



Responsible Offshore Development Alliance

Navigational Aids in Wind Energy Areas

PLEASE RETURN BY **APRIL 30, 2020**

In order to improve safety for mariners likely to interact with offshore wind development, the Joint Industry Task Force is asking for advice on navigational aids on structures within wind energy areas (WEAs). This survey pertains to on-the-water navigational aids only. We would like to gather feedback from the industry to ensure their needs for safety and operations are considered.

Background materials:

- See example images at the end of this document.
- BOEM's Draft Guidelines on Lighting and Marking (<https://www.boem.gov/sites/default/files/documents/renewable-energy/Lighting-and-Marking-Guidelines.pdf>)
- USCG Aids to Navigation Manual (https://media.defense.gov/2017/Mar/29/2001724016/-1/-201/0/CIM_16500_7A.pdf)
- IALA Marking of Man-Made Offshore Structures (<https://www.iala-aism.org/product/markings-of-man-made-offshore-structures-o-139/>)

Please return completed surveys **BY APRIL 30, 2020 to:**

- By email: lane@rodafisheries.org
- By mail:
RODA
P.O. Box 66704
Washington, DC 20035

If you are comfortable providing information about yourself (such as name, email, business/vessel name, homeport, active fisheries, etc.) please do so here:

Please provide additional comments on back or append additional pages

Circle or highlight your preferences for the following questions:

AIS & Radar

Current requirements do not include AIS on turbine and substation installations offshore.

1. What would you like to see?
 - a. AIS on every turbine - Virtual
 - b. AIS on every turbine but activated by vessel captain

- c. High wattage AIS on perimeter with lower wattage on the interior of array (lower wattage only visible in close proximity: 3nm)
 - d. AIS on perimeter of array only
 - e. AIS on perimeter of array and on any transit lanes (i.e. as a lit runway)
 - f. AIS on perimeter of array and every other turbine in the interior
 - g. AIS on every other turbine throughout the array
 - h. No AIS
 - i. Other:
2. Would you like to see radar beacons (RACONS) in a WEA?
- a. Activated on the four corners of the array
 - b. Activate on the perimeter of the array
 - c. Every other turbine on the perimeter
 - d. No RACONS
 - e. Other:

Paint and Marking (See Images 1 & 3)

Turbine paint color is recommended and standardized by BOEM

- *Foundation will be painted yellow*
- *Tower, nacelle and blades will be grey*
- *Ladders at base of turbine should be painted in contrasting color to yellow of foundation.*

Lighting of marking (IALA recommendation, page 11)

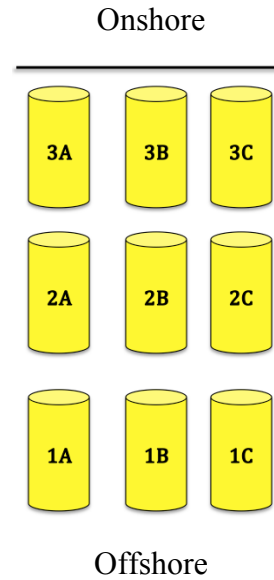
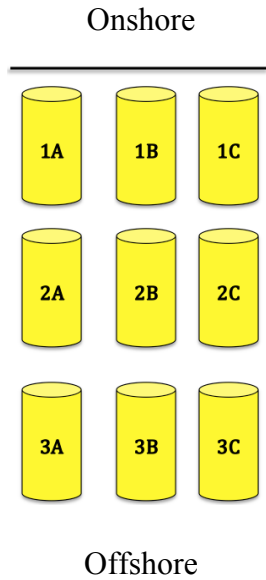
- *It is recommended that each structure, where practicable, displays identification panels with black letters or numbers 1m high on a yellow background visible in all directions. These panels shall be easily visible in daylight as well as at night, either by using illumination or retro-reflecting material.*

