG guidance can be found at: https://irma.nps.gov/DataStore/DownloadFile/420352.

XIV. ADDITIONAL IMPACT ANALYSES

As required by 40 C.F.R. § 52.21(o) of the PSD regulations, the applicant must provide an analysis of the project impacts on soils, vegetation, and visibility and the expected general commercial, residential, and industrial growth associated with the source.

A. Visibility

For the Class II visibility analysis, the project used the VISCREEN model to evaluate important nearby vistas, which included the Fort Tilden Gateway National Recreation Area and the Statue of Liberty National Monument. The main project area is approximately 36 km from Fort Tilden and 55.8 km from Liberty Island. The project's maximum potential to emit emission rates were used in the analysis. The VISCREEN Level 2 screening analysis shows that Empire Wind's plume visibility is less than the threshold criteria.

B. Soils

The EPA's screening procedure for soils is based on the contribution of metals and toxic air pollutants. Since the maximum predicted project concentrations are all located offshore and the project is a minor source of the metal and toxic air pollutants, the impact to soils onshore is negligible.

C. Vegetation

The modeled emissions concentrations for Empire Wind were compared against appropriate injury thresholds and the NAAQS secondary standards. The secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. The maximum modeled concentrations at onshore locations for both the C&C and O&M phases are below the vegetation sensitivity thresholds and NAAQS secondary standards (as shown in Table 10 for NO_2, CO, SO_2, PM_{10}) and hence will not impact vegetation.

Table 10 - Maximum Modeled Concentrations as Compared to the Vegetation Impact Thresholds for the C&C and O&M Phases

Averaging Period	Maximum Predicted Concentration (µg/m³)		Threshold for Impact to Vegetation (µg/m³)	Applicability
	C&C	O&M		
NO_2 Vegetation Impact Thresholds				
1-hour	324.2	671.7	66,000	Leaf injury to plant
2-hour	342.2	671.7	1,130	Affects to alfalfa
Annual	6.2	2.5	100	Protects all vegetation
	6.2	2.5	190	Metabolic and growth impact to plants
CO Vegetation Impact Thresholds				
1-hour	1,036.9	1,346.0	40,000	Protects all vegetation
8-hour	670.2	898.1	10,000	Protects all vegetation
Multiple day	670.2	898.1	10,000	No known effects to vegetation
1-week	670.2	898.1	115,000	Effects to some vegetation
Multiple week	670.2	898.1	115,000	No effect on various plant species
SO_2 Vegetation Impact Thresholds				
1-hour	18.3	7.6	131	Suggested worst-case limit
3-hour	30.2	10.8	390	Protects SO_2 sensitive species
3-hour	30.2	10.8	1,300	Protects all vegetation
24-hour	11.1	2.7	63	Insignificant effect to wheat and barley
Annual	0.12	0.04	130	Protects SO_2 sensitive species

PM_{10} Vegetation Impact Thresholds				
24-hour	12.5	12.6	150	Protects all vegetation
Annual	0.25	0.1	50	Protects all vegetation
Annual	0.25	0.1	579	Damage to sensitive species (fir tree)

D. Growth

Emissions from secondary sources related to industrial, commercial, and residential growth in the areas surrounding the project will be negligible since mostly existing infrastructure will be used and no additional commercial or industrial construction in the area will be necessary to support the project.

XV. ENVIRONMENTAL JUSTICE

Executive Order ("EO") 12898 titled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"[122] requires that federal agencies identify and address, as appropriate and to the extent practicable and permitted by existing law, proportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The EPA defines Environmental Justice ("EJ") as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. NYSDEC implements New York's environmental justice policy detailed in CP-29 Environmental Justice and Permitting (CP-29) and the State Environmental Quality Review Act.

