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Final Lighting and Marking Guidelines

Guidelines for Providing Information on
Lighting and Marking of Structures Supporting Renewable Energy Development

Angel McCoy, Meteorologist
Office of Renewable Energy Programs

BOEM Offshore Wind & Maritime Industry Knowledge Exchange | July 22, 2021

History of Guideline Development

- BOEM held workshop January 2015
- Review of existing guidance – FAA, USCG, IALA
- Define components of guidelines
- Attended by: FAA, USCG, DOD, NPS, FWS, NOAA, BSEE
- Gathered some input from industry – Deepwater Wind, Laufer, Sgurr

Recommendations for Guidelines Development

- **Consistent with existing guidance – FAA, USCG**
- **Consider all aspects including construction, temporary structures**
- **Include lighting, color, markings including consistent numbering**
- **Review of existing guidance from Europe and applicability – funded study:**

Development of Guidance for Lighting of Offshore Wind Turbines Beyond 12 Nautical Miles

Guidelines Drafting

- Drafted guidelines based on workshop recommendations and report
- Shared draft guidelines with other Federal agencies for input
- Began internal review and discussions; and interagency review
- October 2019 published the Draft Proposed Guidelines for public comment
- November 2019 hosted a webinar for public review and comment
- Final guidelines published April 2021

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April 2021

Guidelines Organization

- **Introduction**
- **Authorities and Regulations of BOEM, USCG, FAA**
- **Recommendations**
  - Aviation and Navigation Safety
    - Lighting
    - Marking
    - Sound Signals
  - Environmental
- **Additional Resources**
- **Contact Information**

Introduction

- **Intended to make recommendations regarding lighting and marking design for wind energy facilities and supporting structures**
- **Assists lessees in demonstrating that their plans adequately address safety and environmental protection**
- **Outlines the information to be included in:**
  - Site Assessment Plan
  - Construction and Operations Plan
  - General Activities Plan

30 CFR 585.621

- Are safe;
- Do not unreasonably interfere with other uses of the OCS;
- Do not cause undue harm or damage to natural resources;
- Use best available and safest technology; and
- Use best management practices.

BOEM Authority

The Bureau of Ocean Energy Management (BOEM) has a responsibility under the Outer Continental Shelf Lands Act (43 U.S.C. § 1337(p)(4)(A)) and its implementing regulations (30 CFR part 585) to ensure that activities on Federal renewable energy leases are carried out in a manner that provides for safety and protection of the environment.

BOEM Regulations

- BOEM regulations require lessees to include a description of the project design as part of its plan submittals (30 CFR Part 585.610(a)(6) (SAP), 626(b)(6) (COP), 645(b)(6) (GAP))
- Project design description includes lighting and marking information

Acknowledgement of USCG Authority

- **MISSION: To ensure our nation's maritime safety, security and stewardship.**
- **Recognized expertise in navigation safety, national defense and protection of the marine environment.**
- **Regulatory authority extends to the territorial sea boundary of 12 nautical miles.**
- **Lessees are required by USCG to obtain a permit for private aids to navigation (PATONs) to cover all structures in or near navigable waters of the U.S.**
- **PATON applications/permits are required as a condition for plan approval.**
- **Supporting structures to be displayed on the National Oceanic and Atmospheric Administration nautical charts**

Acknowledgement of FAA Authority

- Recognized expertise in aviation safety
- Regulatory authority applies to structures more than 200 feet (61 meters) in height above the sea surface and within 12 nautical miles (22.2 kilometers) from shore.
- Lessees must file a Notice of Proposed Construction or Alteration with the FAA. The FAA will issue a Determination of No Hazard.
- Recommend voluntary marking or lighting, or both, of a structure less than 200 ft (61 m) in height to address safety impacts to low-level operations and to enhance the conspicuity of these towers.

