



The Offshore Wind Farm Round-Up

Issue #7

November 14, 2022

The Offshore Wind Farm Round-Ups periodically provide a review of recent research efforts in which the effects of offshore wind farms have been studied. In addition, in response to readers' suggestions and questions, Round Ups occasionally include factual, clarifying information,

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.

Click on the link to jump to a section:

- [Questions](#) regarding the ability of offshore wind turbines to hold up in a hurricane
- [Questions](#) about blades falling from wind turbines in good weather
- [Questions](#) regarding recent statements about the Hudson South
- [Question](#) about the NJ Bureau of Public Utilities and ratepayers

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“What happens to offshore wind turbines in a hurricane?” *(and other questions from readers)*

Given that offshore wind farms are relatively new to the East Coast, the only example of what happened to any wind farm at all during a hurricane is the land-based Punta Lima Wind Farm in Naguabo Puerto Rico on the northeast coast of that island.

When Hurricane Maria made a direct hit on the southeast coast of Puerto Rico near Yabucoa (about 20 miles from the wind farm) on September 30, 2017, the maximum wind speed at that time was 155 mph (135 knots), which placed it just below a Category 5 in intensity.¹ It took about eight hours to sweep across the island and when it reached the Atlantic, it was still packing winds with maximum strength of around 109 mph (95 knots). Maria was the third costliest hurricane in United States history, leaving in its wake \$90B in damages across PR and the U.S. Virgin Island combined.²

¹ According to the National Hurricane Center, Category 5 is a hurricane with sustained winds of 157 mph or higher. Category 4 has sustained winds 130 – 156 mph.
<https://www.nhc.noaa.gov/aboutsshws.php>

² **From the official report from the National Hurricane Center:** Tropical Cyclone Report Hurricane Maria 16-30 September 2017, Richard J. Pasch, Andrew B. Penny, and Robbie Berg, published 17 February 2019 https://www.nhc.noaa.gov/data/tcr/AL152017_Maria.pdf

Following is a link to a YouTube video (with an oddly jazzy soundtrack) that shows the damage to the wind farm caused by the Category 4 hurricane:

<https://www.youtube.com/watch?v=o0Kho9UEbqQ>

The video was created by Ovi Duram, a regular on YouTube who frequently creates and posts videos on his own YouTube channel about computer technology and travel to Puerto Rico and Peru.

What is the hurricane rating for the wind turbines Atlantic Shores plans to use?

Atlantic Shores is planning on purchasing turbine model V236-15.0MW from Vestas.

There isn't a good/better/best or a 1 – 5 system used to rate how wind turbines would perform during a hurricane, but all turbines receive a rating from IEC, the International Electrotechnical Commission,³ regarding their toleration of extreme weather conditions.

From the Vestas website: "Globally applicable, the turbine is designed for high wind conditions and rated to withstand IEC 1 extreme wind conditions up to 50 m/s [111.8 mph] and IEC T up to 57 m/s [152.1 mph]."⁴ The same website states that the cut-out wind speed for this model is 30m/s [67 mph], which means that once the wind meets that speed, the brakes are applied to the blades and the nacelle (top part of the turbine) rotates to put the blades out of the wind.

Access the Vestas V236-15.0MC description by clicking on the following link:

<https://az659834.vo.msecnd.net/eventsairaueprod/production-cecevents-public/b4260143c5be4bcaad7f5c01023858d4>

“Can blades fall off in good weather?”

Can blades detach and fall off even if there isn't a hurricane or bad weather? Yes, and a few instances have been reported:

In February 2022, a blade fell off an on-land wind turbine at Biglow Canyon, Oregon, which is 2.5 miles northeast of Wasco

<https://projects.oregonlive.com/wind-farms/>

In April 2022, a blade fell off an offshore wind turbine off the coast of Denmark

<https://renewablesnow.com/news/one-turbines-blades-fall-off-at-rsted-danish-offshore-wind-farm-780042/>

³ IEC is a global, not-for-profit membership organization that develops standards that are used in countries around the world. **From the IEC website:** IEC brings together more than 170 countries and provides a global, neutral and independent standardization platform . . .

<https://iec.ch/what-we-do>

⁴ **Per xpower.com**, IEC classifications indicate the type of protective conductors involved in electrical systems. XPower describes itself as “one of the world’s leading providers of power converter solutions” on its website: <https://www.xppower.com/resources/blog/iec-protection-classes-for-power-supplies>

In July 2022, a blade fell off an on-land wind turbine near Gloucester, Massachusetts. <https://www.nbcboston.com/news/local/blade-tumbles-off-wind-turbine-in-gloucester/2794638/>

Did the blades fly through the air after they detached? If so, how far from the wind turbines did they land?

