JOINT COUNCIL OF TAXPAYERS ASSOCIATIONS
OF LONG BEACH ISLAND (JCTA)

This document was created by the JCTA as a public service and first distributed June 2021; an updated version was published October 2021. Its purpose is to present objective information about the wind energy farm to be located east of Long Beach Island to assist readers in forming their own opinions about this project. The document is not intended to be a final or all-conclusive report.

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ATLANTIC SHORES OFFSHORE WIND PROJECT:

OVERVIEW[1]

v. 2 published October 2021

Who is Atlantic Shores? Formed in December 2018, Atlantic Shores Offshore Wind is a 50/50 partnership between Shell New Energies US LLC and EDF Renewables North America. It was formed to build and maintain a wind farm off the coast of Long Beach Island, the second wind farm in New Jersey.

Where will Atlantic Shores build?

In the ocean: Atlantic Shores is developing a wind farm on 183,353 leased acres (equivalent to about a third of the size of Ocean County) in an area stretching from Barnegat Light to Atlantic City. The western boundary of the leased area is offshore 9 or 10 miles (off Holgate and off Barnegat Light, respectively) and the eastern boundary is 20 miles offshore. The entire area is wedged between two established shipping lanes.

Cables connecting the turbines to each other out in the ocean are buried six feet under the ocean floor; they do not come west toward LBI. The cables run parallel to the shore from Atlantic County to Monmouth County.

On land: Atlantic Shores intends to build two substations: one inland in Atlantic County and the other inland in Monmouth County. At a point in the ocean east of those two counties, the buried cables connected to the turbines, now bundled together in a larger cable, turn west, tunnel under the beach and come on shore to an underground vault that is about 15' x 20' wide. At the vault, cables inside the larger cable are then split and the cables continue underground to the next substations.

There are no plans for structures to be repurposed or built on LBI to support this wind farm. The operations and maintenance center will probably be located in Atlantic City.

Why is Atlantic Shores building in that particular area? The federal Bureau of Ocean Energy Management (BOEM) is responsible for creating leased areas for development after carefully analyzing many factors such as population to be served by the leased area, demand for electricity, wind speed, vessel traffic and location of the shipping lanes, commercial fishing grounds, water depth, and marine uses inside the area. If developers want to go forward, they must use the leased areas awarded by the BOEM and cannot strike out on their own.

How tall are the turbines and how many will there be?

Height: Each turbine stands approximately 850' above the ocean's surface, about the equivalent of an eighty-story building. The blade and its mechanism is 500' – 550' tall; the tower below that is about 300'.

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[1] **SOURCES**

"Surf City Calls for Caution on Wind Farm Builds," by Gina G. Scala, *The Sandpaper*, May 19, 2021, page 30

Conversation with personnel from Atlantic Shore Offshore Wind on February 3, 2021 via Zoom. Atlantic Shore representatives included External Affairs Lead Jessica Dealey, Developmental Manager Doug Copeland and Community Liaison Officer Karen Hershey

Number: Roughly 200 – 250 turbines could be built in the entire leased area, which has the potential to generate 3 gigawatts of offshore wind energy (3 gigawatts = 3,000 megawatts) . Here is why the answer is a range: If Atlantic Shores uses 15-megawatt turbines when it builds out the wind farm, dividing 3,000 megawatts by 15 megawatts produces 200 turbines. If 12-megawatt turbines are used, 250 turbines would be needed, applying the same calculation.

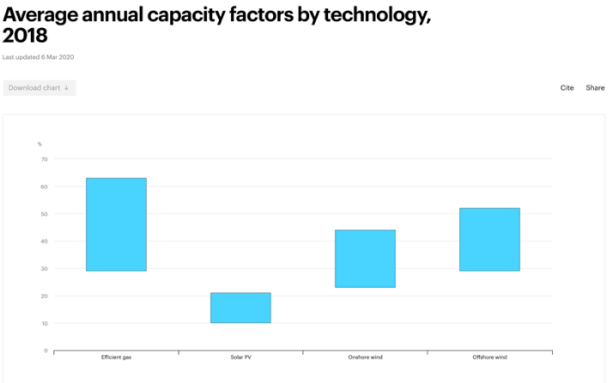
As of February 3, 2021, no 14- or 15-megawatt turbines were in production, although 12-megawatt turbines were common. Atlantic Shores has stated that it intends to use the most current – and therefore the most powerful – turbine technology available on the market when it begins construction offshore in 2025.

The turbine industry is rapidly growing and much of that industry's advancing technology is about squeezing more megawatts out of roughly the same size turbine. As the technology becomes more cutting-edge, it is not the size that changes as much as the inner workings of the turbine (e.g., the drive; the generator) to makes the turbines work more efficiently.

How much electricity will the wind farm produce? According to the Atlantic Shores website, the entire leased area has the potential to generate over 3 gigawatts of offshore wind energy, enough to power nearly 1.5 million homes. New Jersey's goal for offshore wind energy production is 7.5 gigawatts of energy by 2030.

What's behind the numbers?

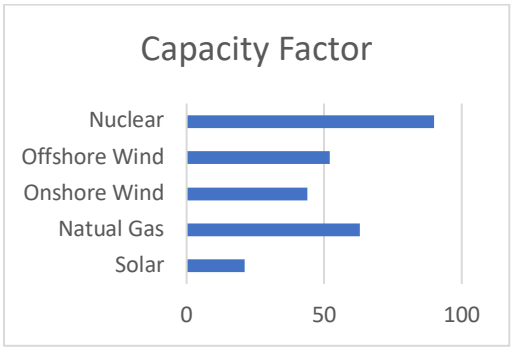
Renewable energy is intermittent. Offshore wind only generates power when the wind blows, solar only works when the sun is shining and neither of those natural phenomenon happens 24hr/day, 365 days/year. The chart below shows the average annual capacity factor for various technologies. The capacity factor is the ratio of an actual electrical energy output over a given period of time to the maximum possible electrical energy output over that period, typically measured in years. That gives an indication of what percentage of the time various sources run. [2]



Efficient natural gas units run 29 – 63% of the time
Solar units run 10 – 21% of the time
Onshore wind runs 23 – 44% of the time
Offshore wind runs 29 – 52% of the time

The average capacity factor for nuclear plants is over 90%. If we add nuclear generation to the capacity factor chart and use the upper end of the range for the other technologies, the chart looks like this:

[2] IEA, Average annual capacity factors by technology, 2018, IEA, Paris https://www.iea.org/data-and-statistics/charts/average-annual-capacity-factors-by-technology-2018



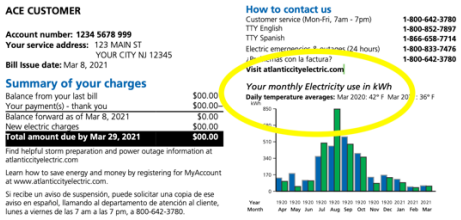
In 2019, natural gas and nuclear power together accounted for 94% of New Jersey's utility-scale electricity net generation.