Background

- **Working group of Federal agencies with interests in lighting, including the FAA, USCG, Department of Defense (DoD), National Park Service, United States Fish and Wildlife Service, and the Bureau of Safety and Environmental Enforcement**
- **Consultations with the FAA and USCG**
- **BOEM-funded studies:**
  - *Evaluation of Lighting Schemes for Offshore Wind Facilities and Impacts to Local Environments (2013)*
  - *Development of Guidance for Lighting of Offshore Wind Turbines Beyond 12 Nautical Miles (2016)*
- **Environmental best management practices**

References

- USCG Aids to Navigation Manual
- USCG Navigation and Vessel Inspection Circular No. 01-19
- FAA Advisory Circular (AC) 70/7460-1L, Advisory Circular (AC) 150/5345-43J
- FAA Engineering Brief No. 98
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)

Impact

- **Offshore wind energy stakeholders have been requesting guidelines for years**
- **Ease of review and compliance with BOEM's regulatory authority to ensure safety and protection of the environment**
- **Expedites the interagency review process**
  - Other Federal agencies contributed to the development of the guidelines ensuring consistency with their regulatory requirements

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Coast Guard Offshore Structure Marking Emphasis

- CG has authority to permit Private AtoNs out to EEZ/US jurisdiction
- Synchronized lighting by position purpose (SPS, IPS, Internal)
- AIS on SPSs, with expansion capability
- Sound Signals on SPSs; Mariner Radio-Activated
- Tower Identification and Labelling (for MA-RI combined areas)
  - Convert structures to aid mariners
  - Developed over time with wide stakeholder input
  - Sample labelling map

Timelines and Recommendations

- Structure Marking Plan Due: 120 days
- Private AtoN Permit applications: 30 days from operation; matching the Structure Marking Plan
- PATON Application Website: **WWW.USHARBORMASTER.COM**
- Collaboration and outreach will continue
- Happy to answer Qs/receive feedback: matthew.b.stuck@uscg.mil

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Wind Turbine Generator Impacts to Marine Vessel Radar

The National Academies of Sciences, Engineering, Medicine

OCEAN STUDIES BOARD

Arianna Baker | BOEM

Committee Members

- **Dr. William Melvin *(Chair),* Georgia Institute of Technology, Georgia Tech Research Institute, Smyrna, GA**
- **Dr. Jennifer Bernhard, University of Illinois at Urbana-Champaign, Champaign, IL**
- **Mr. Andrew McGovern, New Jersey Sandy Hook Pilots Association (Ret.), Great River, NY**
- **Mr. Benjamin Karlson, Sandia National Laboratories, Albuquerque, NM**
- **Dr. Hao Ling, The University of Texas at Austin, Austin, TX**
- **CDR John Stone, USCG (Ret.), United States Coast Guard, Washington, DC**

Statement of Task

An ad hoc committee of the National Academies of Sciences, Engineering, and Medicine will undertake a study to assess impacts of offshore wind turbine generators (WTG) on marine vessel radar and identify techniques that can be used to mitigate those impacts.

Statement of Task

The study will use a combination of literature review and, if informative and practical, apply or adapt existing models to:



- determine and characterize the impacts of WTG on efficacy of marine vessel radar operated on vessels both within and near existing offshore wind facilities, as well as those facilities anticipated to be installed over the next 15 years on the U.S. outer continental shelf; and