The single blade that fell off the Oregon wind turbine was found in the adjacent wheat field, where its impact had carved out a 4' deep trough 100 yards away from the still-standing turbine from which it had separated.

The blades in the other two instances fell straight down.

Has somebody studied the risk of hurricanes along the Atlantic coast? Yes, although we are still searching for studies published more recently. In 2012, five researchers from Carnegie Mellon University's Department of Engineering and Public Policy and Tepper School of Business published "Hurricane Risk to Offshore Wind Turbines Along the U.S. Coast."⁵

HIGHLIGHTS:

- The risk to offshore wind farms is lowest along the coast of Mid-Atlantic and New England regions. There is less than a 10% probability in those regions that hurricanes destroy more than 10% of a wind farm in 20 years in most counties.
- The risk to offshore wind farms is highest for counties along the Gulf of Mexico, in South Florida, and near Cape Hatteras, NC. There is greater than a 30% probability in those regions that hurricanes will destroy more than 10% of a wind farm in 20 years.

Click on the link below to access the full study:

<https://www.cmu.edu/ceic/assets/docs/publications/working-papers/ceic-12-01.pdf>

Please email the Round Up research team at RoundUpLBI@gmail.com if you have knowledge of other more recent studies around this topic. We would appreciate your input.

Questions About Hudson South

Is it true that the Hudson South lease area offers the potential for significantly more wind energy than the Atlantic Shores lease area?

Depends on your definition of significant.

⁵ Authors: Stephen Rose, Paulina Jaramillo, Mitchell J. Small, Iris Grossmann, and Jay Apt, Carnegie Mellon Electricity Industry Center, Department of Engineering and Public Policy and Tepper School of Business, Carnegie Mellon University

The Hudson South lease area is three times larger than the Atlantic Shores leased area, 567,552 acres vs. 183,253 acres, respectively.

The Bureau of Ocean Energy Management (“BOEM”) states that the power production for Hudson South will be 24,143,998 megawatt hours per year, assuming that the wind farm will be producing at 40% capacity.

Using the same formula and capacity, the 357 15MW turbines planned for the Atlantic Shores leased area when completed would produce 18,763,920 megawatt hours. Accordingly, Atlantic Shores’ megawatt production would be 78% of Hudson South’s megawatt production, even though Atlantic Shores’ acreage is 3 times smaller.

Click on the link below for access to the BOEM data:

<https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/NYBight-Wind-Energy-Areas-Summary.pdf>

Is it true that Hudson South has already been screened for conflicts with fishing, marine mammals and navigation and it was already approved for wind projects?

Yes, that area has been approved by BOEM for potential wind farm projects. In March 2021, the Bureau of Ocean Energy Management (BOEM) announced that it had completed the area identification process to delineate Wind Energy Areas in the New York Bight, of which Hudson South is a part.

Regarding the rest of the statement: To some extent, yes, but if this statement is trying to imply that the assessments of conflicts around fishing, the presence of marine mammals and navigational challenges have been concluded, then that statement would be erroneous.

In fact, the process has just begun, as described on the BOEM website (link above):

As part of the process – and before the Final Sale Notice is announced – BOEM must complete an Environmental Assessment, which only considers “the potential environmental consequences of site characterization activities [e.g., surveys and core samples] and site assessment activities [e.g., installation of meteorological buoys] associated with issuing commercial and research wind energy leases in the Wind Energy Areas.”

Further, “The Environment Assessment will not consider any impacts regarding the construction and operation of a wind energy facility. In the future, should a lease be issued, and a lessee propose to construct a commercial wind energy facility, the lessee will be required to submit a construction and operations plan for BOEM’s review and approval. BOEM would then prepare a site-specific National Environmental Policy Act document and conduct necessary consultations before making a final decision to approve the construction of the proposed project.”

Question about A Statement About the NJ Bureau of Public Utilities

Please explain what this statement in a recent Feedback column in The Sandpaper is referring to and is it true? “The New Jersey Board of Public Utilities

has already approved a plan that provides the developers returns from ratepayers that will fully subsidize this project [i.e., the Atlantic Shores Offshore Wind Farm].”

If the statement is trying to imply that the NJ Board of Public Utilities (“NJBPU”) has some sort of kick back arrangement with the developers at the literal expense of ratepayers, then that statement would be incorrect.

It turns out, however, that the process of buying and selling electricity in the energy market is more complicated than you would think, although it would be quite a stretch to say that this process is designed to produce a full subsidy of costs for Atlantic Shores.

Here is a summary of the process that helps provide a context to the answer to the question.