Based on the EPA and NYSDEC definitions, the communities nearby the Empire Wind project with EJ concerns include Brooklyn, NY (the community surrounding the EW1 interconnection cable route, onshore substation, and O&M Base[123]), and two communities along the EW2 onshore export and interconnection cable route, one in Long Beach, NY and the other in Island Park, NY, south of Barnums Channel. Empire Wind has been continuing to do significant outreach in the project study areas to address environmental justice, as specified by CP-29.

A. Environmental Impacts to Communities with EJ Concerns

For purposes of Executive Order 12898 on environmental justice, the Environmental Appeals Board has recognized that compliance with the NAAQS is "emblematic of achieving a level of public health protection that, based on the level of protection afforded by a primary NAAQS,

[122]Executive Order 12898 can be found at: https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf.

[123]The O&M Base will remotely monitor and control Empire Wind operations at all times. The O&M Base will be located at the South Brooklyn Marine Terminal, in Brooklyn, New York, and will include offices, control rooms, warehouses, and wharves for crew transfer vessels and service operations vessels for the offshore wind farm.

demonstrates that minority or low-income populations will not experience disproportionately high and adverse human health or environmental effects due to the exposure to relevant criteria pollutants."[124] This is because the NAAQS are health-based standards, designed to protect public health with an adequate margin of safety, including sensitive populations such as children, the elderly, and asthmatics. The EPA considered information such as compliance with the NAAQS in analyzing potential environmental justice concerns. The EPA has determined that issuance of this OCS permit will not cause or contribute to NAAQS violations or have potentially adverse effects on ambient air quality. It should be noted that maximum modeled air quality impacts from construction do not occur on shore, but rather they occur over water near the windfarm and these maximums are within the health-based NAAQS and allowable incremental increases. Further, air quality impacts diminish as the emissions approach the shoreline where potential EJ communities reside, and diminish further during the longer-term O&M phase. See Section XIII of this document for a detailed analysis of the required ambient air quality impact analysis provided by Empire Wind for both C&C and O&M phases. The EPA has concluded, based on the required air quality impact analysis Empire Wind provided as part of EPA requirements, that the facility's C&C and O&M air emissions will not have disproportionately high or adverse human health or environmental effects on minority or low-income populations. The emissions in both of these phases are within the NAAQS and PSD Increments.

In addition, to address concerns raised by the fisheries, Empire Wind has conducted outreach and research to coexist with commercial and recreational fishing. Empire Wind has also developed a Fisheries Mitigation Plan that describes in detail their approach throughout all stages of the project. Empire Wind also has Fisheries Liaison Officers (FLOs) on their team to coordinate the various communication activities and coordinating interaction with the fishing community. Additional information can be found in Section 8.8 of Empire Wind's COP.

During the C&C phase, Empire Wind has identified the following impacts to communities with EJ concerns:

- Short-term creation of additional construction jobs: Empire Wind anticipates approximately 1,261 direct jobs will be created during the C&C phase of EW1 and 2,154 direct jobs during the C&C phase for EW2. Empire Wind has also committed to investing approximately $25 million to $30 million in various community development and workforce training and readiness funds in New York over the project lifetime.
- Short-term increase in workforce: Empire Wind anticipates a slight influx of workers relocating to the study area to help fill the additional construction jobs, primarily along the onshore export and interconnection cable routes in Kings and Nassau Counties in New York.
- Short-term increase in the demand for public services: The C&C phase will likely result in an increased demand for public services, including police and fire services. The current infrastructure in the study area is well-suited to adapt to this increase and is unlikely to create a shortage for the general public.

[124] *See* Environmental Appeals Board order *In re Shell Gulf of Mexico, Inc. & in re Shell Offshore, Inc*., 15 E.A.D. 103, 156 (December 30, 2010). A copy of the order can be found in the administrative record for this action.