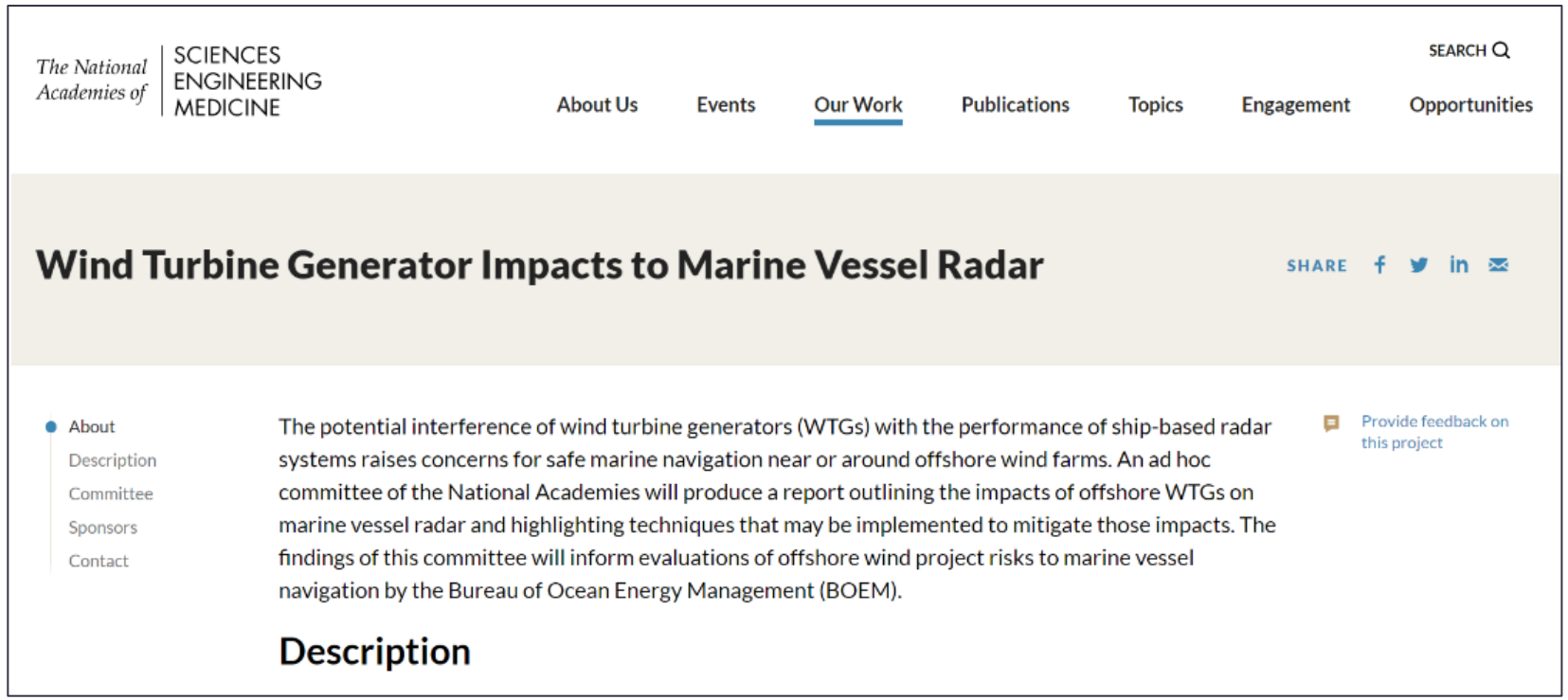


- identify actions that could be taken to reduce the impacts on marine vessel radar to preserve its use as a navigational aid for vessels both in and near WTG facilities.

Statement of Task

- The analysis of impacts to marine vessel radar will include, but not be limited to, parameters such as radar type, radar height, radar range, vessel type and size (vessel carrying radar and vessels to be detected), vessel speeds, turbine height, and turbine spacing.
- The study will analyze potential impacts from the WTG on the ability to navigate in adverse weather conditions and to detect small fixed objects such as buoys.
- The study will estimate the magnitude of clutter, mirroring, shadowing, and any other impacts observed or predicted to be caused by WTGs.
- Finally, the study will consider a variety of mitigation methods including signal filtering, radar antenna relocation, operational training, and replacement of new radar technology, as well as other possible approaches. The study will examine the feasibility of each proposed mitigation method based on vessel type.

