

Embracing the Potential of Offshore Wind in Connecticut

A Study of Opportunities & Challenges

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Summary Report



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The offshore wind (OSW) industry is poised to take off in the United States with significant growth and opportunity being projected from 2021 out through 2050 and beyond. The Block Island Wind Farm developed by Deepwater Wind (now part of Ørsted) was the first wind farm installed in U.S. waters (state waters of Rhode Island), and now Vineyard Wind 1, to be located in the Bureau of Ocean Energy Management (BOEM) Wind Energy Area (WEA) located south of Martha's Vineyard, is the first utility-scale project that has received all the required federal authorizations for construction in federal waters. This first, grid-scale project is set to kick start the offshore wind industry with 15¹ additional utility-scale projects in the federal permitting queue. The East Coast is the prime location to support the OSW industry start-up, with consistent strong winds, amenable geologic/geotechnical bottom conditions, and relatively shallow water depths, which allow for the use of fixed-foundation turbines. Several states along the East Coast are attempting to position themselves for leadership in the OSW industry. This *Offshore Wind Strategic Study* was commissioned by the Chamber of Commerce of Eastern Connecticut (hereinafter referred to as the Chamber), Ørsted and Eversource to create a list of recommendations for how Connecticut can build on its existing strengths and advantages to capture future benefits of the offshore wind industry.

Where do Connecticut's strengths lie with respect to OSW? For one, Connecticut's deep-water ports are particularly accessible to the BOEM existing WEAs and future Northeast call areas, in that these ports have no overhead restrictions (i.e., no bridges or overhead power lines). This is significant as OSW developers prefer to ship their massive components in a vertical position from port to the offshore lease areas – bridges and powerlines downstream of many U.S. port facilities encumber their future utility to the OSW industry. Furthermore, Connecticut has a storied maritime history with a well-developed supply chain already built around General Dynamic's Electric Boat (EB) operations, which has resulted in a robust, developed set of suppliers and manufacturers able to pivot to support the OSW marketplace. In addition, the technology and advanced manufacturing capabilities of the aerospace industry within the State puts it in a unique position to adapt to some of the advanced manufacturing requirements of fixed-bottom wind turbine generators (WTGs) – this is a critical State strength as existing assets can quickly pivot to OSW-related manufacturing for the early-mover projects, thereby allowing developers and original equipment manufacturers (OEMs) to show local content and create net economic benefits associated with their U.S. projects. These technology and advanced manufacturing capabilities will also prove useful as the OSW industry matures towards the anticipated uses of floating foundations (for future BOEM lease areas which are in deeper waters with less amenable geologic characteristics) and concrete gravity-based structures (GBS)-type foundations (to minimize impacts to marine life during installation). Lastly, Connecticut has a knowledge and talent base that, with some targeted development programs, could expand to develop a steady pipeline of qualified and highly skilled workforce for the OSW industry.

Recently, President Biden's administration committed to developing 30 gigawatts (GW) of offshore wind power by 2030. Other OSW-industry models show the potential of up to 110 GW of OSW by 2050², and that is the U.S. market alone. All of this means that the U.S. OSW-related industries are going to experience tremendous growth in the coming decades, providing clean, renewable, and reliable energy, tens of thousands of good, high-paying jobs, and significant amounts of other economic benefits.

¹ [Offshore Wind Market Report: 2021 Edition \(energy.gov\)](#) Page 10

² [Offshore Wind Market Report: 2021 Edition \(energy.gov\)](#) Page xii

With the two OSW projects procured by the State of Connecticut currently in development and the potential for an additional 1,196 megawatts (MW) of capacity, Connecticut has established itself as an early leader in the U.S. OSW industry. Several neighboring states have since made significant efforts to establish themselves as the “center of the OSW universe” and have had some success in doing so³. While Connecticut was an early marketplace leader, the State should continue its to-date successful efforts and develop more programs to maintain and build its status as a significant part of this developing industry. This study was created to discuss where the industry is going and what activities and programs the State of Connecticut should consider undertaking to be relevant and ensure that its citizens thrive as part of the new, green, and clean economy.

To develop this Connecticut Offshore Wind Strategic Action Study for the Chamber, McAllister Marine Engineering, LLC (MME) evaluated the following issues/metrics related to OSW:

- The current state of the OSW market and where it is heading from 2021 through 2035 and 2050.
- The needs and desires of OSW developers and OEMs relevant to the U.S. market, as well as the potential for U.S.-based manufacturers to support the international OSW marketplace.
- Infrastructure and port requirements for the industry.
- The supply chain for WTGs and where supply chain opportunities exist within the State.
- The workforce skills needed for OSW and how to maintain and develop a pipeline of talented workers within the State to fully support early-mover OSW projects, as well as long-term, follow-on projects.