Some definitions[3]:

Kilowatt (kW) – A kW is a unit of electrical capacity equal to 1,000 watts. It is estimated that a typical residential home (without electric heating) can have a peak load as high as 8 kW. (That means everything electric in your home is plugged in, turned on and running at the same time.)

Kilowatt-hour (kWh) – A kWh is a unit of electrical energy equal to 1,000 watt-hours. **According to the DOE, the average New Jersey residential home consumes almost 700 kWh/month.**

See the sample bill below. You can check your Atlantic City Electric (ACE) bill to see how your consumption compares to the average NJ residential bill.


ACE CUSTOMER

Account number: 1234 5678 999
Your service address: 123 MAIN ST
YOUR CITY NJ 12345

Bill issue date: Mar 8, 2021

Summary of your charges

Balance from your last bill	$00.00
Your payment(s) - thank you	$00.00-
Balance forward as of Mar 8, 2021	$0.00
New electric charges	$00.00
Total amount due by Mar 29, 2021	**$00.00**

Find helpful storm preparation and power outage information at atlanticcityelectric.com

Learn how to save energy and money by registering for MyAccount at www.atlanticcityelectric.com.

Si recibe un aviso de suspensión, puede solicitar una copia de ese aviso en español, llamando al departamento de atención al cliente, lunes a viernes de las 7 am a las 7 pm, a 800-642-3780.

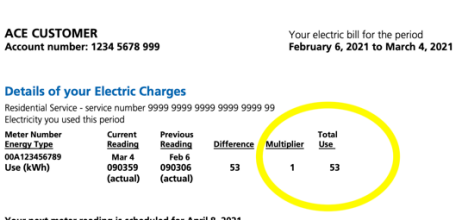
How to contact us

Customer service (Mon-Fri, 7am - 7pm)	1-800-642-3780
TTY English	1-800-852-7897
TTY Spanish	1-866-658-7714
Electric emergencies & outages (24 hours)	1-800-833-7476
¿Preguntas con la factura?	1-800-642-3780

Visit atlanticcityelectric.com

Your monthly Electricity use in kWh

Daily temperature averages: Mar 2020: 42° F Mar 20 36° F


ACE CUSTOMER
Account number: 1234 5678 999

Your electric bill for the period
February 6, 2021 to March 4, 2021

Details of your Electric Charges

Residential Service - service number 9999 9999 9999 9999 9999 99
Electricity you used this period

Meter Number / Energy Type	Current Reading	Previous Reading	Difference	Multiplier	Total Use
00A123456789 / Use (kWh)	Mar 4 090359 (actual)	Feb 6 090306 (actual)	53	1	53

Commonly used units:

1 Gigawatt (GW) = 1,000 Megawatt (MW) = 1,000,000 Kilowatts (KW)

1 Gigawatt-hour (gWh) = 1,000 Megawatt-hours (mWh) = 1,000,000 Kilowatt-hours (kWh)

The only two approved projects thus far is the Ørsted/PSEG Ocean Wind farm – 1,100 MW – and the southern portion of the Atlantic Shores leased area at 1,510 MW.[4]

In the NJ Board of Public Utilities Order dated June 21, 2019 (BPU Docket No. QO18121289), the Board approved an annual allowance of 4,851,497 megawatt-hours for the Ørsted/PSEG Ocean Wind farm. If this is the expected output, then: 4,851,497 megawatt-hours/1,100 megawatts = 4,410 hours/year. That represents about 50% of the time.

[3] 2019 New Jersey Energy Master Plan, p 246.

[4] Press release from the NJ Board of Public Utilities, "NJBPU Approves Nation's Largest Combined Offshore Wind Award to Atlantic Shores and Ocean Wind II," June 30, 2021

What will offshore wind cost?

From an op-ed written by Frank Felder, a Research Professor at the Bloustein School of Planning and Public Policy, Rutgers University and Pranay Kumar, a doctoral student at the Edward J. Bloustein School of Planning and Public Policy at Rutgers We Need to Determine Net Economic Impacts for NJ of Offshore-Wind Energy:

> "According to the BPU, over the 20 years of operational life, the project's monetary impact on ratepayers' monthly bills expressed in 2019 dollars, is expected to be $1.46 for residential consumers, $13.05 for commercial consumers, and $110.10 for industrial consumers. Although these rate increases seem small, they will raise total electricity costs by $160 million per year. Using the BPU's consultant numbers, this is a 1.4 percent increase for residential customers, 1.7 percent for commercial customers, and 2.1 percent for industrial customers."

When will construction begin?

On land: Construction of the substations in New Jersey is expected to begin in 2024, provided that all the necessary approvals and permits have been secured from the Bureau of Ocean Energy Management (BOEM).

In the ocean: Offshore construction is expected to begin in 2025, provided that all the necessary approvals and permits have been secured from the Bureau of Ocean Energy Management (BOEM).

After the BOEM reviews Atlantic Shores Construction & Operation Plan, which was submitted to BOEM in March 2021, and deems the Plan to be "complete and sufficient," then local communities become involved in the permitting process. The first public comment period is expected to take place in late 2021/early 2022, but it could be earlier or later depending on the timing of the BOEM's approval. In advance of the public comment period managed by BOEM, Atlantic Shores plans to hold informational meetings open to the public this summer.

What Atlantic Shores is not The Atlantic Shores project is not the Ocean Wind project, which is another planned wind farm located south of the Atlantic Shores leased area. The state of New Jersey awarded this lease area to Ørsted in 2018, two years before Atlantic Shores received its own award. Ocean Wind is owned and being developed by Ørsted and PSEG in a 75/25 split. Expected to be operational in 2024, Ocean Wind would produce enough electricity to power more than 500,000 homes, according to the Ørsted website.

What are the future plans for wind energy in New Jersey? The New Jersey Board of Public Utilities will make a decision in June 2021 about how much energy to buy from the Atlantic Shores project. It is expected that the Board will announce a purchase somewhere between 1,200 to 2,400 MW of capacity at that time.