Keep Informed



Study Director:

Lexa Skrivanek

askrivanek@nas.edu

Website:

https://www.nationalacademies.org/our-work/wind-turbine-generator-impacts-to-marine-vessel-radar

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Offshore Wind Energy and Electronic Navigational Charts

Captain E.J. Van Den Ameele, NOAA
Chief, Marine Chart Division
7/22/2021

NOAA ENCs

- Primary NOAA chart product for marine navigation
- Supports surface navigation with use of a type approved Electronic Chart Display Information System (ECDIS)
- Adheres to the International Hydrographic Organization (IHO) S-57 Data Transfer Standard:
  - Predefined Features and Attributes
  - Datasets validated against S-58: ENC Validation Checks

Components of a Wind Farm: Chart perspective

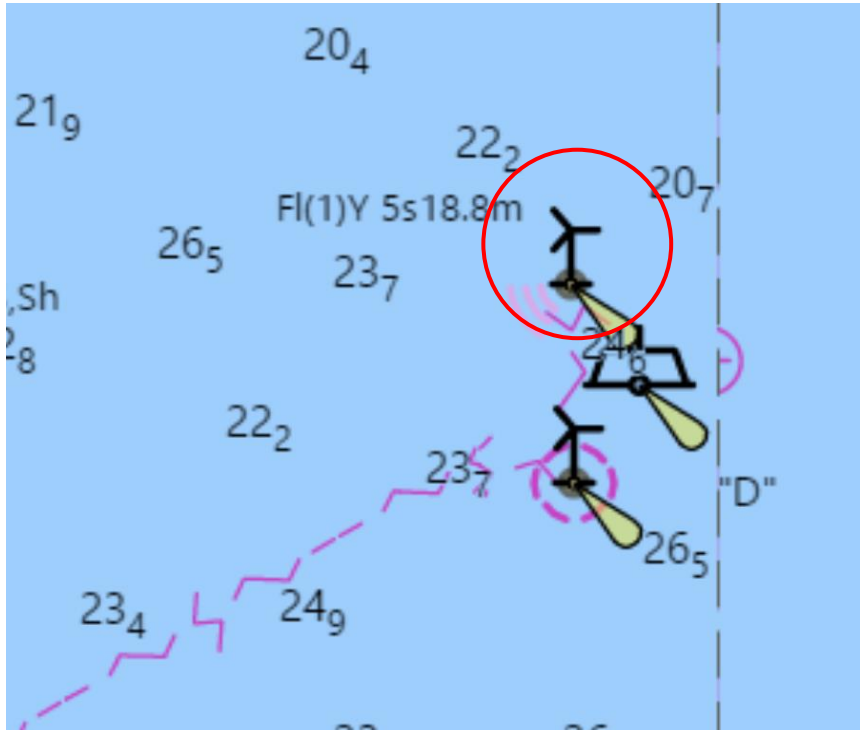
- Foundational structure for wind turbine
- Wind Turbine/blades
- Submarine power cables servicing the wind farm
- Offshore Production Areas encompassing wind farms
- USCG Aids to Navigation coincident with Wind Turbine

