Frequently Asked Questions Related to Wind Energy on the Outer Continental Shelf – Virginia – March 2015

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1. *In its evaluation of offshore wind facilities and their potential impacts, does BOEM consider other marine uses that may also impact the fishing community?*

   - Yes. As part of our analysis of potential impacts for construction, operation and maintenance, and decommissioning of offshore wind energy facilities, BOEM will evaluate impacts to existing and likely future uses of the coastal and ocean environment.
   - Examples include fishing; oil and gas exploration and development; military activities; marine mineral extraction; and commercial, recreational, and military vessel traffic.

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2. *Are there siting considerations to address potential impacts to fisheries and habitat (e.g., turbine configuration to minimize navigational impacts; turbine design options to provide habitat)?*

   - BOEM held a series of workshop in 2012 and 2014 with the fishing community to solicit input for the *Development of Mitigation Measures to Address Potential Use Conflicts Between the Wind and Commercial Fishing Industries.* BOEM's cooperative project (M14AC00029) with the Commonwealth of Virginia, *Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area* is designed to further refine the proposed options to meet the needs of Virginia fishermen.

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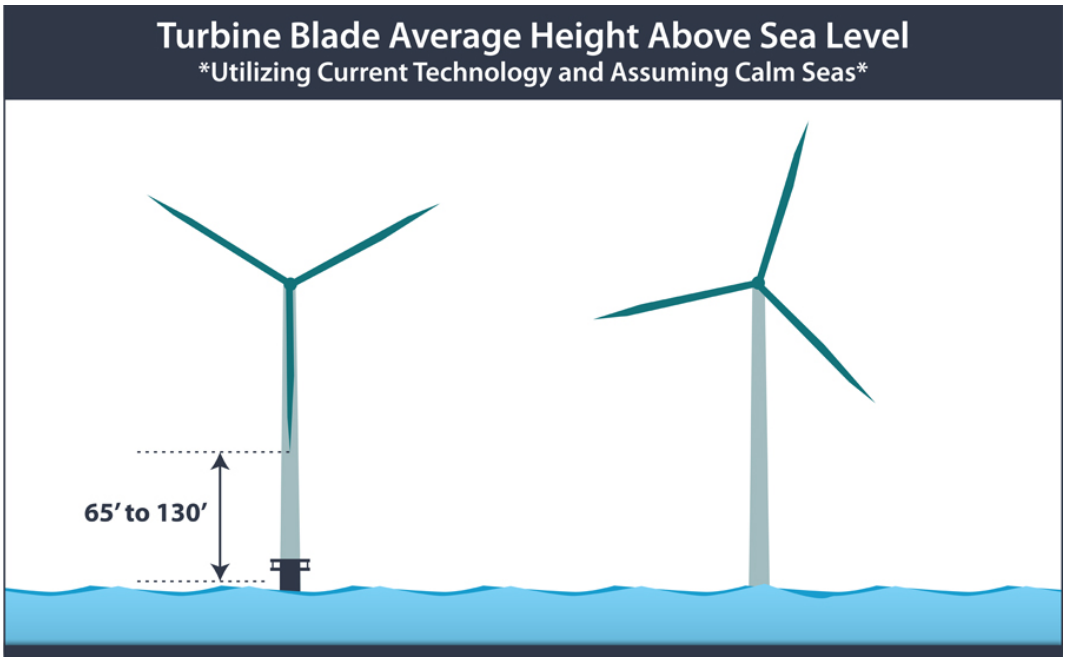
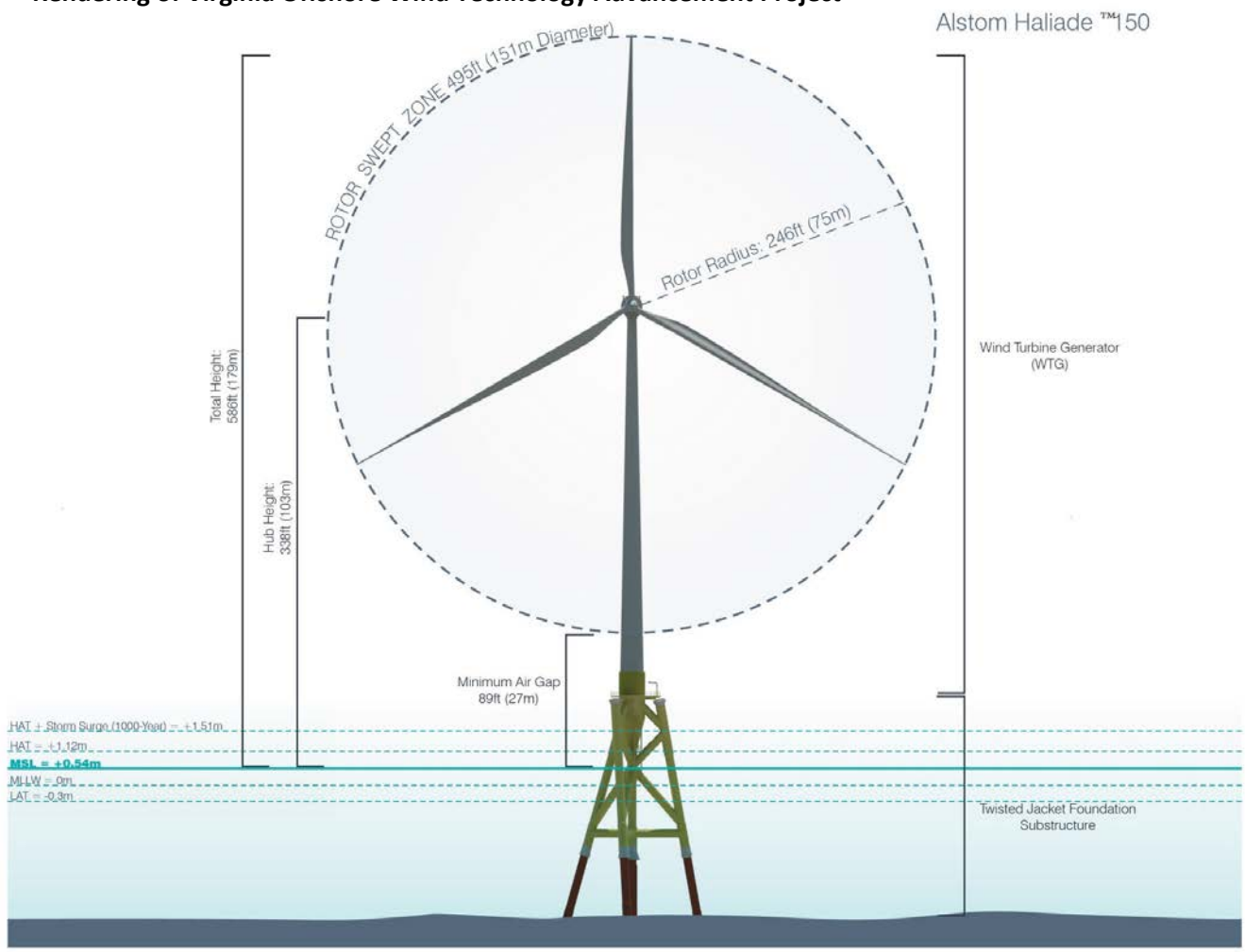
3. What is the average height above sea surface and distance between wind turbines?