The OSW industry will develop in the U.S. within the three following targeted areas: 1) through ports and physical infrastructure; 2) through a U.S. and worldwide supply chain; and 3) through a talented, trained, and skilled workforce. While these three targeted areas each have their distinct characteristics, each one interacts and benefits from the other, and thus, by targeting available State investments strategically, Connecticut can optimize its position within this industry. It should be noted that it will not be realistic or feasible for one state to capture all the offshore wind industry, and several aspects of the industry have already been established across the Northeastern U.S. MME developed the following recommendations aimed at enabling the State to establish itself more-fully within the developing OSW marketplace. As discussed above, the offshore wind marketplace is now taking off and to ensure that Connecticut is not left behind, it is recommended that the State act quickly and effectively to capture its fair share of the coming billions of dollars that will be invested over the next few years by considering taking these strategic recommendations:

SUPPLY CHAIN: WHAT SHOULD THE STATE TARGET FOR MANUFACTURING?

There are two primary areas of the offshore wind manufacturing supply chain that Connecticut should focus on:

1. Leveraging Existing Industries

Promote State manufacturing entities which can quickly pivot their existing manufacturing capabilities to meet the demands of upcoming OEM procurement requests and short-term

³ [Governor Hochul Announces Largest, Single New York State Offshore Wind Supply Chain Award of \\$86 Million to Support Sunrise Wind Project \(ny.gov\)](#), [Thinking locally: Experts applaud N.J.’s efforts to source massive offshore wind turbine parts right here in state | ROI-NJ](#)

schedules. There are a considerable number and types of advanced manufacturing entities in the State, many of which lend themselves well to manufacturing WTG sub-components. Lower tiered components can be shipped to Tier 1 manufacturing/assembly facilities located in other states increasing interstate collaboration, integration, and efficiency of an U.S.-based offshore wind supply chain.

There is a danger that current inter-state competition could lead to a situation wherein the U.S. will not be ready to fully-support the developing U.S. OSW marketplace which would further encourage the European developers and OEMs to utilize their existing non-U.S. based manufacturing facilities. This would result in a loss of potential future jobs for American workers.

2. Attracting New Industries

Incentivize new businesses to set up new higher-tier manufacturing facilities within the State. In this scenario, the primary State assets would be larger and available waterfront properties and State incentive programs to attract manufacturers.

Existing Manufacturing Capabilities within Connecticut

The State's advanced manufacturing capabilities will allow Connecticut an early entrée into the developing OSW marketplace and should focus on manufacturing of corrosion-resistant (required due to the harsh marine environment in which they will be installed) Tier 2 through Tier 4 components, including the following:

- Nacelle sub-components including gears, bearings (such as plain bearings, which are commonly used in aerospace), seals, stator coils, brakes, driver shafts, coolant/lubrication systems, etc. Nacelles are made up of thousands of smaller-scale subcomponents which are too numerous to enumerate herein. As such, nacelle "manufacturing" facilities are actually properties where the thousands of subcomponents are assembled into functioning nacelles.
- Electrical Discharge Machining – A key skill set used in the aerospace industry, is also relevant and needed for the complex geometries of a wind turbine.
- Supervisory Control and Data Acquisition (SCADA) systems.
- Secondary steel sub-components (e.g., platforms, ladders, tie-off lugs, etc.).
- Turbine head pitch/yaw controls.
- Brake components.
- Wiring and coils; and,
- Miscellaneous small/minor components including highly specialized nuts, bolts, washers, cotter pins, screws, and gaskets, to name a few.

The aforementioned list focuses on the WTGs themselves and does not consider the universe of other direct infrastructure and equipment needs including ports, helicopters, small- and large-specialized vessels, inter-array cables, export cables, etc., all of which existing State firms are fully capable of manufacturing.

Due to the U.S. OSW industry's nascent stage and the relatively secretive nature of the industry, it is currently not feasible to accurately identify the number and types of sub-components which the OEMs will require to complete their respective Tier 1 components (i.e., foundation elements, transition pieces, towers, cables, and nacelles). Given the potential for up to 110 GW⁴ of offshore wind-derived energy in the U.S. through 2050, and an average anticipated WTG capacity of 15 to 20 MW, there will be approximately 5,500 to 7,300 WTGs installed in U.S. waters over the next 30 years. According to one source⁵, there could be up to 1,400 GW of Offshore Wind-derived energy globally by 2050. Assuming a 20 MW WTG capacity, this results in well over 70,000 WTGs being installed in global waters. As such, both the U.S. and international OSW market promise to be large and stable for many years to come.

It should also be noted that the State needs to move quickly in implementing its strategies to attract the offshore wind supply chain. With BOEM's recent approval of the Vineyard Wind 1 project, the offshore wind industry is in the process of taking off with new commitments and announcements of development plans happening frequently; as such, the time is now for the State to act to secure its role in this multi-billion-dollar industry.

What should Connecticut do to support manufacturers' entry into this new industry?

