The Offshore Wind Farm Round-Up

Created by the JCTA
Issue #15 August 14, 2023

IN THIS ISSUE

WILL BOATS BE ALLOWED IN THE ATLANTIC SHORES WIND FARM?

Boats will not be allowed during the construction phase.

In response to that direct question, Atlantic Shores sent the following response on July 13, 2023:

> "Atlantic Shores will not restrict access to the wind turbine area except for limited areas during construction for safety reasons.
>
> Atlantic Shores will work with the US Coast Guard to institute a 500-meter safety zone around each construction vessel, which other vessels will not be permitted to enter for safety reasons. These 500-meter safety zones will only be maintained around active construction vessels."

In currently operating U.S. wind farms, boats *are* allowed to enter, but boats are not permitted to tie up to a turbine.

The Duty Officer at the U.S. Coast Guard station in Barnegat Light offered the following information during a mid-July telephone call:

> The State of New Jersey, not the Coast Guard, puts the rules in place regarding boats traversing within the wind farm. Even though the wind farm is built on land leased from the federal government, the Coast Guard has no regulations that cover the operation of boats within that area.

More about that point can be found in a study published by the Marine Affairs Institute at Roger Williams School of Law and the Rhode Island Sea Grant Program in April 2020. This study examines the current legal framework governing access to waters around wind turbines and its application to existing offshore infrastructure. Section 2.1 confirms that the Coast Guard does not have the authority to restrict access to wind farms located 12 – 200 nautical miles from shore.

Access the full study by clicking on this link
https://docs.rwu.edu/cgi/viewcontent.cgi?article=1100&context=law_ma_seagrant

A May 2021 article published in Power & Motoryacht[1] describes how the change in turbine placement within wind farms from a half-mile to one mile apart came about in an effort to better enable boats to travel through them.

Access the full article "What to Expect from Offshore Wind Farms on the East Coast" by clicking on this link
https://www.powerandmotoryacht.com/at-sea/what-to-expect-from-offshore-wind-farms-on-the-east-coast

OFFSHORE SUBSTATIONS

We received inquiries about how many offshore substations would be constructed within the wind farm area and how large these substations would be.

First, what is the purpose of the offshore substations? Located within the wind farm itself, the offshore substations "serve as common collection points for power from the wind

[1] *From the website:* "Power & Motoryacht *is the leading marine media brand in the world. From the award-wining magazine that has captured the imagination of boaters for the last four decades, to its thriving video review program, newsletters, social media channels and podcast,* Power & Motoryacht *is the home for the best stories in boating."*

turbines and also serve as the origin for the export cables that deliver power to shore." *From the Atlantic Shores Construction and Operations Plan, section 4.4 Offshore Substations*.

Number of planned offshore substations: up to 10 small substations. Note that offshore substations come in three sizes — small, medium & large. If the final design uses substations that are considered medium, up to 5 would be needed. If the final design calls for substations that are considered large, up to 4 would be required.

From the COP, section 4.4 Offshore Substations: "Offshore substations will be located along the same east-northeast to west-southwest rows as the wind turbines; small offshore substations will be located no closer than 12 miles from shore whereas medium and large offshore substations will be located at least 13.5 miles from shore."

Access more information in the Offshore Substations section 4.
in the COP by clicking on the link below
https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/AtlanticShoresCOPVolume I Project Description.pdf

Dimensions of the substations (rounded to the nearest whole number)

Small:	115' wide x 131' long x 175' above mean lower low water ("MLLW")[2]
Medium:	148' wide x 213' long x 191' above MLLW
Large:	160' wide x 295' long x 208' above MLLW

Access more information in this section, Topside Design, Installation and Commissioning, in the COP by clicking on the link above and scrolling down to section 4.4.2

We received requests for clarification about what type of current – alternating ("AC") or direct ("DC") -- would be generated by the wind turbines and in what form that current would be transferred to the onshore station on the mainland.

