New York State Offshore Wind
Maritime Technical Working Group (M-TWG)
Shared Research Agenda

October 13, 2021

Overview and Purpose

The Maritime Technical Working Group (M-TWG) is an unofficial, non-decision-making advisory entity that was established by New York State to engage New York and regional stakeholders with maritime and/or offshore wind responsibilities and interests working to advance offshore wind (OSW) development. The M-TWG is led by the New York State Department of State and supported by NYSERDA; COWI has been retained as a technical consultant to the state and CBI is retained to help facilitate the M-TWG meetings. This group has identified a variety of key topics within which additional information may be valuable to help decision-makers arrive at recommendations and policies that will ensure the construction and operation of offshore wind fits as smoothly as possible into the existing commercial shipping landscape. Since the inception of the M-TWG, significant progress has been made in addressing many of these topics, but further study will be helpful to more fully address the listed questions and concerns.

This M-TWG Shared Research Agenda is a compilation of potential research topics and questions useful for shared learning and to enhance decision making on responsible OSW development practices, port infrastructure upgrades, and navigation safety in the region. These questions and opportunities for future study have been compiled with input from M-TWG members into this research agenda, envisioned to be a working document. The topics are intended to identify gaps in our collective understanding of potential impacts to vessel traffic and navigation or where key issues may be currently unaddressed. Topics include those directly and indirectly related to OSW development.

COWI staff have reviewed the previous M-TWG meeting notes, member questionnaire (April 2, 2021), and report (November 11, 2020) to compile the following list of potential future research topics, presented in no particular order. This research agenda also identifies known studies that are on-going or planned. Additionally, many topics and concerns identified by the M-TWG, while applicable to New York, are not unique to New York. A number of these topics are being addressed by various informational webinar series listed in the appendix at the end of this document. Each potential research topic, along with key questions, existing references, previously completed and ongoing studies, and opportunities for future/additional study are presented for each research topic.

1. Acceptable Level of Risk Determination

Topic

Installation of fixed infrastructure (e.g., wind turbines, offshore substations, electrical cables) and the addition of new vessel traffic into an existing and busy waterway will introduce a new risk of allision (fixed structures) and potentially increase the risk of collision (vessels). Acceptance of some increase in risk is unavoidable to deploy OSW. What is the process to determine "acceptable" levels of additional risk? M-TWG members would like to better understand how the changes in risk are calculated and what is the quantitative change in risk that will be deemed acceptable on an industry-wide basis and on a project-specific basis.

Key Questions

- What are acceptable levels of increased risk due to new OSW infrastructure on a project-specific and cumulative basis? Is a numerical standard needed?
- Who should be responsible and what is the process for estimating and evaluating cumulative change in risk due to multiple OSW installations?
- What methodology is used to calculate risk?
- How will acceptable levels of risk be communicated, such as through regulatory review or guidance documents?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• The U.S. Department of the Interior Bureau of Ocean Energy Management (BOEM) requires developers to submit regulatory plans for development, like Construction and Operations Plans that may include Navigation Safety Risk Assessments (NSRA) in accordance with U.S. Coast Guard (USCG) guidance. The details on BOEM's regulatory processes can be found online at https://www.boem.gov/renewable-energy/regulatory-framework-and-guidelines • USCG assists BOEM in the NSRA process. Specific information can be found "Guidance on the Coast Guard's roles and responsiblities for offshore renewable energy installations (OREI)", NVIC 01-19, U.S Department of Homeland Security, 2019. https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/5ps/NVIC/2019/NVIC%2001-19-COMDTPUB-P16700-4-dtd-01-Aug-2019-Signed.pdf?ver=2019-08-08-160540-483	• Study of numerical standards and criteria for evaluating risk used in the approval process of existing OSW installations around the world. • Interview the USCG for clarity on the criteria they use when reviewing an OSW project. • Other opportunities?

2. Set-Back Distance

Topic

Set-back distance refers to the minimum clear distance between a vessel traffic lane and the nearest physical structure that presents a potential for vessel allision (vessel strikes a stationary object). The topic of set-back distance has generated robust debate among members of the maritime community and offshore wind developers and is the topic of continuing conversation. Based on published literature, there is no internationally mandated numerical set-back distance. At this time, regulations and/or guidelines vary country-by-country, and proposed set-back distances are typically evaluated on a project-by-project basis. Set-back distance affects many safety related issues, including available space for vessel maneuvering, buffer zones for loss of propulsion/steerage incidents, impacts to vessel radar, and potential interference with radio-communications. A greater set-back distance offers additional safety buffer; however, it also decreases the available area to install turbines and therefore reduces potential OSW electricity generation and reduces the value of the wind energy areas.