- **First:** Connecticut should make a major push and conduct a large outreach and advertising campaign with the focus of informing OSW developers and OEMs that the State is open for business and fully capable of providing them with lower-tiered components in time to support their first mover and later projects.
- **Second:** Arrange meetings and workshops with developers, OEMs, and appropriate State-agency personnel to explore lower-tier supply chain opportunities with an eye towards evaluating the number and types of components that will be required in the short term by the marketplace. It is hoped by this point that the developers and OEMs will be willing to share their specific anticipated needs in the form of types and numbers of subcomponents needed, as well as their implementation/procurement schedules.
- **Third:** Provide developers and OEMs a clear and easily followed path forward to take advantage of available State incentive programs which could further attract them to bring manufacturing opportunities to Connecticut businesses. It is critical that the State make it easy for OSW entities to anchor operations in Connecticut. The State already has numerous programs in place promoting workforce developments and manufacturing initiatives most notably, and if the State would provide a liaison to the developers and OEMs for navigating and capitalizing on those programs, it will set itself apart.
- **Fourth:** Conduct an outreach/advertising campaign to State manufacturing entities to provide them with the results of the developer/OEM outreach program and educate them on the scale and requirements of the Offshore Wind marketplace. This campaign should be initially conducted through database contacts (including various trade organizations) followed up by workshops, State participation at tradeshow and other outreach mechanisms. Step 4 should be an on-going task to keep Connecticut manufacturers relevant as the U.S. and international offshore wind marketplace supply chain evolves and matures over the next few years. As part of

⁴ [FACT SHEET: Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs | The White House](#)

⁵ <https://www.evwind.es/2020/06/08/1400-gw-of-offshore-wind-energy-is-possible-by-2050/75052>

making it easy to work with the State, development of a business innovation/incubation center would assist in cross-communications between all players in the OSW marketplace.

Opportunities to Attract New Industries

In this area, the State should focus on marketing larger, available water-front properties to upper tier manufacturers where they can anchor their operations and deliver their completed components to marshaling/base ports and Tier 1 component manufacturing facilities by barge. This logistical model of shipping completed manufactured components by barge to the storage, assembly, and marshaling port facilities would allow components to be moved in a horizontal geometry, thereby opening up this portion of the OSW marketplace to properties located upstream of bridges and powerlines. Smaller-scale components could also be moved through the State via intermodal assets such as rail and highways.

It should be noted that many other U.S. states, especially along the East Coast where the largest portion of the market is developing, continue to actively market themselves to European OSW entities and, as such, there will be significant inter-state competition to attract and land such manufacturing firms. Due to this high level of competition, MME recommends that Connecticut focus its efforts more on maximizing existing manufacturing assets, as it will be more readily and quickly implementable and inter-state competition is anticipated to be much less. However, the State should not ignore the opportunity to bring in new offshore wind -specific manufacturers as it does have the distinct advantage of having deepwater port facilities with no overhead air draft restrictions. The State should certainly remain informed and available to promote properties to new developers; however, we believe that Connecticut will receive more bang for their buck by leveraging their existing advanced manufacturing assets and industries.

WORKFORCE TRAINING

The following provides MME's recommendations to Connecticut regarding investment in workforce development training and projects.

MME utilized NREL's Jobs and Economic Development Impact (JEDI) model to evaluate projected job-growth statistics associated with an example 800 MW project staged out of New London or Bridgeport. The results of the JEDI modelling strongly support that OSW can provide significant job-creation benefits. The breakdown of full-time equivalents per megawatt (FTEs/MW) associated with project development activities in the range of the following:

- Direct Employment – 0.3- 0.5 FTEs/MW (i.e., 600 to 1,100 jobs based on current State authorizations⁶)
- Indirect Employment – 6.6-6.64 FTEs/MW (i.e., 13,200 to 13,300 jobs based on current State authorizations)
- Induced Employment – 2.41- 2.44 FTEs/MW (i.e., 4,830 to 4870 jobs based on current State authorizations)

⁶ 2 GW or 2,000 MW of OSW generated electricity, including the two projects currently in development and the remaining 1,196 MW of authorization not currently under development

- Total Employment– 9.3-9.7 FTEs/MW (i.e., 18,650 to 19,300 jobs based on current State authorizations)

Similarly, MME utilized the JEDI model to assess job projections associated with the long-term O&M phase of Connecticut-committed projects. The model results indicated that OSW could provide workforce FTE/MW from O&M activities in the range of the following:

- Direct Employment – 0.06 FTEs/MW (i.e., 127 jobs [assuming a 25-year project life cycle] based on current state authorizations)
- Indirect Employment – 0.2 FTEs/MW (i.e., 410 jobs based on current State authorizations)
- Induced Employment – 0.09 FTEs/MW (i.e., 174 jobs based on current State authorizations)
- Total Employment– 0.35 FTEs/MW (i.e., 711 MW based on current State authorizations)

The JEDI modelling results are illustrative of the following:

1. There will be a much greater number of direct, indirect, and induced jobs per MW of energy produced associated with the development phases of the offshore wind market.
2. There will be fewer jobs created during the 25-year O&M phase of the projects, when compared to the development phases. While these are high quality, skilled jobs, the O&M market is going to be extremely competitive, and Connecticut will likely already have two O&M training programs in place by the time the first couple of projects are deployed. Therefore, there should be sufficient training capabilities in the State for O&M technicians based on current authorizations.
3. As such, the NREL JEDI modeling results clearly support that Connecticut should focus on the development phases for projects for its workforce development programs.

