Offshore Development Can Yield Economic Benefits

The building of vessels and component manufacturing that is needed for offshore wind projects can create much-needed jobs.

BY MICHAEL N'DOLO & BRUCE BAILEY

As Europe expands its offshore wind power capacity by leaps and bounds, interest in North American offshore development grows steadily, albeit slowly, in the face of technical, financial and policy hurdles. State-mandated renewable portfolio standards (RPS) must be met one way or another, and offshore wind will likely be part of the solution. In particular, transmission bottlenecks in major load centers along the Eastern Seaboard represent an opportunity for offshore wind to both meet RPS goals and alleviate overloaded electric grids.

So what is the holdup? Some policy-makers seem convinced that offshore wind power would be prohibitively expensive and a significant drag on a fragile economy. However, a strong argument can be made for just the opposite. One or more U.S. states and Canadian provinces could reap considerable economic benefits if they make a significant up-front investment in offshore wind.

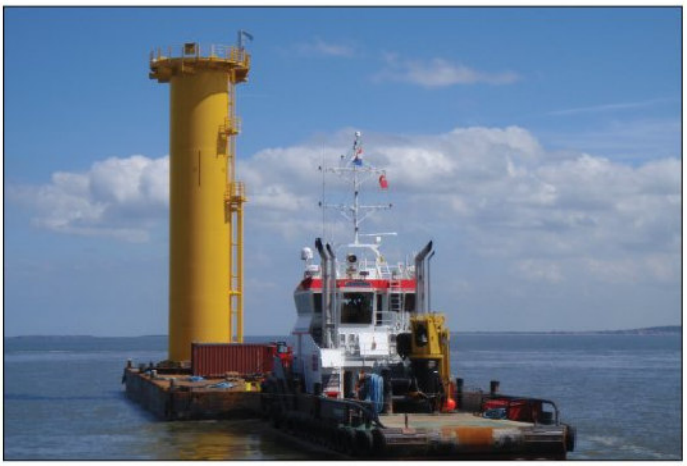
Economic opportunities

Wind power is a job-creation engine. According to the American Wind Energy Association, the wind industry supported over 85,000 jobs in 2009 alone. Most of these jobs were in manufacturing, an area of the U.S. labor force that has been declining rapidly for years. The wind energy industry represents a significant opportunity for turning this decline around.

Although wind power industry clusters exist in North America, there are many specifics to offshore wind that differentiate it from its onshore cousin. Requirements such as installation vessels, unique turbine components, specialized research focus, and professional and technical experience are not yet present in the North American workforce skill set. All of these unique requirements represent an economic opportunity for job creation, ranging from research, design and manufacturing to operations and maintenance.

Vessels. Highly specialized installation vessels must be built, operated, repaired and docked during the off-season. The newest generation of such vessels under development in Europe can cost hundreds of millions of dollars to construct and can require a small army of workers in ports with sufficient ship-building capacity. In addition, other smaller vessels are necessary for ongoing maintenance and repair operations.

The Jones Act requires that all goods transported by water between U.S. ports are carried in U.S.-flagged ships that are constructed in the U.S., owned by U.S. citizens and crewed by permanent residents of the U.S. Although some developers have been successful in requesting an exception, allowing them to use foreign vessels, the Jones Act creates a significant barrier for offshore developers. Investing and developing a domestic vessel industry to serve the offshore market would significantly increase the attractiveness of a region to offshore developers and investors, in addition to creating jobs to support the new industry.



Ferrying a turbine foundation into place
Photo courtesy of Port of Mostyn Ltd.

Components. Offshore components tend to be larger and bulkier. Certain components are either unique to (foundations) or modified for (hermetically sealed nacelles, seaworthy substations, nacelle-mounted or substation-mounted helicopter pads for maintenance, and corrosion-resistant materials) offshore use. One of the largest portions of the installed cost of a typical offshore wind farm is directly attributable to the manufacturing and pre-assembly of turbine and foundation components. In regions where a high level of wind component manufacturing currently exists, there is significant opportunity for creating offshore wind component manufacturing clusters.