- Short-term increase in tax revenue and economic benefits: Empire Wind has assessed that the creation of jobs and increased purchasing of construction materials will provide a total of $283.0 million in direct, indirect, and induced economic benefits, with an additional $24.9 million in state and local taxes.
- Short-term increase in onshore construction vehicle traffic and activities: Empire Wind will implement the following measures to avoid, minimize, and mitigate impacts related to increased construction vehicle traffic:
    - Regular updates to the local community through social media, public notices, and/or other appropriate communication tools; and
    - Development of a Traffic Management Plan in coordination and with approval of the affected local municipalities.
- Short-term shortage of affordable housing due to increased demand: The anticipated increase in relocated workers is unlikely to be greater than the available number of temporary housing units and is not expected to create a shortage.

During the O&M phase, Empire Wind has identified the following impacts to communities with EJ concerns:

- Long-term creation of additional operation and maintenance jobs: Empire Wind anticipates approximately 1,797 direct jobs will be created during the lifetime of EW1 and 2,723 direct jobs for EW2. Empire Wind has also committed to investing approximately $25 to $30 million in various community development and workforce training and readiness fund in New York over the project lifetime.
- Long-term increase in workforce: Empire Wind anticipates a slight influx of workers relocating to the study area to help fill the additional O&M jobs, primarily in Brooklyn, Kings County, New York at the proposed location for the O&M Base.
- Long-term increase in the demand for public services: The O&M phase will likely result in a slight increased demand for public services. The current infrastructure in the study area is well-suited to adapt to this increase and is unlikely to create a shortage for the general public.
- Long-term increase in tax revenue and economic benefits: Empire Wind has assessed that the creation of jobs and operations activities will provide a total of $493.8 million in direct, indirect, and induced economic benefits, with an additional $48.8 million in state and local taxes.
- Long-term shortage of affordable housing due to increased tourism demand: The project could result in increased tourism and corresponding increased demand for vacation housing during the O&M phase, but this increase is unlikely to be greater than the available number of temporary housing units and is not expected to create a shortage.
- Long-term presence of new fixed structures in the lease area such as wind turbines and offshore substations: New and/or additional marine users may be attracted to the area such as sightseeing trips and charter tours. The offshore project area would also be used for recreational and/or commercial fishing by communities with EJ concerns not within the onshore study area. Empire Wind has and is continuing to conduct extensive outreach and engagement with the fishing community and is committed to coexistence with commercial and recreational fishing in the area.

- Long-term presence of new fixed structures onshore such as onshore substations and O&M Base: These new structures and the operational noises generated by them could disproportionately affect communities with EJ concerns. This impact will be minimized since they are consistent with the land use and zoning in the surrounding area.
- An increase in operations and maintenance vehicle traffic: Empire Wind anticipates a low number of workers transiting to the O&M Base and onshore substations and no noticeable increase to existing traffic congestion or air emissions is expected.

Empire Wind will continue to maintain strong community engagement throughout the life of the project. There have been and will be pre-application meetings with local agencies and stakeholders, open houses throughout the project area, and a project website that will provide updates to the local community.

XVI. REQUIREMENTS OF OTHER ACTS

A. Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management and National Historic Preservation Act

For the purposes of the Endangered Species Act ("ESA"), Magnuson-Stevens Fishery Conservation and Management Act ("MSFCMA"), and the National Historic Preservation Act ("NHPA"), the issuance of an OCS air permit is a federal action undertaken by the EPA.

BOEM is the lead federal agency for authorizing renewable energy activities on the OCS; therefore, the Empire Wind project is also a federal action for BOEM. BOEM's regulations at 30 C.F.R. part 585 require Empire Wind to obtain a COP approval before commencing construction on the OCS wind project. In conjunction with the COP approval, BOEM is also responsible for issuing the Record of Decision ("ROD") on the Environmental Impact Statement ("EIS") conducted under the National Environmental Policy Review Act ("NEPA").

The applicant requests a lease, easement, right-of-way, and any other related approvals from BOEM necessary to authorize construction, operation, and eventual decommissioning of the proposed action. BOEM's authority to approve, deny, or modify the project derives from the Energy Policy Act of 2005. Section 388 of the Energy Policy Act amended the OCSLA by adding subsection 8(p), which authorizes the Department of the Interior to grant leases, easements, or rights-of-way on OCS lands for activities that produce or support production, transportation, or transmission of energy from sources other than oil and gas, such as wind power.