Key Questions

- What is an appropriate set-back distance from the edge of the navigation fairway to the closest fixed infrastructure (e.g. wind turbine generator or offshore electrical substation)? How may/should this be affected by project or location-specific factors such as width of navigation channel, turbine layout, vessel intensity, sizes, speed, and seasonal factors?
- When recommended set-back distances cannot be met, what best practices/mitigation measures can be implemented to effectively address the increased risk?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• The literature review section of COWI's 2020 Maritime Technical Working Group Support report covers different approaches to determine the appropriate set-back distance (final report can be downloaded from link in M-TWG section of TWG website) • USCG Port Access Route Studies (PARS) https://www.navcen.uscg.gov/?pageName=PARSReports, https://www.federalregister.gov/documents/2020/06/29/2020-13901/port-access-route-study-northern-new-york-bight, and https://www.federalregister.gov/documents/2021/09/24/2021-20797/port-access-route-study-seacoast-of-new-jersey-including-offshore-approaches-to-the-delaware-bay	• Consider a risk based, project specific approach and methodology that links navigation risk to set-back distance where baseline recommended distances (e.g. 2NM to traffic lane or 5NM to entry to TSS) cannot be met or do not seem reasonable. • Investigate the factors that should impact the determination of set-back distance and the ranking of these, i.e. various accident scenarios with associated likelihood, location, and project specific factors. • Compile database of setback distances and channel dimensions at approved/operational windfarms • Other opportunities?

3. Navigation Emergencies

Topic

Navigation emergencies are an infrequent occurrence; however, they do occur and mariners have contingency plans in place. Loss of vessel steering or propulsion is a safety risk to the vessel, as well as a hazard to other vessels and fixed in-water or shoreline structures. If such an event were to happen while transiting a navigation corridor near an OSW area, a vessel allision with the wind turbine generators could occur if the distance between the vessel and OSW turbines is insufficient for emergency actions to stop the vessel before impact.

Key Questions

- How often do temporary/emergency loss of power/steering events occur?
- What, if anything, can be done in designing OSW installations to reduce the risk of negative outcomes from navigation emergencies?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• Federal regulatory reviews require OSW project-specific safety protocols, coordination with US Coast Guard, and other measures like Search and Rescue Training and Exercises.	• Research occurrences of loss of steerage or power incidents in the New York Bight area to characterize the frequency, type(s) of vessel, and root cause(s). • Other opportunities?

4. Impacts to Navigation Radar and Radio Communication Systems [Incl. Automated Identification System (AIS)]

Topic

In some cases, wind turbine generators can cause a screening or interference effect, obscuring some vessels from the radar of vessels passing by the other side of the wind farm, as well as potential interference to very high frequency (VHF) signals. This can potentially create additional challenges with collision avoidance.

The M-TWG discussed this topic during its August 11 and 14, 2020 Wind Developer Roundtable meetings. The consensus was that radar interference is not a typical concern for operators of large vessels and most effects can be mitigated through strategies like adjusting radar settings.

Key Questions

- Do OSW farms create interference with radar and/or VHF communications, and if so, to what extent? Will increasing turbine sizes or emerging technologies such as floating OSW have an effect?
- What is the appropriate distance needed between a vessel radar and the wind farm to minimize interferences?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• Wind Turbine Generator Impacts to Marine Vessel Radar (Planned), National Academies of Sciences Engineering and Medicine https://www.nationalacademies.org/en/our-work/wind-turbine-generator-impacts-to-marine-vessel-radar	• Other opportunities?

5. Submarine Cable Routing

Topic

Cables from OSW energy areas are critical infrastructure needed to connect the OSW farm to the onshore power grid. These cables will have to pass beneath traffic lanes and/or anchorage areas, traverse challenging sediment conditions that make cable burial difficult, and cross existing assets that necessitate shallower burial, heightening the risk of anchor strikes, damage to the cable, and at the worst, the safety of the vessel and crew. With the growing number of OSW projects being planned, there is broad support for careful planning and coordination to understand and minimize this risk.