This analysis focused solely on jobs created by Connecticut-led energy solicitations. These jobs will be there for Connecticut to win or lose based upon its support of the OSW marketplace. Other states are in the process of actively vying for Connecticut's share of the jobs, just as it is anticipated that Connecticut will attempt to attract offshore wind jobs from other states. MME provides the following two recommendations, which are further detailed in the full document, associated with this issue: 1) establish a robust, long-term OSW State procurement schedule to keep developers and OEMs interested in Connecticut; and 2) work in coordination with other states in the region to ensure that the OSW supply chain comes to the U.S. As the industry scales-up, it is anticipated that each state will receive its fair share of jobs and minimize the potential that interstate competition could result in a situation wherein the U.S. supply chain becomes anchored in Europe due to states' intransigence to work together. Otherwise, continued competition and the resulting fragmenting of supply chain opportunities could potentially result in the U.S. losing out on the opportunities and jobs that are offered by the offshore wind industry.

There are a wide variety of skillsets and workforce categories that would be involved in the OSW industry, all with a wide variety of training requirements. For the purposes of this report and based upon the results of this study, the following specific offshore wind labor skillsets were evaluated:

- Wind Engineering/Sciences;
- OSW Technicians;
- Advanced Manufacturing; and,

- Advanced Skills Trades.

The aforementioned skillsets were selected as certain areas, such as construction services, have existing, successful programs or such programs in development. An example of such a program includes Eversource partnering with the Eastern Connecticut Workforce Investment Board (EWIB) to develop an OSW-specific training program that will incorporate the safety aspects of working on these large projects, as well as the technical training for picking, loading, hauling, and installing large-scale OSW components. Other programs, such as *Helmets to Hard Hats* and apprenticeships programs through the Connecticut State Buildings and Trade Council members, offer excellent opportunities to train more skilled and qualified workers and develop a steady pipeline of construction-service workers that will be needed to support the buildout of the U.S. Offshore Wind industry. These workers should get Global Wind Organization (GWO) safety training, which is an industry standard, and programs exist and/or are in development in the State. Since these construction training programs are already in the works, and based on the job-growth projections, these programs should be supported and promoted; however, no new related programs are anticipated to be required.

Another recommendation is to support the development, opening and operations of an *OSW innovation center*. This would function as an incubator for State residents and businesses to aid them in their own entrée into the offshore wind market. The incubator concept is a great way to advance and innovate new technologies that are needed to support offshore wind, which is where a significant economic benefit exists. This is analogous to MME's recommendation to focus on existing State manufacturers of lower-tiered components. There are similar incubator programs including the *New Bedford Ocean Cluster*, which is promoting the blue economy, including offshore wind, in the New Bedford region and the Cambridge Innovation Center in Providence which includes Ørsted's Innovation Hub and offices of Crowley Maritime.

The other area that is often the focus for OSW jobs are those associated with the long-term O&M operations phases of projects, which requires trained OSW technicians. Park City Wind, as part of its commitment to the State, is actively working to develop program and training opportunities, with a focus in the Bridgeport area. They are working in partnership with Goodwin University to develop a program focused on O&M activities associated with OSW farms. Park City Wind is also developing partnerships with local high schools and community colleges for their advanced manufacturing training to expand those programs towards offshore wind-related engineering work. Their goal is to have a sufficiently trained and qualified workforce pool ready and available in time to service the Park City Wind project. Similarly, in the New London/Eastern Connecticut area, Revolution Wind, through Eversource, is committed to developing a workforce training program with the EWIB. The full details of that program are still under development.

If both these training programs proposed by the Connecticut OSW developers are in place by 2024, there would be sufficient offshore wind technician training programs available to service the in-contract projects and no additional investment by the State would be warranted.