The Atlantic Shores project is one of five offshore wind facilities to be developed in a 400,000-acre area off NJ's Ocean, Atlantic, and Cape May Counties. On March 30, 2021, the Biden Administration identified over 800,000 *additional* acres for possible development off the coast of New Jersey. In total, these 1,200,000 acres represent an area 28% larger than the New Jersey Pinelands.

"We realize that this is a relatively new industry in US waters and we still don't fully understand how offshore wind farms are going to impact fishing operations, protected species, our essential fish habitat and our ability to complete our own surveys and assessments."

Chris Oliver, Assistant Administrator for Fisheries, National Oceanic & Atmospheric Administration (NOAA) October 2020

From opening remarks at the Responsible Offshore Development Alliance (RODA) comprehensive workshop, "Synthesis of the Science: Fisheries & Offshore Wind Energy"

Full remarks at https://rodafisheries.org/portfolio/synthesis-of-the-science/

NOTE: This FAQ is not intended to be an all-inclusive list, but rather a selection from some of the questions that have been asked about this topic.

Will construction activities like pile driving and trenching for undersea cables have a long-term impact on marine life? There are no definitive, seminal studies available yet that answer this question.

A number of studies have investigated the effects of construction noise exposure on different species of fishes and invertebrates. These studies, however, featured a range of methods and a variety of species so consequently, data is lacking for most species' populations, life stages, and other phases as they relate to wind farm development. Further, the studies' results indicate a range of impacts from severe physical injury to no effect at all, making it impossible to extrapolate beyond the species on which the study focused or to draw universal conclusions.[5]

The article cited above offers a good review of the current understanding of the impacts of wind energy activities on fisheries resources; it takes into account the varied noise conditions that occur from site survey to decommissioning. This article is also a good source document for understanding the lifecycle of wind farms, which can involve 40–50-year commitments between site surveys, construction, operation and eventual decommissioning. Activities during all phases of wind farm lifetimes produce underwater sound, a concern because it is unclear how high noise levels and/or persistent unnatural noise could impact marine life in the long-term, including essential fisheries habitats and ecosystems.

How big is the fishing industry in New Jersey? In 2017 in New Jersey, the total seafood catch was 198.6 million pounds placing New Jersey 10th in the country for catch. New Jersey ranked No. 1 in the nation in quahogs landed at 16.5 million pounds, second in sea scallops landed with 11 million pounds, second in Atlantic mackerel landed at 2.8 million pounds, second in surf clam harvest with more than 18.3 million pounds, and second in squid commercial landings at 24.9 million pounds.[6]

What is New Jersey's Energy Master Plan? The 2019 NJ Energy Master Plan calls for 100% clean energy by 2050. The EMP defines "100% clean energy by 2050" to mean 100% carbon-neutral

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[5] *Acoustic Impacts of Offshore Wind Energy on Fishery Resources: An Evolving Source and Varied Effects Across a Wind Farm's Lifetime, published 12/16/2020 in Oceanography, the Official Magazine of the Oceanography Society (*https://shar.es/aoLoSd

[6] *https://www.mycentraljersey.com/story/news/local/how-we-live/2019/09/01/nj-leads-country-fishing-production/2150853001/*

electricity generation and maximum electrification of the transportation and building sectors (the sectors that produce the greatest carbon emissions in the state) in order to reduce state greenhouse gas emissions 80% below 2006 levels.

Offshore wind is clearly a piece of the puzzle, but a stable, sustainable energy supply requires a variety of sources that includes a diverse mix that over time should lean more heavily towards renewables and zero carbon emissions options.

Offshore wind alone, however, will not solve the climate crisis and not all countries are embracing sustainable solutions. Offshore wind planned for the Northeast is dwarfed by the coal capacity being constructed and planned in other parts of the world. As of 2020, 350 coal-fired power plants are under construction in such diverse areas as South Korea, Japan, India, and China. Not only is China building over half of these new coal plants in its own country, but it is also building and financing hundreds of other coal-fired power plants in countries such as Turkey, Vietnam, Indonesia, Philippines, Egypt, and Bangladesh.[7]

Will migration patterns of marine animals be impacted? It is unclear what effect the presence of wind farms will have on the health or the migratory habits of marine animals because there are no definitive, seminal studies available that have focused on these topics.

There has been some concern expressed about whales in letters to the editor in the local press and by environmental organizations including Clean Ocean Action. Here are some facts about right whales. According to NOAA, the North Atlantic right whale is one of the world's most endangered large whale species, with less than 400 individuals remaining. Of that number researchers estimate that there are less than 100 breeding females left. During the spring, summer, and into fall, many of these whales can be found in waters off New England and further north into Canadian waters, where they feed and mate. Each fall, some right whales travel more than 1,000 miles from these feeding grounds to the shallow, coastal waters of their calving grounds off of South Carolina, Georgia, and northeastern Florida, though migration patterns vary. The graphic below shows the range of the right whales.[8]

Will migration patterns of birds be impacted? It is difficult to know how migrating birds will react until after the windmills are in place because, again, there are no definitive, seminal studies available about the impact of windmills on the migratory patterns of birds that fly through wind farms. Migratory birds that are categorized as predators may be impacted during construction. The lease areas were established by the Bureau of Ocean and Energy Management (BOEM) to avoid key bird migration areas. BOEM Environmental Impact Statement includes mitigation actions Atlantic Shores is required to implement related to birds.

[7] https://www.canadianenergycentre.ca/commentary-china-is-building-184-coal-plants-guess-what-that-will-do-to-carbon-emissions/

[8] NOAAhttps://www.fisheries.noaa.gov/species/north-atlantic-right-whale

More importantly, experts like Dr. Scott MacWilliams, Professor of Wildlife Ecology & Physiology at the University of Rhode Island, are expressing concern about the cumulative effects of having several offshore wind farms along the Atlantic coastline, even though assessment of cumulative effects has not been conducted. The construction of an individual offshore wind farm may not have any significant impact because the birds may be able to move someplace else. Additional wind farms constructed along the coast, however, are basically in the same areas that migratory birds fly through. Multiple wind farms along that same flight pathway impact that same population of birds, so the more wind farms, the more cumulative effects there may be. https://web.uri.edu/offshore-renewable-energy/ate/do-we-know-how-many-birds-and-bats-are-killed-by-wind-turbines-per-year/

Below is a brief summary of the Atlantic Flyway zone, of which the LBI coast is a part. The purple area in the map below shows the range of the complete Flyway zone.