Installation. Turbines and foundations must be assembled in a staging area, loaded onto a vessel and installed. There are limitations on the ability for any one state or province to service both coasts, but it is reasonable to assume, for example, that an installation cluster in the Mid-Atlantic region of the

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U.S. could provide installation capacity for a number of projects on the East Coast.

Research and development (R&D). R&D funds are focused on technical issues unique to offshore development, including foundations, deepwater anchoring, special corrosion-resistant materials, and design modifications to decrease maintenance intervals. Although the job creation resulting directly from R&D is minor in comparison to component manufacturing, this type of research is a way for governments to establish themselves as centers of innovation and, thus, contribute to the commercialization efforts of local offshore manufacturers.

Offshore wind development can create jobs, as it did at this U.K.-based port.
Photo courtesy of Port of Mostyn Ltd.

Avoided costs

There are many other ways that offshore development can positively impact local economies, all of which focus on avoided costs. Often misunderstood or ignored, avoided costs are those that, if not addressed, could result in money or opportunity leaving an area.

For example, is the avoided costs of transmission system upgrades. Many metropolitan areas along the Eastern Seaboard suffer from capacity issues in transmission infrastructure that require tens of billions of dollars to remedy. The extent to which such costs can be delayed, reduced or avoided altogether is an economic benefit to the host community and should be considered as an offset to the perceived higher per-kilowatt power costs of offshore wind.

There are additional avoided costs that may be more significant. Many states and some metropolitan areas have either mandates or policy goals requiring the sourcing of renewable energy by a certain date. If such power cannot be produced locally, providers will be required to source renewable power from elsewhere. This is, in effect, taking local ratepayer dollars and sending them outside of the local economy, a situation analogous to consumer dollars flowing out of the U.S. to purchase electronics from low-cost manufacturing countries.

These outflows of dollars are tied to massive job losses. For the exporting state or province, the ability to recapture these dollars represents new money added to the local economy and additional economic activity. The final avoided cost worth noting is that offshore, while expensive relative to fossil fuels, is less expensive than some other sources of renewable energy such as solar or tidal. The differential costs between offshore wind and other forms of renewable energy can be considered avoided costs that are not passed on to ratepayers.

Making the case

Translating these arguments into concrete terms that policy-makers can understand and will act on typically requires a dollars-and-cents argument about jobs, wages and economic activity resulting from offshore wind development. This can be illustrated by conducting an economic-impact study that uses reasonable assumptions and an input-output model. The model demonstrates how changes in final demand – resulting from more money generated from manufacturing components, installation activities, R&D and avoided costs – circulate in the local economy and create spin-off jobs through the multiplier effect. Simply put, a multiplier effect describes the effect that every new dollar has on an economy.

The following case study demonstrates how the state of New York would benefit economically – in terms of new jobs, wages and economic activity – if it were successful in attracting and retaining an offshore wind industry cluster.

The case study assumes that, over the next 10 years, New York captures 10% of the likely U.S. demand for manufactured offshore wind components, hosts the construction of one installation vessel and is awarded research grants to study offshore-specific topics. Annualized, the input would represent $235 million of direct economic activity each year on average as a result of New York's hypothetical offshore wind cluster.

The results say that the assumptions used from the case study would mean 670 new jobs and $45 million in wages to be paid in the various industry categories associated with offshore wind in New York. A further 880 jobs would be indirectly created through the multiplier effect – from purchases made by component manufacturers and from the wages spent locally by employees. In total, the impact would be 1,549 jobs and almost $100 million in wages. New York policy-makers can weigh these impacts against the state's presumed investment to develop this new cluster.