The EPA assesses its own permitting action (i.e., to issue an OCS air permit for the wind farm project, such as the Empire Wind project) as interrelated to, or interdependent with, BOEM's COP approval and issuance of the NEPA ROD for the Empire Wind project. Accordingly, the EPA has designated BOEM as the lead Federal agency for purposes of fulfilling statutory

obligations under the statutes mentioned previously.[125] BOEM has accepted the designation as lead Federal agency.[126]

Under Section 7(a)(2) of the ESA, 16 U.S.C. § 1536(a)(2), the EPA must ensure that any action authorized, funded, or carried out by the EPA is not likely to jeopardize the continued existence of any federally-listed endangered species or threatened species or result in the destruction or adverse modification of such species' designated critical habitat. If the EPA's action (i.e., OCS air permit issuance) may affect a federally-listed species or designated critical habitat, Section 7(a)(2) of the ESA and relevant implementing regulations at 50 C.F.R. part 402 require consultation between the EPA and the USFWS and/or the National Marine Fisheries Service ("NMFS"), depending on the species and/or habitat at issue.

In accordance with Section 305(b)(2) of the MSFCMA, 16 U.S.C. § 1855(b)(2), Federal agencies are also required to consult with the NMFS on any action that may result in adverse effects to essential fish habitat ("EFH").

Section 106 of the NHPA, 16 U.S.C. 470f, and the implementing regulations at 36 C.F.R. part 800 require federal agencies to consider the effect of their actions on historic properties and afford the opportunity for the Advisory Council on Historic Preservation ("ACHP") and consulting parties to consult on the federal undertaking.

The ESA regulations at 50 C.F.R. § 402.07, the MSFCMA regulations at 50 C.F.R. § 600.920(b), and the NHPA regulations at 36 C.F.R. § 800.2(a)(2) provide that where more than one federal agency is involved in an action, the consultation requirements may be fulfilled by a designated lead agency on behalf of itself and the other involved agencies. As previously discussed, BOEM is the designated lead agency for the purposes of fulfilling the EPA's obligations under Section 7 of the ESA, Section 305(b) of the MSFCMA, and Section 106 of the NHPA for offshore wind development projects on the Atlantic OCS, including the Empire Wind project. As a result of this designation, BOEM will consider the effects of the EPA's OCS permitting action in fulfilling its consultation obligations under each of these statutes during the NEPA ROD and COP approval process.

On September 15, 2023, BOEM published in the Federal Register the official notice of availability of the final EIS for the Empire Wind project Construction and Operations Plan (which requires BOEM approval), for both the public and CAA Section 309 review.

On November 21, 2023, BOEM issued the Lead Agency ROD for the Final EIS prepared for the Empire Wind project COP. The ROD documents the BOEM decision to approve the COP for the Empire Wind project. Thus, the EPA understands that BOEM has satisfied its statutory

[125] *See* a copy of the July 25, 2018 letter from EPA R2 to BOEM regarding lead agency designation that is included in the administrative record for this action.

[126] *See* a copy of the September 24, 2018 letter from the BOEM to EPA R2 accepting lead agency designation that is included in the administrative record for this action. Also, see the administrative record for a copy of the November 3, 2023 email from BOEM to EPA R2 re-confirming its role as the lead federal agency for the Empire Wind project, included in the administrative record for this action.

obligations as the lead federal agency under ESA, MSFCMA, and NHPA for the Empire Wind project.

B. Coastal Zone Management Act

Section 307 of the Coastal Zone Management Act ("CZMA") and its implementing regulations at 15 C.F.R. part 930, subpart C require that federal actions within the coastal zone or within the geographical location descriptions (i.e., areas outside the coastal zone in which an activity would have reasonably foreseeable coastal effects) affecting any land or water use or natural resources[127] of the coastal zone[128] be consistent to the maximum extent practicable[129] with the enforceable policies of a state's federally approved coastal management program. Federal actions include federal agency activities, federal license or permit activities, and federal finance assistance activities. The EPA's issuance of an OCS air permit is considered a federal action under the CZMA[130].