Answer: According to section 1.1 Overview of the Projects in the Atlantic Shores' Construction and Operations Plan ("COP"):

1) The wind turbines and the offshore substations within the wind farm area would be connected with a system of high voltage alternating current (HVAC) inter-array cables; and

[2] Mean lower low water ("MLLW") is the average of the lower low water height of each tidal day observed as defined by NOAA's National Ocean Service National Tidal Datum Epoch. The American Meteorological Society defines "National Tidal Datum Epoch" as the specific 19-year period adopted by the National Ocean Service as the official time segment over which sea level observations are taken and reduced to obtain mean values for datum definition.

2) The two areas within the Atlantic Shores wind farm area (called Project 1 and Project 2 in the COP) will be electrically distinct. Energy from each of the offshore substations within Project 1 and Project 2 will be delivered to shore via high voltage alternating current **and/or** (bold added) high voltage direct current (HVDC) export cables.

In other words, as of May 2023, when the COP was last revised, no decision had yet been made if the current coming from the offshore substations would come to shore as HVAC or HVDC. Regardless which option (or some combination of the two) is chosen, the maximum total number of export cables to be installed is eight.

In mid-July 2023, Atlantic Shores advised as follows: "In either case, the equipment for both transmission options would fit within the offshore substation dimensions described in the COP and would appear similar to the casual observer."

Below is a photo of an offshore substation:

Access section 1.1 of the COP by clicking on this link
https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/AtlanticShoresCOPVolume I_Project Description.pdf

NUCLEAR & OFFSHORE WIND'S CARBON FOOTPRINT

A recent statement about nuclear plants being carbon neutral prompted questions about how wind farms compare.

What does "carbon neutral" mean? "Being 'carbon neutral' means that you, or the operations of your business or your national economy, emit the same amount of carbon

dioxide into the atmosphere that you offset by some other means." *From the article published by CNET in February 2021*

Access the full article "What does carbon neutral mean?" by clicking on this link
https://www.cnet.com/home/energy-and-utilities/what-does-carbon-neutral-mean/

Carbon dioxide (CO_2) makes up 79.4% of greenhouse gas emissions, according to the U.S. Environmental Protection Agency ("EPA"). Greenhouse gases trap heat in the atmosphere and, in addition to carbon dioxide, include methane, nitrous oxide and fluorinated gases, at 11.4%, 6.2% and 3%, respectively.

Access "Overview of Greenhouse Gases" from the EPA by clicking on this link
https://www.epa.gov/ghgemissions/overview-greenhouse-gases

Nuclear reactors do not produce direct carbon dioxide emissions, according to the U.S. Energy Administration ("EIA")[3]:

> "However, the processes for mining and refining uranium ore and making reactor fuel all require large amounts of energy. Nuclear power plants also have large amounts of metal and concrete, which require large amounts of energy to manufacture. If fossil fuels are used for mining and refining uranium ore, or if fossil fuels are used when constructing the nuclear power plant, then the emissions from burning those fuels could be associated with the electricity that nuclear power plants generate."

Access EIA's full report "Nuclear Explained" updated November 2022 by clicking on this link
https://www.eia.gov/energyexplained/nuclear/nuclear-power-and-the-environment.php

In nuclear fission, atoms are split apart, which releases energy. All nuclear power plants use nuclear fission and uranium is the fuel most widely used by nuclear plants to produce that reaction, according to the EIA[3].

> "Uranium is considered a nonrenewable energy source, even though it is a common metal found in rocks worldwide. Nuclear power plants use a certain kind of uranium, referred to as U-235, for fuel because its atoms are easily split apart."

The United States imports most of the uranium it uses as fuel, according to the EIA.[3] In 2021, owners and operators of U.S. nuclear power reactors purchased the equivalent of about 46.74 million pounds of uranium, of which 5% came from the U.S.

---

[3] *EIA is part of the U.S. Department of Energy. Every large energy source and every utility and non-utility supplier is required to report their data. The scope is wide and energy sources include oil and its derivatives (e.g., diesel, heating oil, gasoline), coal, gas, nuclear, and electricity.*

The EIA prepares daily , monthly and annual report and also forecasts energy use; its forecasts are considered the standard for future use.

