Read Ahead: Offshore Wind Energy and NOAA's/IOOC[1]'s Equities

U.S. IOOS Advisory Committee[2] Spring 2022 Public Meeting

May 11, 2022 Growing the New Blue Economy: 1:30–3:30 P.M. EDT Wind Energy Panel

Background

Offshore Wind Energy

In recognition of the immediate and critical threat of climate change to our communities, wildlife, and environment, President Biden issued Executive Order 14008[3] on January 27, 2021, "Tackling the Climate Crisis at Home and Abroad." The Departments of Interior (DOI), Energy (DOE), and Commerce (DOC) are pursuing a shared goal[4] of deploying 30 gigawatts (GW) of offshore wind (OSW) in U.S. waters by 2030. Presently,[5] the U.S. has the 30 megawatt (MW) Block Island Wind Farm offshore off the coast of Rhode Island that came online in December 2016 and the 12 MW Coastal Virginia Offshore Wind pilot project off the coast of Virginia Beach that went online in January 2021. These existing projects total 0.042 GW—30 GW is on the order of a 1,000-fold expansion of this current capacity. For context, the Global Wind Energy Council estimated[6] that as of 2019, cumulative worldwide OSW capacity was 29.1 GW, and virtually all of that capacity was built over the course of the prior 15 years—so the U.S. goal is to build more OSW capacity than the rest of the world combined, in half the time.

DOE's National Renewable Energy Laboratory's March 2022 report[7] estimates that 30 GW of OSW will require at least 2,100 wind turbines and foundations and 6,800 miles (11,000 km) of electrical transmission cable. The turbines used in the Block Island Wind Farm were 600 ft. (183 m) tall[8] (*e.g.*, the Washington Monument is 555 ft. [169 m] tall; a "skyscraper", of which there are 853[9] in the U.S., is commonly defined as a high-rise building taller than 492 ft. [150 m]) and plans for future wind farms call for significantly larger turbines. An OSW turbine can be erected in less than a week.

These figures underscore the fact that OSW not only represents a significant opportunity for carbon reduction[10] and economic development, but will also be one of the most significant and rapid changes in use of the U.S. continental shelf ever seen. As such, it will create an unprecedented convergence of a number of policy and operational issues, all of which require critical data to address. IOOS is uniquely positioned to help meet these needs as both a broad inter-agency partnership and a neutral enterprise of NOAA/IOOS-certified regional associations (RAs). IOOS RAs provide an extension of federal government services, to measure a diverse array of ocean variables and leverage assets, resources, and expertise on data collection, management, and dissemination from a broad array of partners in the academic, federal, regional, state, local, industry, private, and non-profit sectors. Myriad partnerships are being developed to address various aspects of OSW development and its interactions with other uses and users. Absent an entity like IOOS—which is designed to serve as a leading hub for marine data flow into Federal data tanks and for discoverability and dissemination—data collection for OSW development will lack coordination, cost-effectiveness, and longevity. This would result in not only missed opportunities to utilize existing mechanisms designed for this purpose, but also tremendous risk of redundancies and gaps, limiting the United States' ability to effectively address pertinent issues.

DOI's Bureau of Ocean Energy Management (BOEM) is the regulatory agency responsible for OSW leasing and permitting. Activities[11] at various stages in the OSW planning process are currently underway for the U.S. East, West, Gulf, and Hawaiian coasts. Accordingly, IOOS activities throughout the U.S. will intersect with OSW at an expanding scale and brisk pace.

NOAA/IOOC Ocean Observing Equities

DOC and its NOAA IOOS Office want to know how their ocean observing activities[12] can assist the OSW industry to achieve the goal of 30 GW by 2030 while minimizing adverse impacts on other ocean industries and amenities. Further, an essential question

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[1] https://www.iooc.us/about/
[2] https://ioos.noaa.gov/community/u-s-ioos-advisory-committee/
[3] https://www.federalregister.gov/executive-order/14008
[4] https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/29/fact-sheet-biden-administration-jumpstarts-offshore-wind-energy-projects-to-create-jobs/ (please also note the further goal of 110 GW of U.S. OSW by 2050)
[5] https://cleanpower.org/facts/offshore-wind/
[6] https://gwec.net/wp-content/uploads/2020/12/GWEC-Global-Offshore-Wind-Report-2020.pdf
[7] https://www.energy.gov/eere/articles/report-outlines-supply-chain-needs-achieve-offshore-wind-2030-goal
[8] https://tethys.pnnl.gov/sites/default/files/publications/BlockIsland_2012.pdf
[9] https://en.wikipedia.org/wiki/List_of_countries_with_the_most_skyscrapers
[10] To put the impact on Earth's climate of 30 GW of OSW in perspective, in 2021 U.S. coal-fired power plants produced 212 GW (https://www.eia.gov/todayinenergy/detail.php?id=50658).
[11] https://www.boem.gov/renewable-energy/state-activities
[12] https://ioos.noaa.gov/about/ioos-by-the-numbers/

driven by the development of OSW is how ocean observing activities should be expanded and modified in response; and likewise, what mitigations do OSW farms need to include to avoid negatively impacting ocean observing activities.