15 C.F.R. part 930, subpart D requires that a non-federal applicant for a federal license or permit, such as Empire Wind, provide a state with a certification of consistency with the state enforceable policies of the coastal management program if the state has identified the federal license or permit on a list of activities subject to federal consistency review in its federally approved coastal management program.

The OCS Lease Area for the Empire Wind project is geographically nearest to the coast of New York state and is also in geographic proximity with the coast of New Jersey state.

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[127] *See* 15 C.F.R. § 930.11 ("*Any coastal use or resource.* The phrase "any coastal use or resource" means any land or water use or natural resource of the coastal zone. Land and water uses, or coastal uses, are defined in sections 304(10) and (18) of the act, respectively, and include, but are not limited to, public access, recreation, fishing, historic or cultural preservation, development, hazards management, marinas and floodplain management, scenic and aesthetic enjoyment, and resource creation or restoration projects. Natural resources include biological or physical resources that are found within a State's coastal zone on a regular or cyclical basis. Biological and physical resources include, but are not limited to, air, tidal and nontidal wetlands, ocean waters, estuaries, rivers, streams, lakes, aquifers, submerged aquatic vegetation, land, plants, trees, minerals, fish, shellfish, invertebrates, amphibians, birds, mammals, reptiles, and coastal resources of national significance. Coastal uses and sources also include uses and resources appropriately described in a management program.").

[128] *See* CZMA § 304(1), 16 U.S.C. § 1453(1) ("The term 'coastal zone' means the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, . . . The zone extends . . . seaward to the outer limit of State title and ownership under the Submerged Lands Act (43 U.S.C. 1301 et seq.) [and other statutes] as applicable. . .. Excluded from the coastal zone are lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers, or agents."); 15 C.F.R. § 930.11 ("*Coastal Zone.* The term 'coastal zone' has the same definition as provided in § 304(1) of the Act.").

[128] *See* 15 C.F.R. § 930.32(a)(1) ("The term 'consistent to the maximum extent practicable' means fully consistent with the enforceable policies of management programs unless full consistency is prohibited by existing law applicable to the Federal agency.").

[129] *See* 15 C.F.R. § 930.32(a)(1) ("The term 'consistent to the maximum extent practicable' means fully consistent with the enforceable policies of management programs unless full consistency is prohibited by existing law applicable to the Federal agency.").

[130] The issuance by BOEM, another federal agency, of the construction and operation plan for the Empire Wind project also constitutes a federal action under the CZMA.

The EPA's action to issue an OCS air permit under 40 C.F.R. part 55 is included on the current lists of federal actions for federal consistency review of both NY[131] and NJ[132] states. Empire Wind submitted a certification of consistency with the New York Coastal Management Program ("NY CMP") to the New York Department of State ("NYDOS") on June 24, 2021. Although the project OCS Lease Area does not fall within a geographical location description for the purposes of 16 U.S.C. § 1456(c)(3)(A) and the implementing regulations at 15 C.F.R. part 930, subparts D and E, Empire Wind, following a request by the New Jersey Department of Environmental ("NJDEP"), voluntarily submitted a consistency certification with the New Jersey Coastal Management Program ("NJ CMP") to the NJDEP on June 24, 2021. Copies of the consistency certifications submitted to NY and NJ are included in the application.

NJDEP has determined that the Empire Wind project is consistent with the NJ CMP rules. NYDOS has determined that EW1 of the Empire Wind project is consistent with the NY CMP rules and has indicated that it will issue a determination that EW2 is consistent with the NY CMP rules at a later date. NYDOS concurrence that the Empire Wind project is consistent with the NY CMP rules is required prior to any EPA final action issuing the OCS air permit.