   - Based on the current technology, the lowest point of the rotor sweep would be 65 to 100 feet (ft) above the sea surface. The minimum gap for the Virginia Offshore Wind Technology Advancement Project (VOWTAP) on the proposed research lease is 89 feet above mean sea level.



Rendering of Virginia Offshore Wind Technology Advancement Project



HAT = highest astronomical tide; MSL = mean sea level; MLLW = mean lower low water; LAT = lowest astronomical tide

- Spacing between turbines is determined on a project-by-project basis to minimize wake effect between turbines and is based on rotor diameter and turbine size. It is anticipated that U.S. offshore wind turbines will use rotors of 151 m (495 ft) or more in diameter, so turbines would be spaced at least 0.3 to 0.6 nautical miles apart. The VOWTAP wind turbines will be arranged in a north-south configuration spaced approximately 0.5 to 0.6 nautical miles (1,050 m) apart.

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4. Will areas around the wind energy facility structures exclude vessel traffic and fishing activity?

- BOEM does not intend to restrict vessel traffic in and around offshore wind facilities.
- The U.S. Coast Guard (USGC) has the authority to implement a safety zone or buffer to ensure safety at sea. They have stated such measures would be evaluated on a case-by-case basis.
- To ensure the safety of the local mariners, VOWTAP's developer will establish a 95 acre temporary work area around each turbine and a 61 m (200 ft) construction right-of-way along the routes of the cables. As appropriate, these areas will be marked and lit in accordance with USCG requirements and monitored by a security boat that will be available to assist mariners.

5. *What is the footprint of the VOWTAP wind turbines and what is the foundation design?*

- The Keystone Inward Battered Guide Structure (IBGS) foundation is narrower at the top than it is at the seafloor. The total footprint of each IBGS foundation is approximately 0.09 acre on the seafloor. At sea level, the IBGS foundation measures approximately 17 m by 17 m (56 ft by 56 ft).
- The foundations consist of one approximately 3.1 m (10.2 ft) diameter central caisson, the structural jacket installed over the central caisson, and three through-the-leg inward battered piles approximately 1.8 m (5.9 ft) in diameter driven through the structural jacket spaced approximately 29 m (95 ft) apart at the seafloor.

