



I. Virginia's Offshore Wind Supply Chain and Service Industry Opportunity

The offshore wind energy market is just emerging in North America. With a potential build-out of at least 20,000 megawatts (MW) of installed capacity (or 2,000-3,000 wind turbines) along the East Coast over the next two decades, Virginia is well positioned as a prime location for the offshore wind supply chain and service industry. As the demand for wind energy increases, experts predict that over 14,000 jobs will be created in Virginia in the construction, maintenance, manufacturing and other service-related industries. Visit the Commonwealth's one-stop shop for offshore wind information at www.vaoffshorewind.org.

II. Virginia's East Coast Advantage

Virginia's Hampton Roads region offers a number of unique competitive advantages over other offshore wind business locations on the East Coast. The Virginia Offshore Wind Team is working with BVG Associates on an opportunity analysis to illustrate Virginia's existing advantages, which will assist offshore wind supply chain companies and other decision makers in their due diligence process. This analysis will articulate why Virginia offers the greatest chance for business success and low exposure to risk. It will also define factors important to industry and decision makers and address how Virginia can demonstrate that it is the location of choice for the offshore wind supply chain.

- ✓ Pro-Business Climate — CNBC ranks Virginia as the fourth top state in the nation and the first on the East Coast for business. Virginia leads the way in education and workforce development to support its thriving economy.
- ✓ Strategic Geographic Location — With commercial offshore wind leases located off the coasts of NJ, DE, MD, VA, and NC at a travel time of less than 20 hours by installation vessels traveling at 10 knots, Virginia's port assets are strategically located in the Mid-Atlantic with direct open access.
- ✓ Unmatched Port Infrastructure — As the second largest on the East Coast in tonnage and the third largest in container volume, Virginia's ports have the ability to handle any type of cargo. Virginia is one of the few states offering "plug in and play" port facilities to the supply chain.
- ✓ Congestion-Free Navigation — Hampton Roads enjoys open shipping channels and navigational flexibility eliminating maritime congestion as a concern. The Port of Virginia is the deepest port on the East Coast and recently gained approval for a dredging project that will take the channels to 55 feet deep and widen them in select areas to allow for two-way traffic of ultra-large containerships.
- ✓ Progressive Energy Policy Stance — In a bipartisan fashion, Virginia's legislature

passed the Grid Transformation and Security Act in 2018, which deems 5,000 MW of solar and wind energy generation to be in the public interest.

- ✓ Zero Air Draft Restrictions — Virginia port facilities have direct access to sea with no overhead obstacles to impede the shipping of large and upright infrastructure and components, an advantage that differentiates it from every other East Coast states.
- ✓ High-Quality Maritime Workforce — Hampton Roads boasts a civilian and military maritime labor force unmatched by any other East Coast state. Its proximity to the largest naval base in the world presents the opportunity to hire retiring military personnel for high-skilled offshore wind jobs.
- ✓ Abundant Waterfront Land and Infrastructure — Virginia's ports offer existing dock capacity and ample on-water marshaling areas. The Virginia coastline is geographically rich with waterfront properties and development or redevelopment opportunities.
- ✓ America's Largest Shipbuilding Industry — Hampton Roads is home to the largest shipbuilding market in the United States. This provides numerous advantages in existing physical and workforce assets. Unmatched infrastructure and workforce resources for design, construction and maintenance of vessel and other marine infrastructure are well developed, diverse and flexible — including capacity for the construction of new specialized vessels and modification of existing vessels.

III. Positioning Virginia as a Prime Location for the Offshore Wind Supply Chain and Service Industry

Following its May 2018 Request for Proposals (RFP), the Virginia Department of Mines, Minerals and Energy (DMME) awarded BVG Associates (BVGA) a contract in July to help deploy strategies that will strengthen Virginia's position in attracting the offshore wind supply chain and service industry to the Commonwealth.

BVGA is leveraging its North American and global partners with extensive offshore wind industry experience, including Ramboll Group A/S, Timmons Group, Greentree Consulting, LLC and the Business Network for Offshore Wind. BVGA and its team are evaluating Virginia's advantages and opportunities as well as providing recommendations to further enhance the Commonwealth's maritime workforce and its favorable business climate.

BVGA and its partners join the DMME-led Virginia Offshore Wind Team that also includes representatives from the Governor's Office, Virginia Economic Development Partnership, Port of Virginia and the Virginia maritime industry.

Three additional teams — Partnerships, Workforce and Business Incentives / Business Climate — support the Virginia Offshore Wind Team's work outlined in the RFP. A host of offshore wind stakeholders and representatives both at the state level and from the Hampton Roads region are engaged in this project.

The final report due late October 2018 will serve as a partnership tool to connect industry prospects with Virginia's robust maritime industry located in Hampton Roads. It will also provide a summary of Virginia's unique advantages, communicate offshore wind-related workforce development and business incentive efforts underway, identify competitive gaps and make recommendations as well as educate state and local economic development and energy policy leaders.

IV. Evaluating Virginia's Port Readiness

DMME contracted with BVG Associates (BVGA) in 2015 to evaluate 10 Virginia ports for their readiness to accommodate seven offshore wind manufacturing and construction activities (blades, generators, nacelles, towers, foundations, cables, construction staging). BVGA also evaluated five Virginia commercial shipyards for their readiness to manufacture offshore substations.