3. What size lettering would you like to see indicated on the turbine? (For reference, see Image 1, lettering on Block Island turbines is 10ft/3m high)
- a. IALA required 1meter marking
 - b. Largest feasible marking that is visible 360 degrees
 - c. 3m
 - d. 5m
 - e. Other:
4. What are your recommendations for the marking to be visible in conditions you experience? (*Circle all*)
- a. Black lettering on yellow foundation background
 - b. Photoluminescent reflective paint on yellow foundation background
 - c. Combination of black and reflective paint (one above the other)
 - d. Combination of black and reflective paint (example: 2 reflective (N&S sides), 2 black lettering (E&W sides))
 - e. Other:

5. How should identifying alpha-numeric labels on turbines be lighted?
 - a. Artificial downward-facing lighting in addition to reflective paint.
 - b. Unlit but use reflective paint
 - c. Follow the IALA recommendation – either illuminated or reflective paint.
 - d. Other:

6. Do you agree that markings should be approximately 50 feet above the highest astronomical tide (HAT) water line?
 - a. Yes
 - b. No
 - c. Recommended height:

7. How should the turbines be marked for directional consistency?
 - a. Numbers increase with distance from shore (i.e. CONSISTENT with the buoyage numbering system), letters advance “generally” from W to E in the Atlantic.
 - b. Numbers decrease with distance from shore (i.e. OPPOSITE of buoyage numbering system), letters advance “generally” from W to E in the Atlantic.



- c. Doesn't matter
- d. Other? Please draw or describe:

8. Should preferred transit lanes be marked and have special lighting characteristics?
 - a. Yes
 - b. No
 - c. Other:

9. Request to align marking nomenclature and naming conventions to be the same on the tower, on charts, etc. across all agencies and all projects?
 - a. Yes
 - b. Not necessary

Turbine Lighting: *This survey is specific to surface-lighting visible to mariners, not aerial lighting which is driven by FAA. See Image 3 below.*

Lighting of Offshore Structures (US Coast Guard, page 4-36)

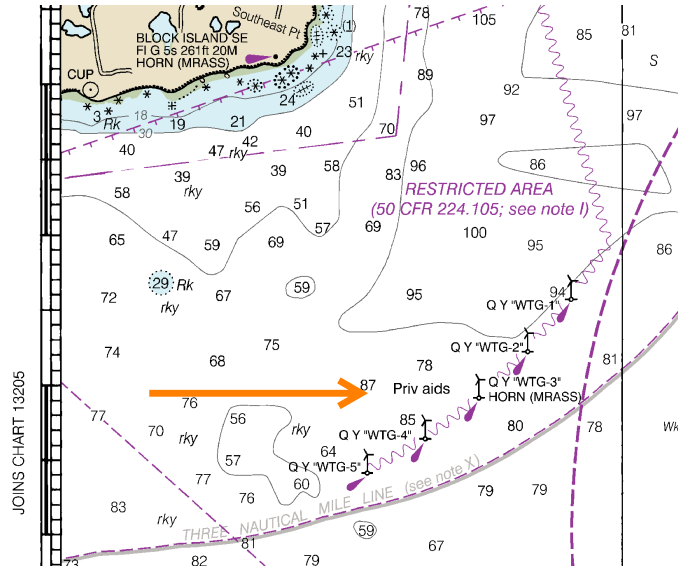
- *Structures having a maximum horizontal dimension of 30 feet or less..., shall be required to have one obstruction light visible for 360° (Source: 33 CFR 67)*
- *Structures having a maximum horizontal dimension of over 30 feet, but not in excess of 50 feet, ... shall be required to have two obstruction lights installed on diagonally opposite corners, 180° apart, or as prescribed by the District Commander, each light to have a 360° lens (Source: 33 CFR 67)*
- *A Significant Peripheral Structure (SPS) is the “corner” or other significant point on the periphery of the wind farm. [These] should be marked by sufficient lights so as to be visible to the mariner from all relevant directions in the horizontal plan. Such lights should display the character of a special mark with an operational range of not less than four nautical miles. As a minimum, lights on individual SPSs should be synchronized... (From: USCG Aids to Navigation Manual)*
- *The lateral distance between [intermediate] lighted structures of the nearest SPS should not exceed two (2) nautical miles. (From: USCG Aids to Navigation Manual)*

10. Are the guidelines recommended by the USCG on turbine lighting on the corners (SPS) and interior of array sufficient?
 - a. Yes
 - b. No
 - c. Additional suggestions:

11. Sound signals will be required in WEAs. Where would you prefer sound signals to be located?
 - a. At each corner
 - b. Along the perimeter
 - c. Other/comments:

12. Here is the chart symbology and characteristics information for the Block Island turbines:

- a. Is the symbology satisfactory? If not please suggest improvements to make the towers more noticeable on charts.