Access EIA's full article updated July 2022 "Nuclear explained: Where our uranium comes from" by clicking on this link:
https://www.eia.gov/energyexplained/nuclear/where-our-uranium-comes-from.php - :~:text=There are economically recoverable uranium,pounds of uranium in 2021

According to an article published June 2023 in *The New York Times*, the United States buys about a third of its enriched uranium from Russia and the rest from Europe.

Access the full NYT article "The U.S. Is Paying Billions to Russia's Nuclear Agency. Here's Why" by clicking on this link
https://www.nytimes.com/2023/06/14/climate/enriched-uranium-nuclear-russia-ohio.html#:~:text=Roughly%20a%20third%20of%20enriched,rest%20is%20imported%20from%20Europe.

Uranium is recovered from the earth through mining or chemical-based extraction, according to the EIA[3]:

> "Although uranium is about 100 times more common than silver, U-235 is relatively rare at just over 0.7% of natural uranium. Uranium concentrate is separated from uranium ore at uranium mills . . . . It is then processed in conversion and enrichment facilities, which increases the level of U-235 to 3%–5% for commercial nuclear reactors . . .
>
> The United States currently has one operating enrichment plant . . ."

Access EIA's full article updated July 2022 "Nuclear explained: The nuclear fuel cycle" by clicking on this link
https://www.eia.gov/energyexplained/nuclear/the-nuclear-fuel-cycle.php

Access the website of Urenco USA, which operates the only commercial uranium enrichment facility on U.S. soil, by clicking this link
https://urencousa.com/about

When uranium is extracted from rock, the process leaves behind radioactive waste, according to the U.S. Environmental Protection Agency ("EPA"). Solid radioactive wastes that are left over from the milling processes are stored in specially designed ponds called impoundments, which remain radioactive and contain hazardous chemicals from the recovery process."

Access the EPA's full report "Radioactive Waste From Uranium Mining and Milling" by clicking on this link

https://www.epa.gov/radtown/radioactive-waste-uranium-mining-and-milling#:~:text=Mining%3A%20When%20uranium%20is%20near,then%20removed%20through%20underground%20tunnels.

- Currently, operating nuclear reactors are water cooled. However,

  - In November 2021, TerraPower, a start-up company founded by Bill Gates, announced that it had chosen Kemmerer, Wyoming as the site where it will build its first nuclear plant, the first to use an advanced nuclear design called Natrium.

  From a CNBC article November 2021: "Natrium plants use liquid sodium as a cooling agent instead of water. Sodium has a higher boiling point and can absorb more heat than water, which means high pressure does not build up inside the reactor, reducing the risk of an explosion."

  For further information about differences between Natrium and existing plants' reactors, read the section "How TerraPower's reactors are different" by clicking on this link to the full CNBC article
  https://www.cnbc.com/2021/11/17/bill-gates-terrapower-builds-its-first-nuclear-reactor-in-a-coal-town.html

  Access TerraPower's website by clicking on this link
  https://www.terrapower.com/

  - In July 2022, the U. S .Department of Energy ("DOE") announced plans to build a sodium-cooled fast test reactor at the Idaho National Laboratory. The Versatile Test Reactor ("VTR") will be able to test nuclear material up to 10 times faster than what is currently possible in the United States. Testing and research conducted at the Idaho National Laboratory could help extend lifetime cores in nuclear reactors, boost fuel performance and even accelerate fusion materials research, stated the DOE.

  Access the DOE's complete announcement by clicking on this link
  https://www.energy.gov/ne/articles/doe-selects-sodium-cooled-fast-reactor-design-versatile-test-reactor-idaho

- **Wind turbines** do not produce emissions that can pollute the air and water (with rare exceptions), according to the EIA[3]:

  > "Wind is an emissions-free source of energy [and] a renewable energy source. Overall, using wind to produce energy has fewer effects on the environment than many other energy sources: Wind turbines do not release emissions that can pollute the air or water (with rare exceptions), and they do not require water for cooling. Wind turbines may also reduce electricity generation from fossil fuels, which results in lower total air pollution and carbon dioxide emissions. . . .