Annual Impact Summary

Type	Direct	Indirect	Total
Jobs	670	880	1,549
Wages	$45,766,834	$52,670,083	$98,436,917
Sales	$234,864,618	$138,570,125	$373,434,743

Source: Camoin Associates and AWS Truepower

Furthermore, there are a number of other effects from avoided costs that are not included in this case study. For example, New York City is suffering from a transmission capacity shortfall that could cost several billion dollars to rectify and take a decade or more to implement. Onshore wind from upstate New York would make substantial amounts of green energy available to New York City consumers.

However, the state is considering an offshore installation south of Long Island that could feed power directly into the

New York City-Long Island metropolitan grid without the upstate transmission upgrade. Without the offshore project and the upstate transmission upgrade, electric consumers in New York City may have to purchase electricity from out-of-state providers through other interconnections, and the city may have to pursue less desirable electricity generation options and/or risk failing to meet the city's renewable energy goals.

By promoting a local offshore development, the state could both promote the development of a local offshore wind cluster and deal with some of its electric transmission issues in an environmentally friendly manner.

Similar cases can be made for locales up and down the Atlantic coast and those bordering the Great Lakes. Without strong policy to support the industry, investing in the necessary infrastructure to support significant offshore wind development may be seen as a gamble. Unfortunately, without vision and commitment, offshore wind will never reach its stride. WP

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verification agents to identify acceptable standards to be applied to individual projects.

The National Wind Turbine Operating Safety Committee is sponsored by the BOEMRE, an agency of the U.S. Department of the Interior.

ABB Wins Order For Power Connection

ABB has won an order worth approximately $700 million from transpower, a German transmission grid operator, to supply an 800 MW power link that will connect more offshore wind farms in the DolWin1cluster – located in the North Sea – to the mainland German grid.

ABB will deploy its proprietary high-voltage direct-current (HVDC) Light transmission technology to transmit power from the 400 MW Borkum West II wind farm and other wind farms to be developed nearby. The wind farms will be connected to an offshore HVDC converter station, which will transmit electricity to the onshore HVDC station at Dorpen, on the northwest coast of Germany, via 165 km of underwater and underground DC cables. The Dorpen/West converter station will, in turn, feed AC power to the mainland grid.

ABB will be responsible for system engineering, including design, supply and installation of the offshore platform, and the offshore and onshore converter stations. The company will also supply and install the sea and land cable systems.

The network of offshore wind farms is expected to be operational by 2013.

SWAY Forms New Company

SWAY AS, a wind turbine developer based in Bergen, Norway, has created a separate business entity, SWAY TURBINE. The main focus of the new company will be to build a prototype of and subsequently commercialize a 10 MW offshore wind turbine, designed for fixed, as well as floating, foundations.

SWAY founder Eystein Borgen will be appointed CEO of SWAY TURBINE, while Michal Forland will replace Borgen as CEO of SWAY.

"Splitting the business into two companies will also open up opportunities for investors who do not wish to commit themselves to both technologies," says Borgen. "In addition, the spin-off will strengthen the focus on both technologies."

SWAY TURBINE is currently working on building a full-scale 10 MW test turbine outside Bergen. In February, ENOVA, a Norwegian state-owned fund, committed 137 million Norwegian kroner for the construction of the test turbine. SWAY TURBINE is in the process of raising 150 million Norwegian kroner in new equity from both new and existing owners.

With SWAY TURBINE up and running, SWAY will continue working solely on its floating foundations for offshore wind turbines.

AutoDesk Helps With WindFloat

Marine Innovation & Technology, a naval architecture and offshore engineering firm, is using digital prototyping software from Autodesk Inc. to develop the WindFloat, which is a small, floating platform capable of supporting large offshore wind turbines.

Autodesk Inventor Professional, Autodesk Vault Professional and Autodesk Showcase Professional software helped Marine Innovation design and render the WindFloat in three weeks. The WindFloat improves on the design of existing offshore support structures by significantly minimizing the motion caused by environmental forces such as wind, waves and currents, according to the company.

Improved stability allows the WindFloat to be placed in previously inaccessible locations where water depths exceed 50 meters and winds are nearly constant, according to the company. Each WindFloat can produce up to 10 MW of renewable energy. WP