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# The Next Frontier for the Maritime Industry: Offshore Wind Farms

## The Life Cycle of an Offshore Wind Farm

Lautec US Inc. | Seward & Kissel LLP

With international interest in alternative energy sources gaining strength, it seems the open seas may present the next big opportunity: offshore wind farms, which are being seen by many as the next black gold. And for those in the maritime and transportation industries, this could be a gold rush.

Lautec US, a premier consulting and IT development firm specializing in offshore wind projects, and Seward & Kissel, a full-service law firm based in the United States known for its shipping, offshore and energy expertise, have joined forces to provide those interested in learning more about the offshore wind industry with an overview of the various stages involved in the development of an offshore wind farm. From initial project development to decommissioning, this article aims to explain the processes, relationships, and legal issues associated with each stage.

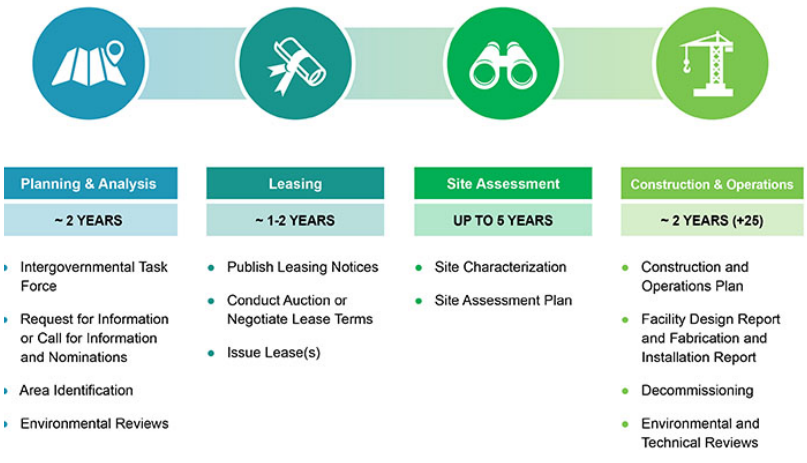
## Background

The offshore wind sector in the United States is still in its infancy but rapidly gaining attention from those in the energy sector as well as the general public given its significant potential. According to the Office of Energy Efficiency and Renewable Energy, offshore wind resources are abundant, stronger, and blow more consistently than land-based wind resources and data suggests that more than 2,000 gigawatts (which is approximately two times the combined generating capacity of all U.S. electric power plants) could potentially be accessed in state and federal waters along the coasts of the United States and the Great Lakes.

## Project Development

The entire life cycle of an offshore wind farm, from initial planning to final decommissioning, can be up to 35 years in length. In the United States, both offshore wind developers and the state and federal government play a major role in conducting initial planning and development of specific offshore lease areas. First, the Bureau of Ocean and Energy Management (BOEM), which is the U.S. federal agency with authority over offshore energy developments on the outer continental shelf, releases several "Call Areas", or potential offshore lease areas, that undergo several environmental reviews and are required to meet certain qualifications (such as the wind speed, bathymetric requirements, environmental impact and local impact).

Once these lease areas are approved, they are auctioned off in a competitive bidding process to an array of interested developers. The developers then create and submit a Site Assessment Plan (SAP) which covers an array of feasibility studies, geotechnical/ geophysical surveys, environmental reviews, design studies, and legal and financial services.



## Participants

Depending on factors like the site location, local regulations and grid operators, offshore wind development projects can have an array of key participants. In the United States, the developers that win the lease areas auctioned off by BOEM are largely responsible for seeing out a project's success. Offshore wind developers usually are energy providers, investment funds, utilities, or a combination of the foregoing. Currently there are twelve companies acting as offshore wind developers in the United States: Orsted, British Petroleum, Equinor, Mayflower Wind (Shell New Energies and EDP Renewables), Vineyard Wind (Copenhagen Infrastructure Partners and Avangrid Renewables, US Wind, Dominion Energy, National Grid, LEEDCO, and New England Aqua Ventus (RWE Renewables and Diamond Offshore Wind). Developers are typically in charge of contracting and negotiating many of the key elements of an offshore wind project, ranging from turbine parts to shipping contracts. Developers work closely with the public sector and grid operators to design and implement power purchase agreements (PPA) which defines the terms of the sale of electricity between the two parties. An interconnection agreement is also negotiated with the local Independent System Operator (ISO), which ensures a safe interconnection from the wind farm to the grid.