Key Questions

- What are appropriate locations for submarine cables and cable corridors?
- How many cables can be sited in specific key geographic areas (e.g., through the Narrows, Long Island Sound, South Shore of Long Island)?
- How will historical/informal and federally approved anchorage areas affect cable routes?
- What are the considerations and implications of bundling multiple export cables?
- What are strategies to shorten and deconflict cables with existing known and unknown subsea infrastructure?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• 9 GW Cable Corridor, Navigation and Port Usage and Ports Cumulative Impact Studies (Ongoing), NYSERDA, HDR, COWI, WSP • New York Anchor Penetration Study (Ongoing), M-TWG, COWI • NYSERDA's Learning from the Experts webinar series presentation on Offshore Wind Transmission Systems, which took place on May 12, 2021, described the concept of planned offshore grids, which would require fewer cables to shore • Offshore Wind Cable Constraints and Opportunities Assessment (Ongoing), NYSERDA, WSP team	• Other opportunities?

6. Considerations for Cable Burial Depth

Topic

To better protect submarine cables from damage and ships' gear from fouling (e.g., anchor strikes and fishing gear), submarine cables can be buried deeper. However, the risk to the cables must be balanced with technical limitations and the costs and environmental impacts of that deeper burial.

Key Questions

- How is anchor penetration depth determined?
- What are appropriate cable burial depths to reduce the risk of fouling?
- What specific advancements in cabling technology should be targeted to address the factors that limit cable burial depth (e.g., installation tools, cost, overheating, faults) and cable co-location (e.g., installation, maintenance)?
- What are best practices for verifying and maintaining cable installation (e.g., as-built surveys, routine monitoring, Distributed Temperature and Distributed Acoustic/Vibration Sensing [DAS/DVS] systems)?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• NYSERDA's Learning from the Experts webinar series presentation on Submarine Cabling, which took place on May 26, 2021, described the cable burial risk assessment (CRBA) process and methods of protecting cables. • New York Anchor Penetration Study (Ongoing), M-TWG, COWI	• Conduct anchor pull tests in the New York Bight, similar to testing performed in Germany. • Research how anchors respond to concrete mattresses and other cable protection measures, including what happens to both the vessel and cable when anchors are fouled. • Further research into appropriate burial depth(s) in New York State waters and the New York Bight, informed by uses and risks, and identifying how this is determined. • Other opportunities?

7. Anchorage Areas Updates

Topic

Vessel traffic associated with OSW installations is expected to increase as OSW projects are constructed and enter service. Along with more vessels potentially in need of anchorage areas, there are likely to be large components transiting navigation corridors like the Hudson River during construction, requiring other vessel traffic to wait in anchorage areas while the construction vessels pass by.

Information regarding the location of unofficial anchorage areas is also valuable when evaluating potential cable routes for the purpose of avoiding anchorage areas in order to reduce the risk of anchor strikes.

The M-TWG has also identified formal, charted anchorage areas that are not commonly used. A byproduct of this research agenda item may be the removal of unused anchorage areas.

Key Questions

- Where are informal, common practice anchorage areas located?
- Are there any existing anchorage areas that are rarely or never used that could be "un-designated"?
- Are additional anchorage areas needed to accommodate changes in vessel traffic patterns?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• Hudson River Safety, Navigation & Operations Committee: Report on NDAA Hudson River Anchorage Study, June 28, 2021 • 9 GW Cable Corridor, Navigation and Port Usage and Ports Cumulative Impact Studies (Ongoing), NYSERDA, HDR, COWI, WSP	• Creation of a spatial dataset or map of common practice anchorage areas. • Spatial analysis of AIS data to quantify use rates for existing, designated anchorage areas. • Other opportunities?

8. Anchor Strike Liability

Topic

Liability for damaging submarine cables is a source of concern in the maritime community. Stakeholders are concerned that if cables are inadequately buried, vessel anchors may inadvertently damage a cable and the vessel owners/operators may be liable for the cost of cable repair and/or outages, even when due to accidental damage. Greater clarity on the legal landscape may help assuage these concerns as the risk of such an incident increases, with both the number of submarine cables and vessels transiting the area increasing.