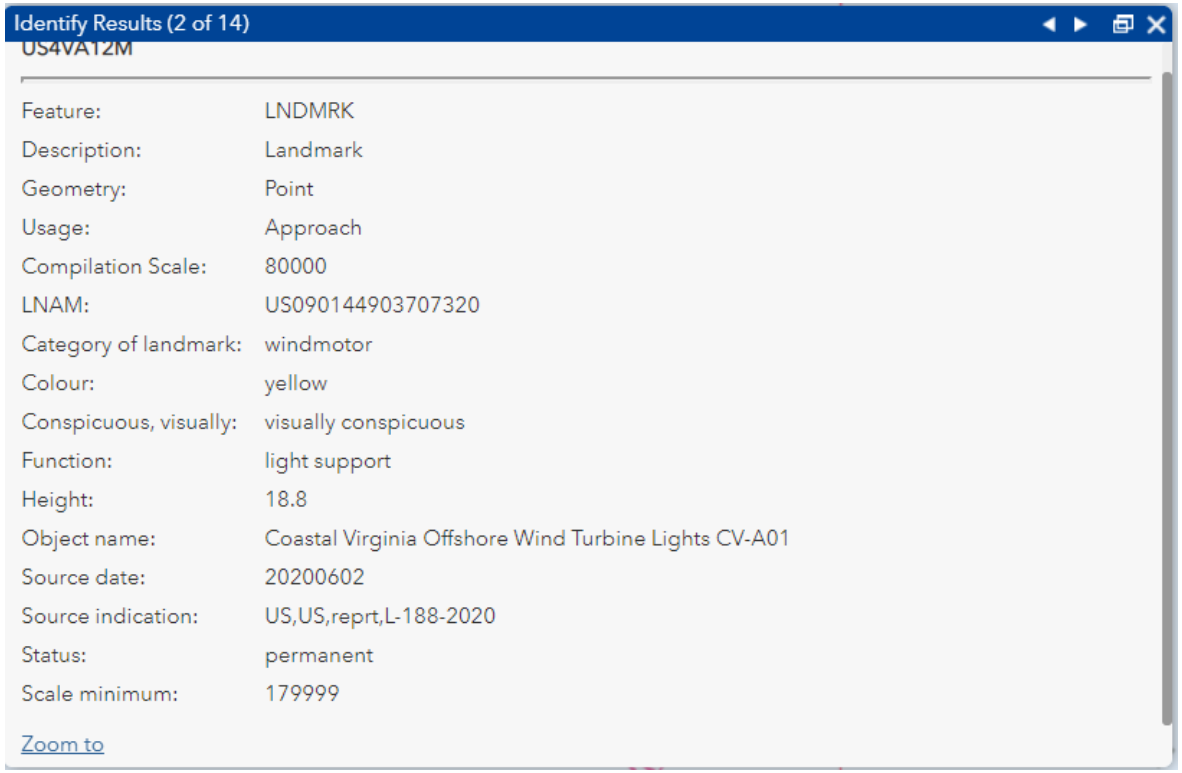
Questions

- Will there be any significant underwater obstructions/dangers to navigation while active construction is underway?
- Will we need to chart caution areas during the construction phase, much like we do with bridges?

Current Chart Depiction Wind Farms

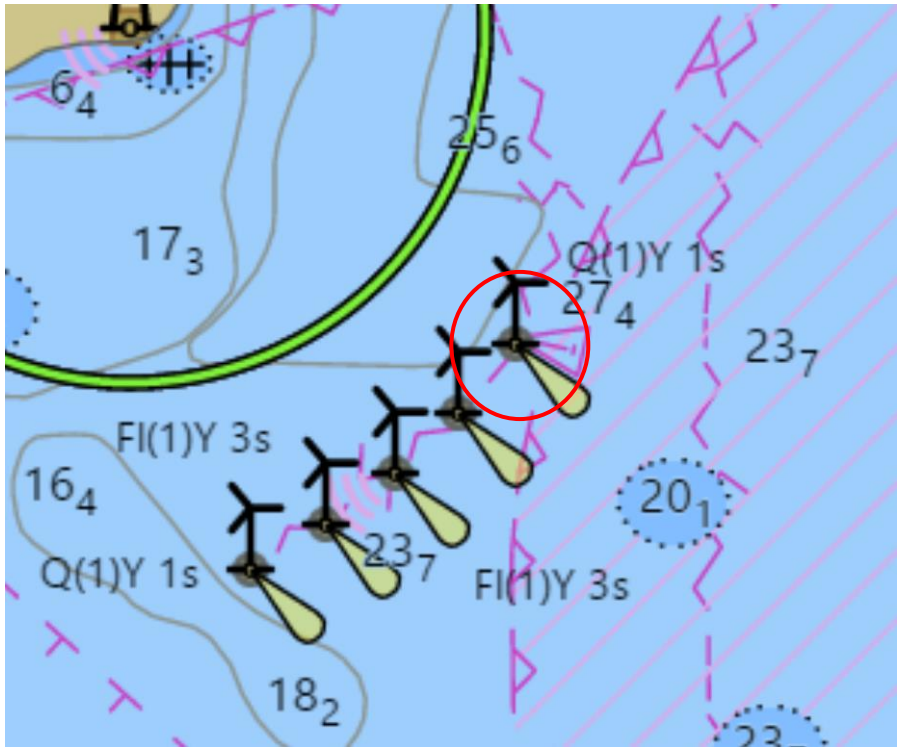
Wind Turbines in the vicinity of : 36° 53’ 30” N, 75° 29’ 28”W