6. *How deep are the electrical transmission cables buried under the sediment?*

- Varies by project with cables typically buried below the seafloor at an appropriate depth based on the underlying geology, navigation and other hazards, and heat transfer properties of the sediment. Mitigation measures, such as concrete mats, rock, and other types of fill may be used in cases where a minimum depth of cover is required or at cable crossings.
- VOWTAP has proposed a 2 m (6.6 ft) target burial depth for the export cable. The operators will be required to conduct inspections, including after storms, to ensure cables remain buried.
- Additional discussion is available in *Offshore Electrical Cable Burial for Offshore Wind Farms on the Outer Continental Shelf* (2011) and *Offshore Wind Submarine Cable Spacing Guidance* (2014) at www.bsee.gov/Technology-and-Research/Technology-Assessment-Programs/Categories/Renewable-Energy-Research

7. *What are the effects of electromagnetic fields (EMF) on fish species?*

The following studies examine the effects of EMF on marine animals (primarily fish):

- In 2011, BOEM initiated a study titled "Renewable Energy *in situ* Power Cable Observation" that is evaluating species densities along electrified and non-electrified undersea power cables off the California coast. This study will be completed in 2015. See the study profile for more information: www.boem.gov/pc-11-03
- On July 7, 2011, BOEM completed the study "Effects of EMFs from Undersea Power Cables on Elasmobranchs (Sharks and Rays) and Other Marine Species." This study researched potential ecological effects of EMFs emitted by sub-sea power transmission cables, suggested solutions that reduce EMF exposure, and identified data gaps and future research priorities. Report is located here: www.data.boem.gov/PI/PDFImages/ESPIS/4/5115.pdf

- In December 2013, a site-specific EMF study was provided for the buried submarine cable that is proposed for VOWTAP. The report, *Magnetic Fields from Submarine Cables*, was prepared by Exponent, Inc. and was issued as part of the VOWTAP Research Activities Plan submitted to BOEM. The VOWTAP EMF report is available at http://www.boem.gov/Renewable-Energy-Program/State-Activities/VA/2013-12-06_Appendix-K_VOWTAP_EMF-Analysis_FINAL.aspx
- The Department of Energy's Pacific Northwest National Laboratory has completed a study titled "Effects of Electromagnetic Fields on Fish and Invertebrates." This study looks at behavioral responses of selected finfish, crabs, and spiny lobster to EMF produced in a laboratory setting. Results are here: mhk.pnnl.gov/publications/effects-electromagnetic-fields-fish-and-invertebrates
- The Oregon Wave Energy Trust concluded an EMF study titled "Electromagnetic Field Measurements." Report is here: oregonwave.org/oceanic/wp-content/uploads/2013/09/Electromagnetic-Field-Measurements-EMF%E2%80%94September-2010.pdf
- A United Kingdom study, "EMF-Sensitive Fish Response to EM Emissions from Sub-Sea Electricity Cables," looked at behavioral reactions of certain sharks and rays to EMF in a large sea pen. The report concluded that although some fish appeared to respond to EMF, no positive or negative effects could be determined.
- In late 2014, BOEM kicked off an Atlantic EMF study on elasmobranch (sharks, rays and skates) and American lobster movement and migration. The study profile is available: www.boem.gov/EMF-Impacts-on-Elasmobranch-and-American-Lobster

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8. If fishermen are displaced or economically impacted, will compensation be available from the Federal government?

- The Fishermen's Contingency Fund, established under the OCS Lands Act of 1978, compensates U.S. commercial fishermen and other eligible citizens and entities for property and economic loss caused by obstructions specifically related to oil and gas development activities on the OCS.
- BOEM does not have the authority to establish a similar mitigation fund related to OCS renewable energy development.
- Through BOEM's compliance with the National Environmental Policy Act, the Agency must identify environmental, economic and social impacts related to approval of construction and operation of offshore wind energy facilities. Projects like the Virginia Cooperative Agreement and public involvement in the NEPA decision-making process are vital for understanding potential impacts.

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9. Where can I find more information about offshore wind energy development in the Atlantic?

- Information on the planning process and the status offshore wind leases, including opportunities for comment, can be found on the BOEM website at: www.boem.gov/Renewable-Energy
- Information specific to off-shore wind development and fisheries conflicts can be found at: www.boem.gov/Fishing-Offshore-Wind-Mitigation-Measures-Development-Workshops