Drawing on intelligence from established offshore wind industry suppliers, the BVGA team developed a set of optimal requirements for each offshore wind activity. The requirements included waterside infrastructure, onshore infrastructure for the activities themselves and access requirements for vessels associated with offshore wind activities. BVGA also developed estimates of construction jobs and permanent manufacturing jobs. It developed port utilization scenarios, including a 'super-port', a series of cluster ports and a distributed network. It also engaged ten industry partners to validate the optimal port requirements and review the port utilization scenarios.

Although offshore wind activity is more demanding on port infrastructure than many other commercial port activities, Virginia's ports offer a high level of readiness. The study concluded that five ports have a realistic potential to be used for one or more offshore wind activities. The five ports include:

- ✓ Portsmouth Marine Terminal;
- ✓ Newport News Marine Terminal;
- ✓ Peck Marine Terminal;
- ✓ Virginia Renaissance Center; and
- ✓ BASF Portsmouth

Each of the ports requires various levels of upgrades to meet offshore wind power requirements. While the full report provides details of the required upgrades specific to each activity at each port, the following is a summary of key findings:

- ✓ Portsmouth and Newport News Marine Terminals have the highest level of port readiness. They each have sufficient space to accommodate multiple, co-located offshore wind activities, making them candidates for a future offshore wind manufacturing and deployment hub. The necessary upgrades to meet offshore wind requirements would cost up to \$10 million at each port.
- ✓ Peck Marine Terminal has the space and vessel access to accommodate many of the offshore wind manufacturing activities. Overhead navigational clearance precludes using Peck Marine Terminal for foundation manufacturing and construction staging. Necessary upgrades at Peck would cost up to \$14 million.

- ✓ Virginia Renaissance Center (VRC) has a high level of readiness but faces navigation constraints. Blade manufacturing and submarine cable manufacturing could be located at VRC and necessary upgrades would cost up to \$5 million.
- ✓ BASF Portsmouth represents an opportunity to develop new port infrastructure and would require a larger investment of \$8 million to \$45 million.
- ✓ Cape Charles Harbor, a privately owned port of the Eastern Shore of Virginia with close proximity to deep water, has the potential to be a strategic offshore wind site but will need basic ground improvements and an upgrade to the waterside infrastructure.
- ✓ Five Virginia shipyards studied are capable of manufacturing conventional offshore substations without further infrastructure investment. Two of these facilities had dry docks suitable for manufacturing self-installing substations.

V. Virginia Offshore Wind Development

Harnessing the offshore wind resource is a win-win for Virginia and allows the Commonwealth to be part of the green revolution across the nation. As more offshore wind areas are developed in the United States, costs, which have declined dramatically over the past decade in Europe, will continue to come down significantly and have come down in other states in the U.S., e.g., Massachusetts and Rhode Island. Virginia's offshore wind research efforts can contribute to these cost declines through learning and efficiencies gained during project deployment. Virginia's unique port and workforce assets provide a tremendous opportunity for the Commonwealth to establish itself as a leader in offshore wind power development by capitalizing on the opportunity to grow a new industry.

Dominion Energy contracted in 2017 with a global wind leader — Ørsted Energy of Denmark — to build Coastal Virginia Offshore Wind (CVOW), a two turbine, 12 MW demonstration project located 23.5 nautical miles offshore from the Virginia Beach coastline.

CVOW is located in the Commonwealth's 2,135-acre research lease, the only one of its kind along the East Coast for offshore renewable energy awarded by the Bureau of Ocean Energy Management (BOEM). The project is currently in the final stages of BOEM approval with a 2020 target completion date. CVOW continues Dominion Energy's commitment to 3,000 megawatts of solar and wind energy under development or in operation by the beginning of 2022.

CVOW will lay the groundwork for potential large-scale commercial development (up to 2,000 MW) in an 112,800-acre commercial Wind Energy Area adjacent to CVOW beginning approximately 23.5 nautical miles east of Virginia Beach which Dominion Energy has leased from BOEM. All other lease areas along the East Coast are controlled by private development companies, which must enter into power purchase agreements with utilities in other states.

VI. Virginia Energy Plan Recommendations (2018)

Development of the offshore wind resource — As the CVOW project moves forward, Governor Northam should commit to a goal that the full 2,000 MW of offshore wind potential in Virginia’s wind energy area be developed by 2028. This goal would enable development of a strategy to ensure that Virginia continues to diversify its fuel mix through offshore wind resources. To facilitate the development and execution of a strategy, the Commonwealth should consider creating the Office of Offshore Wind within the Division of Energy at DMME. In addition, Dominion Energy should submit a timeline for the various steps and approvals necessary to accomplish the full build-out of the offshore wind resource. The Commonwealth should continue to work with Dominion Energy, BOEM, the Department of Defense, the Port of Virginia, commercial shipping and fishing interests, and other stakeholders to ensure that all stakeholder concerns are addressed and that the resource can be deployed at the lowest possible cost.

Development of the offshore wind supply chain — As the pending offshore wind report provides specific policy recommendations, the Commonwealth should include the offshore wind industry as a priority in future workforce development and economic development strategic plans. A coordinated prioritization of the offshore wind supply chain will send a signal to local and regional partners regarding the crosscutting value that the industry can bring to the Commonwealth. Governor Northam should also initiate regional collaboration with neighboring states, which can help provide greater certainty for the industry as it looks to establish a long-term project pipeline. This may reduce regulatory and administrative burdens for companies as they make investment decisions.