Clip of NOAA Chart 13218

- b. Is the character explanation clear and unambiguous? How could it be succinctly approved?

(1) No.	(2) Name and Location	(3) Position	(4) Characteristic	(5) Height	(6) Range	(7) Structure	(8) Remarks
SEACOAST (Massachusetts) - First District							
APPROACHES TO NEW YORK - NANTUCKET SHOALS TO FIVE FATHOM BANK (Chart 12300)							
652	BLOCK ISLAND WIND FARM WTG-1	41-07-32.740N 071-30-27.040W	Q Y				Maintained by Deepwater Wind RI. Private aid.
653	BLOCK ISLAND WIND FARM WTG-2	41-07-11.570N 071-30-50.220W	Q Y				Maintained by Deepwater Wind RI. Private aid.
654	BLOCK ISLAND WIND FARM WTG-3	41-06-52.960N 071-31-16.180W	Q Y				Maintained by Deepwater Wind RI. Private aid.
654.5	Block Island Wind Farm WTG-3 Fog Horn	41-06-52.960N 071-31-16.180W					Maintained by Deepwater Wind RI. MRASS: Fog signal is radio activated, during times of reduced visibility, turn marine VHF-FM radio to channel 83A/157.175Mhz. Key microphone 5 times consecutively, to activate fog signal for 60 minutes. HORN: 1 blast ev 20s (2s bl). Private aid.
656	BLOCK ISLAND WIND FARM WTG-4	41-06-36.540N 071-31-44.620W	Q Y				Maintained by Deepwater Wind RI. Private aid.

Note: Q = Light Characteristic – Continuous Quick-Flashing
 Y = Color characteristic of the aid to navigation – Yellow
 From: *Light List, Vol I, Atlantic Coast, St. Croix River, ME to Shrewsbury River, NJ 2020 pg. 9*

13. If there were cellular coverage in a wind farm, would you use apps on your smart phone to help you navigate, or obtain weather information, or communicate with other vessels? Please list the apps here:

Image 1: Block Island wind turbine with marking

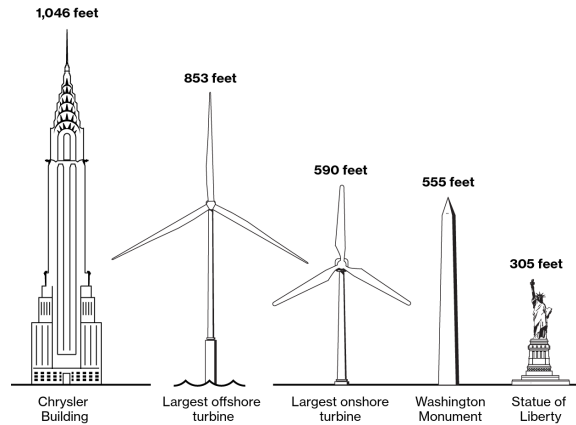


Photo courtesy of Ørsted with edits by RODA. BIWF turbines are 6MW with black lettering.

Image 2: Example 12MW turbine specifications

Monumental Turbines

The biggest offshore wind turbines are as tall as skyscrapers



Note: These are the largest planned turbines in development.
Sources: U.S. Department of Energy, Vestas, GE, Bloomberg research

Bloomberg

Image courtesy of Bloomberg

Largest commercially available turbine on the market is the 12MW GE Haliade-X

Specifications (for GE Haliade-X)

Total height of the turbine = 853 ft
Lowest point of blade tip to water surface = ~120ft
4 parts of a turbine

- Foundation (~80ft) - yellow
- Tower - grey
- Nacelle (houses the rotor) - grey
- Blades - grey

Foundation types:

- Jacket (BIWF)
- Monopile
- Gravity base
- Suction bucket
- Floating (multiple designs)

Image 3: USCG Standard for Lighting and Marking of Turbines

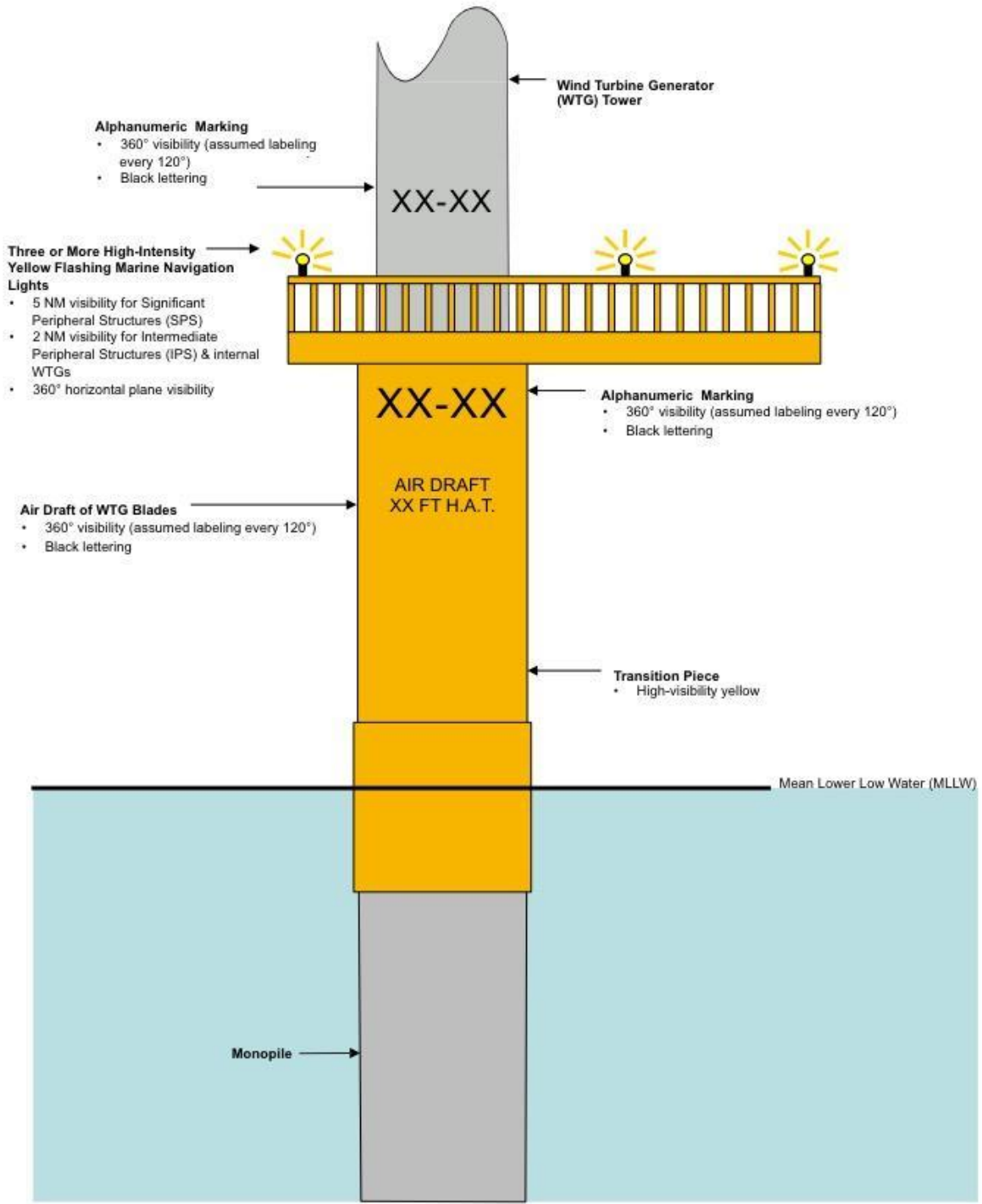


Figure Not to Scale