As a final note on the workforce development issue, many of the manufacturing jobs, especially those associated with lower-tier components, can be conducted by existing State entities – again, this ability to easily pivot to manufacturing of OSW components is a primary strength of

Connecticut. As such, MME believes that existing State and industry training programs related to advanced manufacturing (such as vocational apprenticeship programs) on the trade/technical school level have sufficient capacity to support this sector of the offshore wind industry, although (as with any new market sector) some adjustments to curricula will likely be warranted to *keep up* with the requirements of the OSW marketplace as it evolves; however, we do note that the State has already stated that, as of 2019, the demand for manufacturing workers exceeded the supply by 3,000 jobs per year. The challenge lies not in creating the training programs but steering young Connecticut-based talent into those programs. It is believed that the combination of a strong public outreach program and natural market forces exerted as the U.S. offshore wind industry ramps up will drive enrollment into such existing training programs and developing new programs will not be required. However, the founding of the recommended innovation center/incubator will support State businesses with an entrée into the OSW marketplace and help educate the public regarding the opportunities of OSW, as well as provide a launching point for OSW practitioners to meet and hire Connecticut talent, and most importantly innovate and create new approaches for offshore wind.

We have discussed where the existing and in development training programs are for certain aspects of OSW, however MME does see the need for support and program development for other targeted OSW workforce areas, notably, welders, pile drivers, and OSW engineers and science related fields, as discussed below:

- **Welders and Pile Drivers** – This skilled workforce can be developed starting in vocational high schools through community colleges, and the State should support setting up apprenticeships and training programs to meet the anticipated demand and experience requirements for welders. These workers will not only serve the OSW industry, but also the maritime (e.g., Electric Boat) and construction industries. Similarly, pile drivers are a skilled trade group that would require early career job training and provide a skillset that will be transferrable across OSW, maritime and construction industries. Currently, there exists only one program, through Mass Maritime Academy⁷, for training pile drivers for OSW activities, which has the focus on GWO training.
- **OSW Engineers and Scientists** – Connecticut has a group of highly-respected science and engineering colleges and universities, and by setting up programs for offshore wind engineering/sciences, the State can develop a solid pipeline of professionals trained in the multiple engineering and science disciplines required to support OSW. An advantage of developing OSW engineers and scientists is that they will not be limited to working solely on OSW projects within the immediate vicinity of the State, but throughout the Country. Connecticut can position itself as the knowledge center of the OSW industry for the State with professionals designing, planning, and permitting projects nationally - as well as the innovation/incubation center. Connecticut is flush with such high-quality engineering and science development programs starting in high school and available in the community colleges, as well as its four-year universities and graduate programs, all of which will provide future workers to the OSW marketplace. Further, there are highly trained and highly experience engineers and scientists living in Connecticut who can easily and effectively pivot

⁷ [MA Maritime Academy Launches Offshore Wind Training Facility - North American Windpower \(nawindpower.com\)](http://nawindpower.com)

to provide senior-level support and services as the OSW industry evolves. Because OSW programs require a multi-disciplinary team of geophysicists, structural engineers, geotechnical engineers, mechanical engineers, geologists, oceanographers, ecologists, biologists, meteorologists, fishery experts and electrical engineers, among others, the State should continue to support and promote the development of these talent pools.

WHAT STATE PORTS SHOULD BE USED FOR WHAT PURPOSES?

The State has three major deep-water ports with New London and Bridgeport facilities considered applicable to OSW. Both New London and Bridgeport are attractive to OSW developers as they do not have overhead restrictions. New London, given its proximity to the BOEM wind energy lease areas, has potential for several opportunities, including construction and marshalling ports, an O&M base, and supply chain opportunities such as secondary steel and metal fabrication. Bridgeport, due to its distance from the wind energy lease areas, is less attractive as a long-term O&M base, unless used as a service operations vessel (SOV) port. The deep-water port has better potential for marshalling and fabrication of items like secondary steel. Throughout our efforts we reviewed multiple facilities and created a heat chart to show which facility would be good for which use, as shown below.

Please note, these assessments were made independently of any of the property owners and developers, and often without contact or consultation from them. These properties may or may not be available for OSW development and their inclusion in this report does not imply that they are available for development or redevelopment. Our inclusion of specific properties within this report is only meant to illustrate their potential functionality for the OSW industry. Owners of other potential properties can utilize these selection metrics if they desire to offer them to the marketplace at some point in the future.

Major Port Facilities (> 10 acres in land area)

Grade	Definition	Examples of Upgrades Needed
Green	Site is suitable for the activity with minimal upgrade needs	Re-grading, re-paving
Yellow	Site is suitable for the activity with some significant upgrades	Maintenance Dredging, filling to increase bearing capacity, strengthen existing waterside infrastructure
Orange	Site is suitable for the activity with some major upgrades	Extensive improvement dredging, new waterfront infrastructure, significant environmental remediation, or mitigation
Red	Site is not suitable for the activity	Air Draft limitation, lack of area, insufficient water depth

Table 1 Relative Ranking of Port Suitability for each Offshore Wind Activity.