The Atlantic Flyway, which is globally significant as a major movement corridor for birds in the Americas, supports hundreds of millions of birds annually including 164 species of waterbirds and a similar number of land birds, many of which are of conservation concern. The waterbird species include 33 seabirds, 36 waterfowl, 25 terns and gulls, 39 shorebirds, and a diverse mixture of herons, egrets, and rails. Greater than 35% of these species are believed to be declining already.[9]

The assemblage of birds that utilize the Flyway is diverse and their relationships to the Atlantic Coast are varied, so it is impossible to form general conclusions because of the diversity and variables within each species.

Will turbine locations and operations alter the Cold Pool? A recent report[10] stated that "[There are] unique and delicate oceanographic conditions along the expansive Atlantic continental shelf, a region characterized by a strong seasonal thermocline that overlies cold bottom water, known as the 'Cold Pool' . . . . Changes in stratification [in the continental shelf off the eastern seaboard] could have important consequences in Cold Pool set-up and degradation, a process fundamental to the high fishery productivity of the region."

The report does not offer any definitive conclusions about whether the presence of wind farms could impact the Cold Pool. However, it suggests prioritizing further research "…that identifies stratification thresholds of influence, below which turbines and wind farm arrays may alter oceanographic processes, and these should be examined within context of spatial and seasonal dynamics of the Cold Pool and offshore wind lease areas to identify potential areas of further study."

The report goes on to suggest: "Given the spatial overlap of this essential habitat feature and a number of offshore wind energy lease areas, careful consideration must be made about the ways

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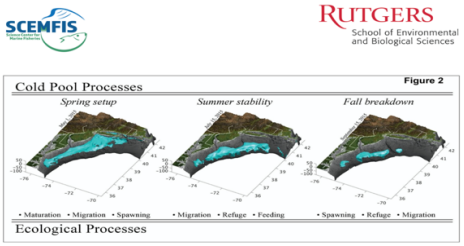
[9] *Watts, B. D. 2010. Wind and waterbirds: Establishing sustainable mortality limits within the Atlantic Flyway. Center for Conservation Biology Technical Report Series, CCBTR-05-10. College of William and Mary/Virginia Commonwealth University, Williamsburg, VA. 43 pp.*

[10] *Could federal wind farms influence continental shelf oceanography and alter associated ecological processes? A literature review,* (Science Center for Marine Fisheries and Rutgers University School of Environmental and Biological Sciences, Dec. 2020.

that turbine array fields may interact with seasonal processes underlying Cold Pool formation, maintenance, and breakdown."

The Cold Pool spans much of the Mid-Atlantic Bight (which extends from Martha's Vineyard, MA to Cape Hatteras, NC). It is a naturally forming layer of cold water, just beneath warm surface water, extending to the ocean bottom that forms every spring and lasts until the fall. Its annual appearance is a vital part of the life cycle of many marine species and its size and intensity vary by season (see graphic below).



The report[11] continues: "Strong seasonal stratification traps cold (typically less than 10°C (50°F)) water above the ocean bottom sustaining a boreal fauna [i.e., marine animals in the northern region] whose range extends farther south than would be anticipated by latitude. **This boreal fauna represents vast fisheries, including the most lucrative shellfish fisheries in the U.S.**" (emphasis added).

From an additional report[12]: The fisheries for sea scallops, surf clams and ocean quahogs have been identified as the most vulnerable to loss due to conflicts with offshore wind development. In 2017, New Jersey ranked No. 2, No.2, and No.1 in the nation, respectively, for catch of these species.

<u>What is the impact of Electromagnetic Fields (EMF) on marine animals</u>? According to a report published by the Bureau of Ocean Energy Management in 2011, none, provided that the cables are properly insulated and buried under the seabed at an appropriate level.[13] Other studies. however, suggest little or no impact to marine creatures, some suggest significant negative impacts while others are inconclusive. It depends on the species. Atlantic Shores has indicated that offshore cables are buried at a target depth of 6 feet. The depth of the cables increases as the cables get closer to shore and go under the beach.

It is well-established, however, that some species are more susceptible to electromagnetic fields than other species; links to data are provided below. According to OES-Environmental, established by the International Energy Agency (IEA) Ocean Energy Systems (OES) in January

[11] *Could federal wind farms influence continental shelf oceanography and alter associated ecological processes? A literature review,* (Science Center for Marine Fisheries and Rutgers University School of Environmental and Biological Sciences, Dec. 2020.

[12] *Kirkpatrick, A. J., S. Benjamin, G. S. DePiner, T. Murphy, S. Steinback, and C. Demarest, 2017: Socio-Economic Impact of Outer BOEM 2017-012 Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic.*

[13] "Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species: Final Report, BOEM May 2011.

2010 to examine environmental effects of marine energy development[14], certain marine animals, such as certain elasmobranchs (sharks, skates, rays, etc.), marine mammals, crustaceans, sea turtles, and other fish species, can sense electromagnetic fields (EMFs). These species use EMFs to navigate, orient, and hunt for prey.

Cables from operational marine renewable energy (MRE) devices can add EMFs to the environment, on top of other anthropogenic sources such as underwater telecom or power cables, while also adding to the Earth's natural field. MRE devices can potentially alter the ambient EMF field, which may disrupt the animals' ability to detect natural signatures, potentially affecting their survival, reproductive success, or migratory patterns. With the advent of larger MRE developments, the intensity and range of the emissions may increase.

The evidence base to date suggests that the ecological impacts of EMFs emitted from power cables from single MRE devices or small arrays are likely to be limited. Field and laboratory studies suggest that marine animals living in the vicinity of MRE devices and export cables are not likely to be harmed by emitted EMFs.

Is there one place I can go to find information about wind farms and their impact on the environment? Our own local organization under the direction of Rick Bushnell, ReClam The Bay, has an excellent resource page on its website https://reclamthebay.org There are links to articles and to documents and reports from the Bureau of Energy Management (BOEM) and the New Jersey Bureau of Public Utilities. In the News section of the website, you will see several excellent videos from RODA (Responsible Offshore Development Alliance) from its comprehensive presentation (October 2020), Synthesis of the Science: Fisheries & Offshore Wind Energy."

The Fisheries and Offshore Wind Energy: Synthesis of the Science project consists of two integrated components, **a virtual workshop** and **a published report**, which together have the overarching purpose of enhancing regional and national understanding of existing science and data gaps related to offshore wind energy interactions with fish and fisheries.

This joint effort brings together the National Oceanic and Atmospheric Administration (NOAA) Fisheries, the Bureau of Ocean Energy Management (BOEM), and the Responsible Offshore Development Alliance (RODA). Through a collaborative process co-designed by fishermen, wind developers, and state, academic, and federal partners, this effort will advance the Responsible Offshore Science Alliance's (ROSA) regional science efforts, by describing the current state of science, existing research and monitoring programs, and data gaps and soliciting input regarding priority research questions.