Current Chart Depiction Continued

Wind Turbines in the vicinity of : 41° 07’ 32” N, 71° 30’ 26”W



Identify Results (2 of 14)

US5RI10M

Feature:	LNDMRK
Description:	Landmark
Geometry:	Point
Usage:	Harbour
Compilation Scale:	40000
LNAM:	US003683455400050
Category of landmark:	windmotor
Conspicuous, visually:	visually conspicuous
Function:	light support
Information:	Maintained by Orsted
Object name:	Block Island Wind Farm WTG-1
Source date:	20200303
Source indication:	US,US,reprt,1stCGD,LNM 09/20
Status:	private
Scale minimum:	89999

Zoom to

Charting Policy on Wind Farms

- Offshore Production Area
  - Policy from the Nautical Chart Manual Volume 3
    - If it is required to encode an offshore wind farm, general information about the wind farm such as blade diameter and blade vertical clearance should be encoded
- Landmark object
  - Policy from the Nautical Chart Manual Volume 3
    - If it is required to encode individual offshore wind turbines, it should be done using a “landmark” object category with attribute “windmotor.”
    - Where a landmark is encoded, an ECDIS Base Display object must also be encoded coincident to ensure the feature is always displayed on the ECDIS.
    - Where fitted, lights should be encoded.
    - The extent and nature of any restricted area related to the wind turbine should be encoded as well.

Source Data Requirements for Wind Farms

- Current Practice
  - Charted wind turbines have been sourced from the USCG Local Notice to Mariners (LNM) in conjunction with the coincident Aid to Navigation (ATON)
  - Submerged cables servicing the wind turbines have been sourced from LNM/Marine Safety Information Bulletin
- Preferred Practice
  - NOAA would conduct advanced monitoring of construction permits for construction of wind turbines/submerged cables
  - Coordination with permitee on the acquisition of post-construction as-built diagrams/surveys of the wind turbines/submerged cables
  - Monitor the weekly LNM for the announcement of coincident ATONs
  - Submerged cable charted with individual symbol if as-builts are delivered with GPS positioning

Open Questions

- Who permits construction of the actual wind turbine?
- Are turbines permitted individually or in groups?
- Are the limits of the offshore production area authorized through a Federal Register announcement?
- Will there be fairways authorized for transit through an offshore production area?
- Will there be any Federally authorized restricted areas associated with wind farms/offshore production areas?
- Do wind farm construction details fall under “Critical Energy Infrastructure Information” a form of controlled unclassified information?
- Will blade clearance be uniform throughout the offshore production area or variable?

Contacts for Source Receipt

- When projects are completed or if permits are currently available in advance of construction, NDB would welcome receipt of this information. Below are our preferred communication methods:
  - ocs.ndb@noaa.gov – email inbox for all digital submissions, such as pdfs, etc.

  - Department of Commerce, NOAA
    Nautical Data Branch, N/CS26
    1315 East-West Highway
    Silver Spring, MD 20910-3282

  - craig.winn@noaa.gov