Key Questions

- In what anchor strike scenarios is the cable asset owner responsible? When is the vessel operator responsible?
- What opportunities exist to address increased costs to vessel operators in the case of accidental anchor strikes due to cables buried too shallow, becoming unburied, or shifting from their mapped locations (e.g., mitigation/contingency fund)?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• New York Anchor Penetration Study (Ongoing), M-TWG, COWI	• Report on the current legal environment regarding liability for damage to submarine infrastructure, with case studies. • Evaluate frameworks for establishing a mitigation fund, or similar, to alleviate financial burdens when accidents occur. • Other opportunities?

9. Vessel Traffic Modeling and Simulations

Topic

New York/New Jersey Harbor and its approaches are some of the busiest waterways in the world. The construction and operation of OSW infrastructure will introduce additional vessel traffic, including survey vessels, heavy component transport vessels, installation vessels, operations and maintenance vessels, and decommissioning vessels. While M-TWG members generally agree that additional vessel traffic can be accommodated, they have questions regarding the types, frequency, and sailing schedule of the additional vessel traffic and would like to obtain that information as soon as possible to allow for early planning.

Key Questions

- To what extent and how will OSW vessel traffic alter regional vessel traffic patterns?
- What additional vessel traffic modeling or simulations are needed to understand potential changes in vessel traffic as a result of leased and planned offshore wind energy areas? Some examples to consider may include what is the quantity of sufficient safe haven (anchorages and/or lay berths) for U.S.-flagged vessels?
- What are long-term navigation channel dredging and/or deepening needs due to OSW vessels?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• Northern NY Bight & Seacoast of NJ Port Access Route Study (Ongoing), USCG • Hudson River Anchorage Study (Ongoing), USCG • 9 GW Cable Corridor, Navigation and Port Usage and Ports Cumulative Impact Studies (Ongoing), NYSERDA - HDR, COWI, WSP	• Emergency preparedness planning, including integrated emergency/contingency planning (e.g., evaluate “Suez Canal” type incident) • Other opportunities?

10. Jones Act-Compliant Vessel Availability

Topic

The Merchant Marine Act of 1920, more commonly referred to as the Jones Act, requires that the transportation of cargo and personnel from one U.S. port to another U.S. port must be completed by a vessel that is built, owned, and operated by U.S. citizens or permanent residents. There are currently no operating Jones Act-compliant OSW installation vessels and only a limited number of such vessels planned. While feeder

barge installation strategies are possible, the U.S. has yet to develop a develop a fleet fully capable of installing and operating OSW facilities efficiently and cost effectively to support offshore wind power procurement commitments and goals.

Key Questions

- What is availability of Jones Act-compliant OSW vessels?
- How do developers determine if vessels are available?
- What does it take to build a Jones Act-compliant vessel?
- Will the Garamendi Bill affect the OSW industry? (https://garamendi.house.gov/media/press-releases/garamendi-reintroduces-bipartisan-energizing-american-shipbuilding-act and https://garamendi.house.gov/sites/garamendi.house.gov/files/CJG%20signed%20-%20GARAME_011_xml.pdf)

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• DNV U.S. Offshore Wind Vessels Webinar (https://brandcentral.dnvgl.com/mars/embed?o=AC32FEB06D9897DB&c=10651&a=N) • Business Network for Offshore Wind: Trends in Vessel Design and Offshore Wind Maritime Supply (https://www.offshorewindus.org/event/marine-log-webinar/)	• Create a regularly updated database of Jones Act-compliant vessels potentially capable of supporting the OSW industry, organized by vessel type. • Other opportunities?

11. Regional Shipyard Capacity

Topic

Offshore energy facilities require operations and maintenance activities to be performed through their construction and operational life, and vessels to support this work will be transiting from the marine terminals, likely in the New York Harbor region, to the OSW areas. In addition to the offshore infrastructure, the construction and operations vessels themselves will require regular maintenance and repair. The M-TWG has identified a potential concern that New York's existing shipyard capacity may not be sufficient to service the new vessels locally. More broadly, it has been suggested to understand the types and quantities of vessels that will be added to New York waters and determine if there is sufficient capacity to support these vessels in all phases of operation.