Wind Farm Visibility

v. 2 published October 2021

NOTE: This document addresses issues related to the planned wind turbines field due east of Long Beach Island. However, Atlantic Shores will first build out the southern portion of the field east of Atlantic City. While these windmills will be at least occasionally visible from LBI's southernmost beaches, the minimum distance will be approximately 13 miles. As such, it offers little comparison to the field off LBI which begins as close as 9.5 miles east of Holgate.

[14] Sixteen countries, including the United States, are members of the IEA . The report from which we are quoting is the OES-Environmental 2020 State of the Science Report: Environmental Effects of Marine Renewable Energy Development Around the World.

Is visibility an issue? For many people, this is a key concern because they believe this factor has the most potential to impact housing values, their enjoyment of the Shore, and tourism. When the turbines are installed, the current view of the ocean and horizon will be changed and will look different depending on the time of day and the season of the year.

Can We Get Any Idea of the Visibility?

Atlantic Shores conducted a virtual open house in July that related to the Atlantic City field. During this open house, there was a great deal of information including data from a Rutgers study on visibility. For a visual representation of the planned Atlantic City field, please see this link: https://bit.ly/AtlanticShoresVirtualOpenHouse

To date, there is no representation of what the turbines in the LBI field will look like when viewed from LBI. Here is what we do know. The size of the 12 MW towers from uppermost point to the sea is expected to be at least 850 feet. The towers will be 9.5 miles from Holgate at their nearest point and 10 miles from other LBI locations. The turbine field will extend out to approximately 20 miles from shore. This means the towers will be stacked in rows from west to east in addition to rows from north to south. For context, please consider the following:

- The height of the turbine is the equivalent of a 60-85 story building, assuming 10-14 feet per story in a high rise.
- As a point of comparison, the Ocean Resort Casino in Atlantic City is 13.7 miles from the Holgate Parking lot and is clearly visible at 751 feet tall
- The Bureau of Ocean Energy Management (BOEM) has created a number of hypothetical visualizations for a New York wind field but please note these visualizations illustrate what the turbines would look like if they are at least 20 miles away. http://bit.ly/BOEMHypotheticalVisualizations
- Visibility was studied in the UK in 2015 when turbines were much shorter. http://bit.ly/DetailedUKStudyShorterTurbines
- This site contains a number of articles and the first study cited has images to visualize offshore wind turbines during the day and at night. http://bit.ly/VisibilityAcademicPapersWithVisualizations

Caveat: Please be aware that perspective can be misleading depending upon how photos were taken, reproduced and viewed. This is another reason the Rutgers Study is important.

Will the turbines be visible at night? From Atlantic Shores, February 3, 2021: "All turbines are required to have FAA lighting on the top of the tower so we are working with a technology that does not turn them on unless aircraft is in the vicinity so we can mitigate how often those lights needs to be blinking. We are not sure how close the aircraft has to be before the lights activate, but we believe it is a couple of miles, but we cannot say for certain. The lights all blink in unison, so it does not produce some random pattern.

All the leaseholders from New England down to Maryland are working collaboratively with FAA to figure out an efficient way to do this type of lighting so that it is uniform. As part of the project, there are all sorts of documentation that is filed and it becomes part of the charts that pilots are using.

The turbines are required to have lighting at the top and at the bottom as well to help anyone navigating through the wind farm at night by boat. These lights are on in different types of

weather and are not visible from shore because they are forty feet above the water all the way out there."

Comment: Even if the new lighting proposal received FAA approval, the amount of current air traffic and how often the lights would need to blink is unknown.

Other visibility factors - time of year, time of day, marine layer - per Atlantic Shores

From Atlantic Shores, February 3, 2021: "We were able to pull a couple of stations into the study in draft form (the study is still ongoing) and they found that the highest visibility comes in early spring and late fall. The reason for that is because the water temperature and the air temperature are equal; the marine layer — that haze on the horizon — is formed whenever there is a difference between the air and water temperature. So typically in the summer there is cooler water and warmer air, which creates the marine layer, which can limit visibility. Those conditions also create a lot of summer thunderstorms and sea breezes, which is what our wind farm takes advantage of.

Through the study so far, we found that during the peak summer tourism season, often times by mid-morning through late afternoon the marine layer forms, which can limit visibility. We are assessing adding even more sensors on offshore buoys we install or on coastal weather observation stations so we can better verify that going forward. We want to share this study publicly as soon as it is finalized.

ASOW will also work to make the visibility data public so mariners can see what the conditions are out in the ocean. If you visit our website, ASOW has a public buoy data available, so if you are going fishing out in the Atlantic and want to know what the wave heights are and the temperature, it is there."

Separation vs. appearance

Part of the challenge of understanding what the windmills will look like from land is understanding how far into the wind farm we will be able to see. We tend to think of how visible the windmills will be based only on the closest line of. Turbines that runs north to south beginning at 9.5 miles. However, the turbines that run west to east are also likely to be visible, albeit on a diminishing basis as they get further away.

So, when you look to the north and south, the windmills that extend to the east from the first row, along with your direction change in perspective, will cause you to see many more windmills than just in the western-most row. This will create a greater mass of visible turbines than if there was only a single row of turbines, and this may be especially evident when lit at night.

Continuing issues & questions

- When will any Rutgers study data specifically pertaining to the LBI field be made available?
- Do the blades reflect light at sunrise and sunset?
- When will the lighting radar technology be confirmed?
- Can the lights be shielded in any way, e.g., the side facing the beach?
- How often do planes travel a route which would activate the radar lighting?
- Are there any applicable Federal or State laws against light pollution?
- Is there any legal right to a view?
- Does windfarm visibility only affect oceanfront owners?

Impact on LBI

v. 2 published October 2021

Broadly speaking, in today's environment, the impacts of the offshore wind industry on individual well-being are poorly understood, have been little studied, and most empirical research in the field has focused on the potential visual impact from hypothetical or proposed developments.

A lack of information is frequently the greatest obstacle to acceptance of this young technology. This applies not only to tourists visiting the affected coastal regions, but especially to local residents and vacation homeowners. Negative offshore wind farm perceptions are linked to concerns over impacts on wildlife and the view as well as concerns about the impact of offshore wind farms on the traditional image of coastal living. Positive opinions of offshore wind farms are the result of interpretations of positive impacts on the economy through job creation and the development of new tourism and recreation opportunities, strengthening energy security and by giving the coast a more modern image.