First, some background: New Jersey is in a power pool called PJM and through PJM, producers of electricity – whether they are a natural gas-fired project, a solar installation or Atlantic Shores – bid into two markets: 1) the capacity market, which means selling a certain amount of megawatts that are available; and 2) the energy market, which is electricity being delivered to the grid.

Below we will give a simplified description of each market with a focus on the energy market as this relates to the contract Atlantic Shores has with NJBPU.

Here is how the capacity market process works: Power providers are eligible to bid into the capacity market auction which are usually held annually for time period three years ahead. For example in 2023, a power provider would be bidding for capacity in the year 2026. An off-shore wind project is eligible to bid at its Effective Load Carrying Capability which means the amount of electricity it can generate during peak times for the PJM systems. For Atlantic Shores this may be about 40% of its installed capacity, but the actual calculation is not determined yet and the various inputs and calculations are complex. The eligibility for wind projects to bid into the capacity market is relatively new and could change between now and 2027 when Atlantic Shores is expected to be constructed. There is no contract between Atlantic Shores and NJBPU for capacity.

Here is how the energy market process works: The energy market is usually bid into the Day Ahead Market and most power providers will bid unless for some reason the provider is not operational (e.g., down for repairs). As an example, on November 14 a power generator tells PJM that it can provide X amount of megawatts per hour on November 15 at \$Y price per megawatt hour. PJM then collects all of the bids from other generators and responds back to the power producers that their bid was (or was not) accepted and, if so, for how many megawatts and hours. Atlantic Shores will most likely bid into the Day Ahead Market and since its fuel (the wind) is free, it will most likely clear the market. All power providers that clear the market will receive the same price.

Here is how that all impacts the Atlantic Shores project: The NJBPU awarded a contract to Atlantic Shores for a maximum of 1,510 megawatts for each hour of the year and established an OREC (Off Shore Wind Renewable Energy Credit) of \$86.62 per megawatt hour for the first year.

After the first year, the credit (OREC) gradually increases every year and it will average \$106.18 per megawatt hour over the 20-year period of the contract. The contract gives Atlantic Shores the right to sell the credits (ORECs) to regulated distribution companies -- such as Atlantic City Electric -- and those distribution companies are *required* to buy them.

How payment flows. Although the NJBPU closely monitors the entire OREC program, NJBPU contracts with a third-party clearinghouse service to manage the transfers of the ORECs and the payment processes mentioned above.

Atlantic Shores will sell electricity into the Day Ahead Market like all other power providers. Atlantic Shores receives the proceeds of the sale of electricity in the energy market and transfers the ORECs generated plus the revenue from electricity sales to the clearinghouse. In return, Atlantic Shores will receive from clearinghouse the fixed priced for the ORECs.

Separately, the clearing house will transfer the ORECs to the distribution companies and collect payment to match the net value of the OREC price *less* revenues from the electricity sales. The distribution companies will in turn collect this from its customers and the amount will vary based upon the customers' rate class and amount of electricity used by the customer.

Atlantic Shores cannot transfer credits to the clearinghouse in excess of 1,510 MW per each hour of the year during the duration of this contract. Should hourly production of the wind farm exceed that number, Atlantic Shores may sell the extra electricity in the energy market to generate revenue, which is returned to the ratepayers at the end of the year.

Value of the Subsidy: As described above, Atlantic Shore will receive a fixed payment for the amount of electricity it sells. The subsidy is the difference in the fixed OREC price -- \$86.62 in the first year -- and the market clearing price. In summer of 2021 when the contract was awarded, the market clearing price was around \$35 per megawatt hour, so that would have created a subsidy to Atlantic Shores of a little over \$50 per megawatt hour, had Atlantic Shores been operational.

Now with the war in the Ukraine and other factors, the average market clearing price is around \$75 per megawatt hour, so the subsidy for Atlantic Shores would be only about \$11 per megawatt hour, if the wind farm were operational.

Finally, there is no argument that having a fixed rate of revenue for 20 years is a benefit to Atlantic Shores. On the other hand, the owners of Atlantic Shores assume the full risk of the project by funding the cost of construction, covering all costs around operations and maintenance, absorbing the cost of debt and inflation and, ultimately, dealing with the consequences of the wind not blowing as much as expected.

The NJBPU only guarantees that if the power is generated, it can be sold at \$86.62 per megawatt hour during year one and then sold for a cost that escalates over the course of the contract for an average price of \$106.18. NJBPU does not guarantee the profitability of the project nor does it guarantee a fixed return to the investors or power producers.

For a complete explanation of the NJBPU OCEC program, click on the link below:
[https://offshorewindhub.org/sites/default/files/resources/OREC Mechanism Proposal.pdf](https://offshorewindhub.org/sites/default/files/resources/OREC_Mechanism_Proposal.pdf)

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

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