## Permitting

Once the developer has completed its SAP, it must then create a Construction and Operations Plan (COP), which covers all proposed activities, planned facilities, and as well as project easements that a developer intends to construct and use for a project planned under its lease. A Facility Design Report (FDR) and a Facility Installation Report (FIR) are also required by BOEM prior to the manufacturing and installation phases of a project. Once all permitting is deemed sufficient, BOEM will then begin its Environmental and Technical reviews for the proposed project. There is also an array of local permits that are required for development that cover areas ranging from export cable connection to visibility.

## Manufacturing

While the COP and permitting processes are being completed, the developer will begin planning the manufacturing of components needed for an offshore wind farm. Manufacturing begins as soon as the project has been approved. This stage includes but is not limited to: the manufacturing of castings, gearboxes, rotor components, blades, towers, drive train, platforms, foundations, cabling, and substations.

## Transportation and Installation

Once a project's manufacturing has been completed, the installation process can begin. Installing and building an offshore wind farm requires several different types of specialized vessels and equipment including jack-up vessels, crew transfer vessels, heavy lift vessels, and cable laying vessels. Installation of offshore wind turbines and substations is an incredibly complex process that involves both the logistics of transporting components and personnel to site as well as installing the turbines at each position. Following transportation, installation typically begins with placing a foundation. While there are many different types of foundations, which are typically determined by ocean depth and project location, the most common type of turbine foundation is called a monopile. A transition piece, which connects the turbine's tower, hub, and blades is then put on top of the foundation. Cables will be used to connect the individual turbines once assembled in arrays, before connecting the array to an offshore substation. Multiple turbine arrays can be connected at the substation where the voltage of power generated is stabilized and transformed, before the electricity is transmitted to shore by means of one or more larger cables. Once at shore, the power is either directly connected to the grid, or transformed in an onshore substation, ensuring that the voltage level matches the grid.

## Operation and Maintenance

An offshore wind farm is typically in operation for over twenty years, which leads to the operation and maintenance phase of the project being a very expensive element of an offshore wind development project. A majority of this phase comes through routine inspections and maintenance of the components of a wind farm including array and export cables, offshore turbines, blades, and foundations. During this phase several types of condition monitoring also occur, such as SCADA modeling, weather forecasting, marine coordination, and onshore and offshore logistics.

## Repowering and Decommissioning

As offshore wind is a relatively new industry around the world, the first wave of decommissioning/repowering is slated to happen in the next couple of decades. As turbines reach the end of their operational life, developers have the choice to either decommission the turbines or begin the process of repowering them. If the developer chooses to decommission the turbines, this involves an offshore dismantling process. This process varies on an array of factors (such as the size of the wind farm, local regulations and type of foundation used) but often requires the removal of the turbines themselves and the associated cabling and structures. If the developer chooses to repower, the life cycle begins again.

## Documentation and Legal Concerns

### Regulatory Landscape

A complex scheme of federal, state and local regulatory and other legal requirements apply to most all phases of an offshore wind project and should be considered during planning, installation, operation and decommissioning phases. As discussed above, BOEM is the leading federal agency exercising jurisdiction over offshore wind farms. However, there are other important regulations, such as the Merchant Marine Act of 1920 (The Jones Act, which covers the vessels used in connection with the project), Coastal Zone Management Act (which covers the protection of coastal areas), the Outer Continental Shelf Lands Act (OCLSA), the National Environmental Policy Act (which covers environmental impacts) and some of the other environmental regulations described below, all of which will have a significant impact on the installation, operation and decommissioning of offshore wind farms. In addition, compliance is also required with the rules and regulations of the U.S. Fish and Wildlife Service (which is responsible for fish and wildlife impacts of wind farms).