The stand-alone 288 MW wind farm project described in a 2008 study[15] "will most likely have minimal impact on New Jersey's and the Shore's brand image, but the proposed wind farm can improve New Jersey's brand image with a holistic, credible and accountable green action plan."

Public opinion study While U.S. studies have been limited, one study addresses factors underlying public opinion regarding offshore wind power based on a survey of residents near a proposed development off Cape Cod, MA.[16]

Supporters were found to be younger, better educated, and more likely to own their own home. Opponents were more likely to earn over $200,000/year, and more likely to expect to see the project while going about their daily routines.

The overwhelming majority of the surveyed population expected negative impacts from the project; much smaller numbers expected positive effects. When asked which factors most affected their position, the most frequently mentioned were (in order):

1. damage to marine life/environmental impacts
2. electricity rates
3. aesthetics
4. impacts on fishing or boating

When the expectations expressed by the Cape Cod respondents are compared with the findings of the project's draft Environmental Impact Statement (EIS), however, many of the beliefs upon which opinion are based appear to be factually incorrect.

Finally, they tested which changes in the project would affect support. There was a clear evolution in the increase in the level of support as the public learned more facts about the project's impact on air quality and climate and as the environmental impact to birds and marine mammals became better understood.

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[15] "An Assessment of the Potential Costs and Benefits of Offshore Wind Turbines" prepared for the State of New Jersey by Global Insight, Lexington, MA and Eddystone, PA, September 2008

[16] "*Public opinion and the environmental, economic and aesthetic impacts of offshore wind*," Drew Bush, McGill University Department of Geography and McGill School Environment, Montreal, Canada and Porter Hoagland, Marine Policy Center, Woods Hole Oceanographic Institution, Woods Hole, MA, February 2016.

U.S. vs. the UK Offshore wind farm development is years behind the same or similar development abroad. U.S. studies on the perceived impact of offshore wind farms have been few, which leaves us to rely on data from similar scenarios abroad.

LBI's most similar offshore wind farm comparison found is in the U.K., specifically its east coast. The U.K. is home to 1,300 turbines in 24 offshore wind farms; the turbine technology and capacity is expectedly older.

*From a 2015 U.K. stu*dy: Perceptions among U.K. East Coast survey respondents of offshore wind farms and their impacts were generally favorable. A clear majority of respondents (from both the coast and inland) felt that offshore wind farms do not harm human health, are an efficient way to generate electricity, contribute significantly to the U.K. economy, create local jobs, and do not affect fishermen's incomes. In the study, the majority of other variables used to measure experiences of offshore wind farms (such as whether respondents had seen one or could see one from their houses) had no significant effect.

Opinion was more evenly divided as to whether offshore wind farms have a positive effect on coastal tourism, benefit local communities, harm wildlife or spoil the view.

More from the U.K. study: Renewable energies were viewed more favorably than fossil fuels and nuclear. Offshore wind was the third most favorable electricity source with 83% of both the UK and East Coast sample viewing it as either favorable or very favorable. Forty two percent of the East Coast sample and 34% of the inland sample would like to see at least 30% of their electricity produced by offshore wind.

In the bigger picture, this 2015 U.K. study showed an overall need to improve public awareness about offshore wind farms and electricity generation more generally.

Offshore wind projects in the U.S The U.S. is home to more than 1,500 wind power projects *(www.4coffshore.com)*; approximately 11% (164) are offshore wind farm projects. Of those 164 offshore projects:

- Only two are currently operating and they are both in the Atlantic Ocean. They are both fully commissioned and between them, there are seven 6 megawatt ("MW") turbines with a combined capacity of 42 MW.

  The Block Island wind farm was the first commercial offshore wind farm in the United States. It is 3.8 miles from Block Island RI with five 6 MW turbines (total capacity 30 MW)

  The second is the Coastal Virginia Offshore Wind Farm ("CVOW"), which is located 27 miles off of Virginia Beach. There are two 6 MW monopile turbines, with a capacity of 12 MW.

- Besides these two in operation, none of the others have progressed enough to connect the turbines and generate electricity
- Besides these two in operation, none of the others are in the build phase
- 18 are either consented or have applied for consent.

As a point of comparison, Atlantic Shores, the project off the coast of LBI, proposes a field of 160 - 200 turbines and a generating capacity of 2,230 MW.

Home Values

Currently, the impact of the turbines on LBI real estate values is unclear. The 2008 study looked at values of oceanfront and ocean view residential properties. The results reflected no lost property value if a wind farm was located at 20 miles offshore (the study contemplated 3, 6 and

20-mile scenarios) However, residential property differences of any magnitude, as the result of a wind farm, become less severe once a wind farm has been operating for two years.

There are no comparable U.S. real estate value histories available to evaluate. Therefore, in the absence of data, any conclusions about what will happen to the value of real estate once the turbines are present are purely speculative. Further, it is only an opinion, not supported by evidence, that the view of the offshore wind farm would be particularly "disturbing."

Property Tax Revenue Municipalities may have a financial interest in the wind project as property tax revenues would be impacted if the presence of a wind farm negatively impacts property values. The Global Insight study posits that a decrease would be likely with a turbine presence at 3 or 6 miles offshore and that a minimal reduction may occur at 12 miles offshore.

Rental Values The impact A study by economists at North Carolina State University[17] offers results showing that if turbines are built further than eight miles from shore (Atlantic Shores proposed offshore wind farm starts at 10 miles), then the visual impacts diminish substantially for many survey respondents and it is unlikely the turbines would negatively impact coastal vacation property markets.

The study further concludes that if turbines were 12 miles or further from shore, the turbines would not impact this group's vacation rental decisions. The number of turbines in the wind farm made some difference if the turbines were 8 miles from shore or closer, but didn't appear to make a difference once the wind farm was 12 or more miles offshore.

Tourism U.S. communities have limited experience in evaluating impacts on tourism or real estate values. JCTA could find no other offshore wind project in the United States is being faced with the ASOW combination of turbine size and proximity to shore.

The 2008 Global Insight study showed that tourism sales impacts are temporary and decline quickly and that economic impacts are reduced as the proposed locations move further offshore.

A 2108 University of Delaware study[18] funded by the Bureau of Ocean Energy Management ("BOEM") found the distance wind turbines are from the beach has a significant impact on how tourists feel about them:

- At 12.5 miles, 20% of respondents reported that their experience would be worsened by the turbines, 13% reported that it would be improved and 67% reported no effect.
- At 20 miles offshore, only 10% of the respondents reported that their experience would be worsened, 17% said that it would be improved and 73% said that it would have no effect.
- The "break-even" point, or the distance where as many thought they would be better off as those who thought they would be worse off , turned out to be 15 miles offshore.