> Wind turbines have some negative effects on the environment. . . . Producing the metals and other materials used to make wind turbine components has impacts on the environment as well, and fossil fuels may be used to produce the materials.
>
> Although most of the materials used to make wind turbines can be reused or recycled, turbine blades, as most are currently constructed, cannot be recycled. Researchers at the National Renewable Energy Laboratory established an approach to manufacturing wind turbine blades, employing a thermoplastic resin system. These thermoplastic resins allow for the recycling of wind turbine blades and also reduce the energy required to manufacture blades."

Access EIA's full report updated December 2022 "Wind explained: Wind energy and the environment" by clicking on this link
https://www.eia.gov/energyexplained/wind/wind-energy-and-the-environment.php

Subsequently, CNBC reported that "in the spirit of corporate sustainability — specifically not wanting their blades piling up in landfills — wind turbine manufacturers themselves are contracting with recycling partners":

> "In December 2020, General Electric's Renewable Energy unit signed a multi-year agreement with Boston-based Veolia North America to recycle decommissioned blades from land-based GE turbines in the U.S. Veolia opened a recycling plant in Missouri, where it has recycled 2,600 blades to date. . . .
>
> Siemens Gamesa Renewable Energy has begun producing fully recyclable blades for both its land-based and offshore wind turbines and has said it plans to make all of its turbines fully recyclable by 2040.
>
> Vestas Wind Systems has committed to producing zero-waste wind turbines by 2040, though it has not yet introduced such a version. In February, Vestas introduced a new solution that renders epoxy-based turbine blades to be broken down and recycled. . . ."

Access the CNBC article "Recycling 'end-of-life' solar panels, wind turbines, is about to be climate tech's big waste business" to read more about companies that are actively engaged in recycling wind turbine components by clicking on the link below
https://www.cnbc.com/2023/05/13/recycling-end-of-life-solar-panel-wind-turbine-is-big-waste-business.html

THE FUTURE OF EAST COAST WIND POWER

A recent article in *The Washington Post* with the headline "The future of East Coast wind power could ride on this Jersey beach town" looked at the controversy around offshore wind farms from a variety of viewpoints.

Links to sources cited in the article include the following:

- American Clean Power
- Caesar Rodney Institute
- Cape May County Elections Departments
- Department of Environmental Protection
- Lawsuit filed against Ørsted & NJ to block a tax break for the Ocean Wind 1 project
- Marzulla Law, LLC
- NOAA National Oceanic & Atmospheric Administration
- Protect Our Coast
- Representative Jeff Van Drew
- Rutgers University NJ Climate Change Resource Center

Access the full article published August 8, 2023 by clicking on the link below
https://wapo.st/45ioNo2

This Offshore Wind Farm Round-Up was prepared by a group of writers and researchers from Long Beach Island, New Jersey.

Round-Ups endeavor to periodically provide a review of recent research efforts in which the effects of offshore wind farms have been studied. In addition, they offer factual, clarifying information, in response to readers' suggestions.

Research included in Round-Ups points you in the direction of the science and assumes no point of view one way or the other about the presence of offshore wind farms off our shore. Likewise, clarifications are provided without editorial comment; they are there for you to consider so you can draw your own conclusions.

Questions about the content of Round-Ups and suggestions for future topics can be directed to RoundUpLBI@gmail.com. The Round-Up research and writing team welcomes questions and comments.

Round-Ups are distributed to the voting representatives of the eleven member organizations of the Joint Council of Taxpayers Associations of LBI (JCTA). Each taxpayer and property owners association then distributes this information to its members and the community via its regular communication methods, e.g., through newsletters; posted on websites; social media.