XVII. OTHER REQUIREMENTS

A. Indian Nation Consultation

Executive Order 13175 commits federal agencies to engage in consultation with tribes when federal actions have tribal implications. In accordance with the EPA Policy on Consultation and Coordination with Indian Tribes[133], EPA Region 2 in a letter dated June 8, 2023[134] notified the Shinnecock Indian Nation in Long Island, New York of the opportunity for consultation on the Empire Wind proposed offshore wind project prior to the EPA's initiation of the public comment review of the Empire Wind draft OCS air permit. On September 19, 2023, the EPA held a consultation meeting with Shinnecock Indian Nation representatives and provided additional information following the meeting to address questions the representatives asked regarding the project.

B. Clean Air Act General Conformity

Pursuant to 40 C.F.R. § 93.153(d)(1), a conformity determination is not required for the portion of an action that includes major or minor new or modified stationary sources that require a permit under the NSR program.

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[131] *See* "NEW YORK STATE COASTAL MANAGEMENT PROGRAM AND FINAL ENVIRONMENTAL IMPACT STATEMENT", Table 3 "Federal Activities, Affecting Land and Water Uses and Natural Resources in the Coastal Zone of New York State" available at https://dos.ny.gov/system/files/documents/2023/04/revised-nys-cmp-2023_0.pdf.

[132] See "NEW JERSEY COASTAL MANAGEMENT PROGRAM FEDERAL CONSISTENCY LISTINGS FEDERAL ACTIVITIES; LICENSES, PERMITS AND OTHER REGULATORY APPROVALS; AND FEDERAL FINANCIAL ASSISTANCE PROGRAMS" available at https://coast.noaa.gov/data/czm/consistency/media/nj.pdf.

[133] *See* EPA Policy on Consultation and Coordination with Indian Tribes, available at https://www.epa.gov/tribal/epa-policy-consultation-and-coordination-indian-tribes.

[134] The letter offering consultation and coordination is included in the administrative record for this air permit action.

XVIII. COMMENT PERIOD, HEARINGS, AND PROCEDURES FOR FINAL PERMIT DECISION

The EPA, in processing this application, has followed the administrative and public participation procedures of 40 C.F.R. part 124. As required in 40 C.F.R. § 124.10, the EPA will provide a public announcement and offer the public the opportunity to comment on the draft permit conditions during a 35-day public comment period. A copy of the draft permit is available on the EPA website at https://www.epa.gov/caa-permitting/caa-permits-issued-epa-region-2. The draft permit, this Fact Sheet, a copy of the application, and additional supporting documents, will be available in the docket for this permitting action (docket number EPA-R02-OAR-2023-0522) at regulations.gov. All persons, including the applicant, who have comments on any condition of the draft OCS air permit must raise all issues and submit all available arguments and all supporting materials for their arguments in full by the close of the public comment period. Comments should focus only on the draft OCS air permit and not on issues related to other permits or authorizations issued by other permitting authorities for the Empire Wind project. The commence and closure dates of the public comment period will be available in the public announcement on the EPA website at https://www.epa.gov/caa-permitting/caa-permits-issued-epa-region-2 and at https://www.epa.gov/publicnotices/notices-search/program_or_statute/clean-air-act-caa-252035. See the public notice for details related to submitting public comments. A public hearing[135] will be held during the public comment period. See the public notice[136] for details related to the public hearing.

Following the close of the public comment period, and after the public hearing, the EPA will prepare a response to all substantive comments and make the responses available to the public on the EPA website at https://www.epa.gov/caa-permitting/caa-permits-issued-epa-region-2. The EPA will consider all written and oral comments submitted during the public comment period and during the public hearing, before issuing a final permit decision. See the public announcement for more details.

[135] *See* 40 C.F.R. § 124.12 ("Public hearings").
[136] *See* 40 C.F.R. § 124.10 ("Public notices of permit actions and public comment period").