IOOS data and the products derived from them provide a host of services that benefit the OSW industry, including information used for: hurricane and weather forecasting; search-and-rescue planning; oil and hazardous marine spill response; safe maritime navigation; and port operations. IOOS has considered its nearshore stations and fixed platforms like buoys as less likely to be impacted by OSW, but understands that high-frequency radar (HFR) remote sensing systems and mobile platforms like ships and underwater gliders will need to mitigate OSW impacts to their operations.

Mobile ocean observing platforms will need to be routed around or through wind farm areas, with studies and sampling plans updated accordingly. Additionally, access restrictions due to wind farm maintenance or other hazards will periodically interrupt access to navigable waters. Cabling from the wind farms to shore will also limit bottom trawling and other seafloor sampling activities.

Like a host of other radar systems[13], HFRs experience significant[14] wind turbine interference (WTI). If unmitigated, WTI will eliminate HFRs' surface current and wave measurements over distances of dozens of kilometers from the immediate wind farm area, including near total loss of coverage offshore of those states where multiple wind farms are present. Given HFRs' broad coverage offshore over much of the U.S. exclusive economic zone, relocating OSW farms is not a viable option for wind turbine radar interference mitigation (WTRIM). Since investigations have demonstrated that there is not a WTRIM solution used elsewhere or by another type of radar that works for HFR, BOEM in cooperation with IOOS has developed HFR WTRIM software that can effectively mitigate WTI to HFR, if data streams from additional *in situ* surface current and wave sensors (*e.g.*, buoys) are present in and around the wind farms.

Until offshore wind development is in place, all specific impacts will be difficult to quantify. Such quantification will require established baselines and sustained observing to most effectively predict, assess, and adapt to the complex effects of OSW on a number of economic, environmental, and policy issues. The insight of this Committee is therefore requested to help IOOS plan for, contribute to, and adapt to OSW development.

Options

The IOOS Office has identified the following areas where it believes the engagement of this Committee would be most helpful.

1. Guiding and supporting the establishment of IOOS as a convening point for inter-agency cooperation and coordinated marine data collection associated with OSW development and its interactions with existing sectors and uses/users that rely on ocean and coastal data. This is to build upon and strengthen the partnership of 17 federal agencies and the 11 certified RAs that IOOS represents, and capitalize on the unique function of IOOS as a broadly based ocean observing enterprise.
2. Identifying what changes and/or observing assets are needed to respond to the challenges that large-scale OSW development presents and to minimize impacts while protecting continued improvements to ocean observing throughout OSW leases. Also, recommending definition(s) for the quality level of ocean observations necessary to address these challenges and establishing minimum standards for the data quality.
3. Identifying what opportunities for public-private partnerships with OSW developers may exist to jointly implement and fund observing assets, understanding that these goals are desirable to the OSW industry and other IOOS stakeholders. Also, the Committee's input is requested on how to coordinate these activities within NOAA, with other Federal agencies, and across the IOOS RAs.
4. Suggestions for leveraging the January 2022 *Memorandum of Understanding* (MOU) *between NOAA and BOEM to Responsibly Advance Offshore Wind Energy*[15]. This MOU allows for the development of topic-specific "annexes" that could be used to provide specific direction to actions needed from BOEM, OSW Lessees, and NOAA to preserve IOOS equities. As an example, given BOEM's regulatory authority, an annex to the MOU could include agreement to incorporate language in the terms and conditions of OSW leases requiring the installation, operation, and maintenance of those additional sensors needed for HFR WTRIM—along with committing Lessees to telemeter those data to NOAA, and likewise for NOAA to affirm assimilation of those data into its products that are beneficial to the OSW industry.

[13] https://windexchange.energy.gov/projects/radar-interference-working-group
[14] https://hdl.handle.net/1912/25127
[15] https://www.noaa.gov/news-release/noaa-and-boem-announce-interagency-collaboration-to-advance-offshore-wind-energy