Heat Chart - Comparison of Offshore Wind Component Port Requirements with CT Ports													
Port	Construction / Marshalling	Storage	O & M	Manufacturing									
				Steel Foundations	Concrete Foundations	Transition Pieces	Tower Sections	Nacelle	Blades	Secondary Steel	Cable	Generator	Substation
New London State Pier*	Green	Green	Green	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow
Mohawk Northeast Construction–New London	Red	Yellow	Yellow	Red	Red	Yellow	Green	Yellow	Yellow	Yellow	Green	Yellow	Yellow
Pequot Crossing - Waterford	Red	Yellow	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Dominion Mill Stone - Waterford	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Branford Marina - Branford	Yellow	Yellow	Green	Red	Red	Red	Red	Red	Red	Red	Yellow	Red	Red
New Haven Terminal	Red	Yellow	Green	Red	Red	Red	Red	Yellow	Yellow	Yellow	Green	Yellow	Yellow
Stratford Army Engine Plant	Red	Yellow	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Barnum Landing - Bridgeport	Yellow	Yellow	Green	Red	Red	Red	Red	Red	Red	Red	Green	Red	Red
Cooks Point – Bridgeport (Former Derecktor Shipyard)	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Barnum + Cooks Point Combined	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
PG & E Facility - Bridgeport	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Former Norwich Hospital Site- Norwich	Red	Red	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

*Once currently implemented upgrades are completed

Table 2 Comparison of OSW Component Port Requirements with State Ports

Marshaling/Construction Base Ports

Ports that might be strong candidates for this type of use are located downstream of any bridges or other air-gap restrictions. As such, they are fully capable for use in a traditional *European way* wherein wind turbine installation vessels (WTIVs) can access the ports, load up and transit directly to the offshore wind farms for installation. The lack of air-gap restrictions allows the installation contractors to trans-ship components in a vertical geometry which lowers the risks associated with transferring large OSW components at sea.

- New London State Pier:** This facility has been funded, is under construction, with an early 2023 anticipated completion date. The facility is leased out by Ørsted/ Eversource to support the installation of their Revolution Wind, Sunrise Wind and South Fork projects, and can be made available to other developers when the aforementioned projects are not using the State Pier. Further, Ørsted has contracted with Dominion Energy to utilize their first-in-the-Nation, Jones Act-compliant WTIV. As such, the New London State Pier is the second U.S. port in line to be completed for OSW use. It is also located within reasonable steaming distance of multiple BOEM OSW lease areas located off Massachusetts, Rhode Island, and New York. It is anticipated that

this port will continue to be relevant in the marshaling and installation of multiple offshore wind projects through at least 2050.

- **Bridgeport Properties:** These three properties are currently under private ownership and/or by PSE&G. Avangrid Renewables is planning to use Barnum Landing to support its Park City Wind project, while there have been no reported actions associated with the former Derecktor Shipyard and PSE&G, they both have the potential for redevelopment to support future OSW operations. Bridgeport is located approximately 50 nautical miles farther away from New London and the BOEM offshore lease areas which makes their steaming distance a bit far from the New York lease areas. The area of Bridgeport Harbor will require dredging to make these sites amenable for OSW uses.

MME also recommends that the State evaluate, if the opportunity arises, purchasing the applicable portions of the PSE&G property for eventual build out into an OSW port or manufacturing center. This facility, depending on the conditions (both environmental and physical) in which it could be acquired, has the potential to be redeveloped as a major port asset for the State. Due to the location and acreage anticipated, it could be multifunctional, capable of either hosting manufacturing or as a marshaling/construction port.

O&M Ports

New London Harbor is situated in close enough proximity to the Massachusetts and Rhode Island BOEM offshore wind lease areas and therefore able to support crew transfer vessel (CTV) operations, while Bridgeport Harbor is less attractive for CTV operations due to steaming distance issues. Both harbor areas are located sufficiently well to support SOV operations. MME makes the following recommendations with respect to potential O&M support bases:

- **CTV Ports:** The City of New London should study the potential to develop the Fisherman's Landing property into a CTV operations base. It is well located to provide such services and could easily support the O&M operations of multiple offshore wind operators.
- **SOV Ports:** Due to longer allowable steaming distances, SOV support ports can be located further away from the wind farms that they service. We anticipate that there will be significant inter-state competition to attract these types of facilities. While there is potential for Connecticut's ports to support SOV operations, MME recommends that this not be a primary focus. It should be noted that any of the Bridgeport properties could relatively easily pivot to use as SOV ports should there be a future period where marshaling/construction base-type operations slow down.

Higher Tier Manufacturing Ports

As discussed above, the main assets Connecticut has to offer new manufacturers of higher-tiered OSW component are State fiscal incentive programs and large, vacant waterfront properties.

For the purposes of this Strategic Action Study, MME recommends that the State explore possibilities and interest on the following two properties:

- **Pequot Landing:** This approximately 500-acre parcel is currently undeveloped, is owned by the Mashantucket Pequot Tribe and is located approximately four miles up the Thames River from the New London State Pier facility.