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[17] *"The Amenity Costs of Offshore Wind Farms: Evidence From A Choice Experiment,"* Sanja Lutzeyer, McKinsey and Company, Johannesburg, South Africa and Center for Environmental and Resource Economic Policy, North Carolina State University; Daniel J. Phaneuf, Department of Agricultural and Applied Economics, University of Wisconsin; and Laura O. Taylor, Center for Environmental and Resource Economic Policy, North Carolina State University, April 2016.

[18] "*Atlantic Offshore Wind Energy Development: Values and Implications for Recreation and Tourism*," George Parsons and Jeremy Firestone, University of Delaware, March 2018.

The University of Delaware researchers also found that a surprising number of respondents would make special trips just to see wind turbines offshore.

During a study conducted in the South Baltic region, it became clear that transparent communication and on-site activities would not only raise the level of acceptance for a wind farm project among tourists, but could give rise to a certain pride for being part of such a ground breaking project, particularly among local inhabitants.

The study investigated how offshore wind farms can be integrated into regional tourism concepts by looking at real-world examples from the North Sea and Baltic areas[19]. Attraction possibilities range from offshore information centers and travelling exhibitions to boat tours and helicopter flights around offshore wind farms, also the use of observation platforms with telescopes. Specially designated areas for divers and sailors in the vicinity of offshore wind farms, as well as restaurants and merchandising products, were some of the possibilities.

Offshore wind-related tourism activities such as sea-bound wind farm tours have developed in regions of Europe; the resultant change in public opinion has been documented.[20]

> "Deliberately visiting an offshore wind farm has a positive relationship with pro-offshore wind farm factor scores while deliberately avoiding a location with an offshore wind farm has a negative effect.
>
> Deliberately avoiding a location with an offshore wind farm does, however, have a *positive* impact on anti-offshore wind farm individual factor scores. The proportion of respondents who have deliberately visited (UK: 8.7%, East Coast: 8.0%) or deliberately avoided (UK: 5.1%, East Coast: 5.7%) an area where an offshore wind farm is visible is small, suggesting offshore wind farms have limited impact on tourism."

Fishing

Grid layout The Atlantic Shores project layout offers one nautical mile [1 nautical mile = 1.5 land mile] in between each turbine in every direction. Seven wind farm developers have jointly agreed to lay out all of their projects by this method. The CEO of Vineyard Wind (Massachusetts), Lars Pedersen, says a Coast Guard study[21] backed their proposal.

Fisherman still see the wind industry as an existential threat. The fishing industry has demanded a correction of that study, saying it used a bad data source for navigational data and asked for additional, wider transit lanes. In the summary it published in the Federal Register, the Coast Guard acknowledged receiving "various comments … concerning navigation corridors," including from groups that had asked for navigation corridors between 2 and 4 nautical miles in width. But the Coast Guard concluded that the larger corridors would "actually provide far less area than the numerous corridors that result from the recommended array and spacing."

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[19] "T*he Impact of Offshore Wind Energy on Tourism*," German Offshore Wind Energy Foundation, April 2013.

[20] "*Public Perceptions of Offshore Wind Farms*," Caroline Hattam, Tara Hooper and Nicola Beaumont, Plymouth Marine Laboratory (PML), Plymouth, UK, 2015.

[21] "*The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study*," United States Coast Guard, May 2020.

Dr. Andrew Gill, who has 20+ years international experience in fish and fisheries ecology and researching animal responses to environmental changes and ecological impacts from human activity, is now a Senior Lecturer in Aquatic Ecology at Cranfield University, UK. Dr. Gill says the wind farms attract fish and appear to offer something of a refuge for them. But it's too soon to say how their presence has affected the catch.

Vineyard Wind 1 This offshore wind farm is slated to become one of the world's largest offshore wind projects with 62 13 MW turbines. The project has incorporated significant mitigation measures, including

1) agreements with Massachusetts and Rhode Island to provide millions of dollars to compensate fishermen for potential loss of revenue and gear and to enhance their ability to fish in and around the lease area; and

2) a commitment to continue funding pre- and post-construction survey studies with both the University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST) and the Massachusetts Lobstermen's Association (MLA) to measure what impact, if any, the windfarm is having on the marine environment.

Popular Resources

June 18, 2021 v. 1

All description are from the organization's website unless otherwise noted

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ALLIANCE FOR A LIVING OCEAN (ALO) http://www.livingocean.org/

The mission of the Alliance for a Living Ocean shall be to promote and maintain clean water and a healthy coastal environment through education, research and active participation. We recognize the need to manage our entire watershed, bay and ocean holistically since all water flows from "the raindrop to the ocean."

ATLANTIC SHORES OFFSHORE WIND (Atlantic Shores) https://www.atlanticshoreswind.com/

Strategically positioned to meet the growing demands of renewable energy targets in multiple east coast markets.

BUREAU OF OCEAN ENERGY MANAGEMENT (BOEM) https://www.boem.gov/about-boem

The Mission of the Bureau of Ocean Energy Management is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way. *Return to the first page*

Our Values:

Responsible Stewardship: *The bureau is responsible for stewardship of U.S. OCS energy and mineral resources, as well as protecting the environment that the development of those resources may impact. The resources we manage belong to the American people and future generations of Americans; wise use of and fair return for these resources are foremost in our management efforts.*

Science-Informed Decisions: *BOEM is committed to using the best available science in bureau decision making. To fill critical gaps in the information needed to inform the wide range of decisions within the bureau, BOEM facilitates world class research by talented scientists in many disciplines. The bureau also employs a significant number of scientists and technical experts across a range of relevant disciplines that provide the foundation of human capital needed to make sound decisions at all levels of the organization.*

Integrity and Ethics: *As public servants, we adhere to fundamental principles of ethical behavior. The bureau as a whole is committed to conducting its business according to the highest ethical standards. In accordance with the examples set by BOEM leadership, each BOEM employee is expected to conduct their daily operations in a way that demonstrates both professional and personal integrity. This includes a commitment to the highest level of scientific and scholarly integrity.*

CLEAN OCEAN ACTION (COA) https://www.cleanoceanaction.org/index.php?id=334

Clean Ocean Action (COA) is a broad-based coalition of 125 active boating, business, community, conservation, diving, environmental, fishing, religious, service, student, surfing, and women's groups. These "Ocean Wavemakers" work to clean up and protect the waters of the New York Bight. The groups came together in 1984 to investigate sources, effects, and solutions of ocean pollution.