Key Questions

- What vessel maintenance and repair support services will be necessary for the addition of OSW construction and support vessels?
- What is the timeline for these vessels entering service?
- What is the timeline for upgrade or construction of shipyard facilities?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• The Port Authority of New York and New Jersey released the Port Master Plan 2050, however this considers only the public terminals operated by PANYNJ. (https://www.panynj.gov/port-authority/en/press-room/press-release-archives/2019_press_releases/port_authority_unveilscomprehensive30-yearplantoaccommodatefutur.html)	• Create a statewide master plan for all public and private marine terminals and waterways • Compile a list of active shipyards in New York and the northeast region slated to support OSW, including descriptions of the limits of vessels that can be serviced at those facilities. • Other opportunities?

12. Construction and Operational Safety Zones

Topic

BOEM guidance states that developers are expected to recommend construction safety zones, as was done during construction of the Block Island OSW project. European projects adopt a 50m safety zone during construction. During operations, European projects vary by country in whether or not they require a safety zone.

Key Questions

- What are appropriate and/or planned durations and dimensions for Construction and Operational Safety Zones?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
	• Research occurrences of vessel allisions in existing OSW farms in both construction and operational phases to determine if they are more likely to occur in countries that do not require specific safety zones. • Other opportunities?

13. Seabed Infrastructure Security

Topic

Offshore renewable energy installations are expensive infrastructure that will be valuable to the New York State and U.S. economies. Like land-based infrastructure, seabed infrastructure, including submarine cables and the OSW turbine generators, is vulnerable to sabotage and physical and/or cyber-attacks from foreign adversaries ("Grey Zone Warfare") or non-state actors.

Key Questions

- Who will be responsible for cable and seabed infrastructure security and what requirements may be imposed on mariners and on OSW farm operators?
- Will potential security measures result in any additional operational procedures or limitations for mariners and/or wind farm operators?

Existing References, Previously Completed and Ongoing Studies	Opportunities for Future / Additional Study
• USCG Guidelines for Addressing Cyber Risks at Maritime Transportation Security Act (MTSA) Regulated Facilities (https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/5ps/NVIC/2020/NVIC_01-20_CyberRisk_dtd_2020-02-26.pdf?ver=2020-03-19-071814-023)	• Research occurrences of intentional incidents or sabotage at existing overseas OSW installations, including the vulnerable aspects of OSW infrastructure and how those vulnerabilities and strategies to reduce such exposure compare with infrastructure like bridges and ferries? • Other opportunities?

Appendices

Appendix	Contents	Version / Update
A	OSW Webinar Series	September 28, 2021

A. OSW Webinar Series (Latest Update: September 28, 2021)

BOEM's Offshore Wind and Maritime Industry Knowledge Exchange Series

Future and past webinars can be registered for and/or viewed at the following links:

- Summary Report, March 5-6, 2018: https://www.boem.gov/sites/default/files/renewable-energy-program/BOEM-Maritime-Meeting-Summary-FINAL-%281%29.PDF
- Webinar recordings and presentations: https://www.boem.gov/renewable-energy/stakeholder-engagement/boem-offshore-wind-and-maritime-industry-knowledge-exchange **Error! Hyperlink reference not valid.**
    - Ports: Stressors, Conflicts and Offshore Wind Needs, June 24, 2021
    - Agency & Industry Coordination, July 22, 2021
    - Marine Spatial Planning for the Maritime Sector, August 19, 2021

NYSERDA's Learning from the Experts Webinar Series

Future and past webinars can be registered for and/or viewed at the following link:
https://www.nyserda.ny.gov/All%20Programs/Programs/Offshore%20Wind/Focus%20Areas/Connecting%20With%20New%20Yorkers/Webinar%20Series

- Siting and Leasing for Offshore Wind Energy Areas, March 24, 2021
- Offshore Wind Technology 101, April 7, 2021
- Article VII Permitting Process for Offshore Wind, April 28, 2021
- Offshore Wind Transmission System, May 12, 2021
- Offshore Wind Submarine Cabling, May 26, 2021
- Digital Aerial Surveys to Inform Offshore Wind Development, June 9, 2021
- The Science of Visibility, June 23, 2021
- Offshore Wind Resiliency Planning, July 7, 2021
- Offshore Wind Stakeholder Engagement, July 28, 2021

- Offshore Wind COP Review Process, August 11, 2021
- Environmental Considerations for Fixed Offshore Wind Foundation Technologies, September 1, 2021
- Regional Collaboration on Wildlife & Fisheries Research, September 15, 2021