- **Former Norwich Hospital Site:** This 393-acre brownfield site has been vacant since the State shuttered the hospital's doors in 1996. The former Norwich Hospital property in Preston, for which Mohegan Gaming & Entertainment (MGE) and the Town have an ownership transfer agreement, is currently undergoing remediation. If MGE discontinues interest in the property, the property could be of interest to the OSW industry.

Both properties are strong candidates for use as higher-tiered manufacturing facilities as they have direct waterfront access, as well as intermodal rail and roadway access. It is important to note that both properties will have overhead height restrictions and, therefore, components manufactured at either facility that would be too large for road or rail transport and would require shipment by barge to their respective delivery locations. This barge strategy is similar to what is being proposed at the Port of Albany in New York for the tower-manufacturing operation.

There are other areas where Connecticut could focus to enhance its overall strategy for attracting and retaining the OSW industry. These include the following:

Create a Centralized Agency or Inter-agency Committee Specifically Tasked with Harnessing Offshore Wind or Clean Energy Opportunities

While Connecticut, across existing State agencies, currently has the capabilities and provides the services of a centralized-type State agency, it is currently not clear to outsiders (e.g., developers, supply chain entities, manufacturers, etc.) whom to contact and what resources are available. For instance, procurement of clean energy sources is managed by Department of Energy and Environmental Protection (DEEP); however, supply chain and development aspects of the offshore wind marketplace are managed by Department of Economic and Community Development (DECD). Workforce training programs are offered by the Connecticut Office of Workforce Strategy, as well as local Workforce Investment Boards. The Connecticut Port Authority has overall jurisdiction of State-owned port assets. Environmental impairment issues, and their associated required remedial measures, fall under the jurisdiction of another sector of DEEP. This long and evolving list of agencies can be quite confusing to potential offshore wind end users of the diverse services and programs offered by the State, especially for international entities. In order to provide efficient one-stop-shopping for businesses who want to work in and with the State to develop and further the offshore wind industry, it is recommended that a centralized agency or inter-agency committee be formed that can draw from all the State's knowledge base and resources. This could be as simple as a committee of appointees from each relevant department working together under an OSW-specific group that will serve as the face of Connecticut offshore wind.

Example model agencies from other East Coast states include the Massachusetts Clean Energy Center (MassCEC)⁸ and New York State Energy Resource and Development Agency⁹ (NYSERDA). The agencies are distinguished and recognized in the OSW industry as well-organized, knowledgeable, and well-informed resources for assisting and promoting the development of offshore wind in their respective states, as well as the Northeast region.

⁸ [MassCEC](#)

⁹ www.nysERDA.ny.gov

This recommended governmental body would need sufficient staff to actively coordinate and work with the existing developers, promote the supply chain to the industry, develop the workforce training programs, recruit firms and talent to the State, and follow through and oversee development to ensure that the State's priorities are being advanced. Further, it is imperative that a State-wide, outward-facing united front be presented: *"Connecticut is open for business, and we (the State) are here to help!"*

Regional Partnership

This Strategic Action Study is aimed at helping the State of Connecticut to stand out from its neighbors; however, this goal is only valuable if the OSW industry achieves its potential of becoming an economic engine within the United States, especially along the East Coast. MME posits that a highly effective means to help shepherd the industry forward is through the implementation of a regional partnership program with other states which have also set stringent decarbonization goals via the generation of offshore wind with the end goal of developing a renewable energy resource which will result in a consistent, reliable part of the region's electrical portfolio.

A strategic alliance with neighboring states could be very effective with helping the region as a whole. Connecticut and Rhode Island have 1,196 MW and 600 MW, respectively, of OSW-derived energy that will be procured in the relatively short term. If they can coordinate their procurements, similar to what is being done with Revolution Wind, then a 1.7 GW procurement will be prominent in the industry and help the two states compete against other active states such as Massachusetts, New York, and New Jersey. There are already elements of this alliance that can be exploited, like the shared workforce and supply chain talents servicing General Dynamic's Electric Boat.

With a more formal regional partnership, a collection of states can more actively and successfully lobby the federal government to promote key items that are needed for the industry to continue its development, such as developing a timeline for the identification of additional BOEM lease area procurements, more efficient permitting protocols, and most importantly, federal investment in infrastructure that would be used to build out and support the operations of the U.S. offshore wind industry. This infrastructure would include port redevelopment, upgrades to the energy and transmission grids, and to multi-modal transportation networks to support these infrastructure upgrades.

Procurement Strategies

MME provides the following recommendations for the State of Connecticut to approach future OSW procurements:

Procurement Timeline

As the U.S. OSW industry is still in its infancy and, with the historical headwinds that it has faced thus far, from Cape Wind to the years-long delays in BOEM permitting, industry players are concerned about the short- and long-term efficacy of the U.S. offshore wind marketplace. Before earmarking and expending significant development funds, all levels of the OSW industry players will require a level of certainty that the market is actually taking off and has a long-term viability to support the expenditure of large amounts of monies within the State. In the way of providing such assurances, Connecticut has made the authorization to procure up to 2.0 GW of OSW-derived energy, of which about 1.1 GW is in process (304 MW for Revolution Wind and 804 MW for Park City Wind). The Revolution Wind project

does not count against the 2.0 GW authorization, leaving 1,196 MW of OSW-derived energy authorization remaining.