Under the guidance of COA's Board of Trustees, COA's staff researches pollution issues affecting the marine environment, then formulates policy and campaigns to eliminate each pollution source. The staff then coordinates and organizes the Ocean Wavemakers to use their individual experience and expertise to help. Press events, rallies, writing letters, making phone calls, testifying at public hearings, and distributing literature are just some of the ways members of the coalition become involved.

DEPARTMENT OF ENERGY — WIND (DOE)
https://www.energy.gov/science-innovation/energy-sources/renewable-energy/wind

The United States is home to one of the largest and fastest-growing wind markets in the world. To stay competitive in this sector, the Energy Department invests in wind research and development projects, both on land and offshore, to advance technology innovations, create job opportunities and boost economic growth.

Moving forward, the U.S. wind industry remains a critical part of the Energy Department's all-of-the-above energy strategy to cut carbon pollution, diversify our energy economy and bring the next generation of American-made clean energy technologies to market

The Wind Vision Report takes America's current installed wind power capacity and assesses the potential benefits of various scenario

Learn more about the Wind Energy Technology Office's R&D portfolio with an interactive map that allows users to search by states and types of partner organizations. . *Return to the first page*

ELECTED OFFICIALS – HOW TO CONTACT THEM
https://www.usa.gov/elected-officials

Federal, state and local elected leaders

ENVIRONMENT NEW JERSEY
https://environmentnewjersey.org/feature/nje/go-big-offshore-wind

Our campaign: Go Big On Offshore Wind. Campaign goal: Convince Atlantic Coast states to harness the wind that blows off our shores.

LBI COALITION FOR WIND WITHOUT IMPACT https://www.savelbi.org/

We are a non-partisan, mission-driven grassroots coalition comprised of hundreds of concerned LBI homeowners, business owners and visitors.

We are proponents of a sensible approach to wind energy and alternative/renewable energy solutions. However, we are opposed to the location, scope and size of this project as currently proposed by Atlantic Shores.

Our coalition is led by Beach Haven resident Dr. Bob Stern, an engineer who previously managed the office in the U.S. Department of Energy that oversaw the protection of the environment as it relates to energy programs and projects.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) https://www.noaa.gov/

Our mission is to understand and predict changes in climate, weather, oceans, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources.

NOAA is an agency that enriches life through science. Our reach goes from the surface of the sun to the depths of the ocean floor as we work to keep the public informed of the changing environment around them.

From daily weather forecasts, severe storm warnings, and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality and affect more than one-third of America's gross domestic product. NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers and other decision makers with reliable information they need, when they need it.

NOAA's mission to better understand our natural world and help protect its precious resources extends beyond national borders to monitor global weather and climate, and work with partners around the world.

Our agency holds key leadership roles in shaping international ocean, fisheries, climate, space and weather policies. NOAA's many assets — including research programs, vessels, satellites, science centers, laboratories and a vast pool of distinguished scientists and experts — are essential, internationally recognized resources. We work closely with other nations to advance our ability to predict and respond to changes in climate and other environmental challenges that imperil Earth's natural resources, human life and economic vitality. *Return to the first page*

NATIONAL OFFSHORE WIND R&D CONSORTIUM
https://www.energy.gov/eere/wind/national-offshore-wind-rd-consortium
(National Offshore Wind Project)

The National Offshore Wind Research and Development Consortium, established in 2018, is a not-for-profit public-private partnership focused on advancing offshore wind technology in the United States through high-impact research projects and cost-effective and responsible development to maximize economic benefits

In late 2017, the U.S. Department of Energy (DOE) announced $20.5 million for a consortium that would conduct research and development (R&D) to address technological barriers and lower the costs and risks of offshore wind in the United States. Of these funds, $18.5 million would be directed to the consortium, and $2 million would go directly to DOE national laboratory research in support of the consortium.

DOE and the Department of the Interior identified the following research areas to facilitate the development of the U.S. offshore wind industry:

- *Wind plant technology advancement.*
- *Wind resource and physical site characterization.*
- *Installation, operations and maintenance, and supply chain technology solutions.*

Addressing these challenges requires industry-wide collaboration, working closely with the brightest academic and national laboratory scientists.

ØRSTED https://us.orsted.com/

We believe that it's time to take real action to create a world that runs on green energy. Renewable energy holds the key to a cleaner future, and we need to act now to reduce the effects of climate change

Despite the progress, we believe that more can be done to reduce the consequences of climate change. More than a third of the global carbon emissions stem from energy generation.

This huge figure made us rethink our business strategy back in 2008, and that's when we embarked on our journey of transforming from a fossil-fuel to a renewable energy company. We increased our investments in offshore wind farms and started to convert our power stations from firing coal to using sustainable biomass as fuel. In 2017, we took the final step and divested our oil and gas business.

RECLAM THE BAY (RCTB) https://reclamthebay.org/

RCTB is more than an endeavor to restock a decimated shellfish population. A critical part of our mission is forming and supporting partnerships with academics, municipalities, citizen groups and other environmental organization in order to educate the public. This empowers and energizes them to make changes to their life style to improve the quality and resilience of the bay *Return to the first page*

RESPONSIBLE OFFSHORE DEVELOPMENT ALLIANCE (RODA) https://rodafisheries.org/

We are a broad membership-based coalition of fishing industry associations and fishing companies committed to improving the compatibility of new offshore development with their businesses.

Our approach is to directly collaborate with relevant regulatory agencies (e.g., National Marine Fisheries Service, Bureau of Ocean Energy management, U.S. Coast Guard, fishery management councils, and state agencies), offshore developers, science experts, and others to

coordinate science and policy approaches to managing development of the Outer Continental Shelf in a way that minimizes conflicts with existing traditional and historical fishing.

On March 25, 2019 RODA executed a ten-year Memorandum of Understanding with the National Marine Fisheries Service and Bureau of Ocean Energy Management to collaborate on the science and process of offshore wind energy development on the Atlantic Outer Continental Shelf. RODA will use this MoU to work with both agencies and more broadly to ensure that local and regional fishing interests are involved early and often throughout offshore wind development processes, and that the interests and concerns of commercial fishermen are communicated as effectively as possible.

SAVE OUR SHORELINE NJ https://www.saveourshorelinenj.com/
https://protectourcoastnj.com/

Protect Our Coast is a united group with one common goal… stop the wind turbines off of the New Jersey shoreline. We are extremely concerned with the fast-track development without comprehensive research detailing the true effects on New Jersey's tourism, fisheries, wildlife and coastal communities. The burden of doubt is on the developers to prove without a reasonable doubt the projects will result in a net benefit. Return to the first page