The development of offshore energy, including renewable energy, is highly dependent on the political climate, and the regulatory landscape can change fast. For example, recent executive orders ban new energy leases offshore Florida, Georgia, South Carolina and North Carolina, which apply not only to oil and gas leases but also renewable energy leases, beginning on July 1, 2022 until June 30, 2031. It remains to be seen how this may affect offshore wind projects in the affected areas in the future.

### Tax Considerations

The tax treatment of offshore wind facilities depends on whether they are located in the "United States" for federal income tax purposes. Offshore wind facilities located within the twelve-mile limit would be deemed to be located in the United States for federal income tax purposes, while those beyond the twelve-mile limit would be deemed to be located in international waters (and outside the United States).

While the location of an offshore wind facility may not have a significant impact on U.S. investors, it has a significant impact on non-U.S. investors as they may be able to avoid U.S. federal income tax on income generated by the facility. The location of the facility may also impact the tax treatment of entities operating supply and repair vessels.

A variety of federal and state tax credit programs may also be available for offshore wind projects.

### Environmental Issues

Wind energy is subject to certain environmental regulations. For example, wind power is still subject to environmental impact inquiries under the National Environmental Policy Act (NEPA). Federal, state and local governments also create "setbacks" for wind turbines, defining the minimum distance a turbine can be built from residential structures, property lines, roads, environmentally or historically sensitive areas, and other locations. Additionally, depending on the location, laws regarding conservation of wildlife might be implicated, including but not limited to the Endangered Species Act (ESA), the Migratory Bird Treaty Act (MBTA), and the Bald and Golden Eagle Protection Act (Eagle Protection Act). Finally, certain projects might be subject to the jurisdiction of the Federal Aviation Administration (FAA), which focuses on whether there is an obstruction to airspace.

## Shipping and Chartering Considerations

Vessels (such as various installation and service operations vessels) play a vital role in the installation, operation, maintenance and decommissioning of offshore wind farms. Getting the various equipment and necessaries to the wind farm site, however, requires careful consideration of the Jones Act, which regulates maritime commerce and requires goods shipped between U.S. ports to be transported on ships that are built, owned, and operated by United States citizens or permanent residents.

Jones Act compliant vessels are more expensive to use but with proper planning and structuring less expensive non-Jones Act vessels may be used for certain aspects of an offshore wind farm. In a small number of wind farm projects that have been completed in the United States, the project developers have used a double-handling method where the equipment is loaded on to a Jones Act-compliance barge and subsequently lifted on to a specialized installation vessel in the ocean (by a vessel that is not Jones Act-compliant). This method of handling can involve mechanical risks and may not be commercially viable as the scale of the project increases.

Whether Jones Act-compliant or not, these highly specialized installation and service vessels are expensive to construct and often designed and built with a long-term employment in mind in order to minimize the investment risk on the part of the owner. A vessel employment is often documented on a "charter" or "charterparty". While the shipping industry has model form charters that are prevalently used, charters of highly specialized purpose-built vessels may require careful negotiation of terms.

*The information contained in this article is for informational purposes only and is not intended and should not be considered to be legal or investment advice.*

## FURTHER INFORMATION

**We at Lautec and Seward & Kissel welcome any questions about this article and the offshore wind farm industry.**


**Keith J. Billotti**
Partner at Seward and Kissel LLP
Co-head of the Maritime and Transportation Capital Markets Group
(212) 574-1274
billotti@sewkis.com

**Hoyoon Nam**
Partner at Seward and Kissel LLP
(212) 574-1640
nam@sewkis.com

**Nick Zenkin**
Research and Development Manager at Lautec
(978) 435-5883
nze@lautec.com