During our conversations with various offshore wind developers, it has become clear that their involvement in anchoring various operations in a particular U.S. state will likely be a direct function of the size and certainty of the OSW market within that state. It was a common theme in these discussions that developers believe that they will have a higher probability of winning state energy procurements (i.e., PPAs and ORECs) if they show local content for the state in consideration, whether there are formal local content/net economic benefit requirements included in their respective state procurements. As such, developers are more willing to anchor their own operations (and potentially OEMs which would follow them) in states that have a well-defined and long-term plan for issuing future solicitations (e.g., Massachusetts, New York, New Jersey, Virginia, and North Carolina) than states such as South Carolina, Connecticut and Rhode Island which have not been publicly committing to such long-term offshore wind energy solicitations.

As such, MME recommends that in order to entice the industry and keep Connecticut attractive/relevant, the State should provide more clarity and a formal vision for its OSW-derived energy goals and procurement schedule. Massachusetts has set a goal of 4.0 GW of offshore wind by 2027, New York has set forth of a goal of 9.0 GW, New Jersey has committed to 7.5 GW, North Carolina has committed to 8.0 GW by 2040 (this is the first state-planned procurement past 2035) and Virginia has committed to 5.2 GW. The large commitments and long-term procurement schedules made by other East Coast states are keeping these states fully relevant the U.S. OSW marketplace, and thus helping them to attract the supply chain and the focus of the supporting industries.

In order to compete and show the supply chain that the State takes its commitment to developing the OSW industry seriously, Connecticut should set forth a clear procurement schedule and make a strong commitment to soliciting renewable, clean, OSW-derived energy, preferably past 2035 to keep the State at the forefront into the future.

Local Content Requirements

Local content requirements in state OSW procurements can provide mixed results for the long-term economic benefits they are intended to provide. Attempting to maximize local content through state procurements is a short term, potentially ill-advised solution, particularly with the uncertainty that currently exists in Connecticut's long-term commitment to OSW. By itself, a lower cost of energy provides a significant statewide economic impact, just in savings in operational costs to existing users. That does not even consider the benefits of generating and using clean, zero-carbon, renewable energy sources for the State, which can have a significantly positive impact on addressing climate change. Future Connecticut OSW procurements should provide precise, but not excessive, local commitments requirements. These could take the form of one or more of the following:

- Require the staging of O&M operations for a project within the State.
- Provide a commitment of funding to support innovation research and development innovation center/incubator for the industry to an organization (e.g., educational entity, non-for-profit group, trade organization, etc.) in the State.
- Commitments to staging deployment and marshalling out of a port facility in the State.
- Require providing clarity on the local content from the lower levels of the supply chain.

- Require that Tier 1 suppliers to the developers are held to the same standards as the developers, whereby they need to commit to using local content in the lower levels of the supply chain – in other words, confirm that all levels of the developer’s supply chain are following the rules included in the energy procurements awarded by the State.
- Require follow up reporting on local content usage and project development activities, including supply chain content and stakeholder coordination (such as fisheries) on a periodic basis.
- Require supply chain coordination among the developers after award.
- Require investment in port infrastructure in the future State energy procurements.

Keep the Citizens of the State Informed and Excited

One of the State’s strongest assets is its highly experienced and qualified workforce which affords Connecticut and the OSW industry with the skill sets required to quickly support the first-mover Offshore Wind projects slated for development off the U. S. East Coast. This study has focused primarily on promoting industry and working with existing business entities; however, OSW should also be promoted to the public. The implementation of an effective and ongoing public outreach program is recommended to provide the citizens of the State with an understanding of the opportunities represented by offshore wind and inform taxpayers of workforce training opportunities. The program should aim to keep the citizens excited about the existing and future economic opportunities associated with the OSW industry and provide guidance on how they can take advantage of these opportunities. This outreach program should promote not only the economic benefits of offshore wind, but also the environmental benefits associated with generating clean, reliable, renewable energy to all the citizens of Connecticut. Offshore wind is a proven technology with over 25 years of implementation in Europe, it provides clean energy from a region with consistent winds, and is the source of jobs and economic benefits, all of which will benefit the citizens of Connecticut.

OSW is an exciting and rapidly developing industry, and with this focus and dedication, the State of Connecticut can establish itself as a center of knowledge and be a major contributor to the U.S. and worldwide supply chain. The next three decades are likely to provide rapid growth and significant economic impact, so these strategic actions and investments made in the near term will provide benefits and rewards for years to come.