DIRECTION

THE FUTURE OF WIND

While offshore wind at high seas clearly has barriers to overcome, it could drastically increase capacity by adding almost 70 percent more construction space to consider. (Courtesy: Chatham Partners)

Wind development in the high seas could unlock offshore potential

The offshore wind industry is making great strides in developing technology. That means projects can be built further from shore, including technological innovations in floating foundations and hydrogen storage. However, a new report by Chatham Partners, a boutique law firm specializing in renewable energy, indicates that if such technology were to allow the construction of wind farms in the high seas, the current legal framework would not have the scope to cover such development.

The high seas are all regions of the sea that sit outside the control of a single nation. They make up 50 percent of the surface area of the planet and cover more than two thirds of the oceans. However, the lack of clear rules covering development in the high seas will be a challenge for using any of these areas for offshore wind. According to the report, "Offshore Wind in High Seas: Unlimited potential beyond national control?", the industry should call for discussions to form a robust legal framework now or risk missing the opportunities the high seas could offer in decades to come.

Global efforts toward decarbonization have proven offshore wind to be a viable alternative power source to fossil fuels. However, the sector could still face challenges in developing close to shore due to countries' desire to protect coastal ecosystems and conflicts with local industries and the military or simply inactivity. These would not be obstacles in most of the high seas.

While offshore wind at high seas clearly has barriers to overcome, it could drastically increase capacity by adding almost 70 percent more construction space to consider. However, if offshore wind were to look to the high seas for development, the lack of a legal framework will become a major obstacle.

In particular, uncertainty around right of use, ownership, and jurisdiction of the high seas presents a significant challenge. Building close to shore in an Exclusive Economic Zone means that the relevant state has the remit to govern and authorize installation and operations of a wind farm under their national laws; but no such jurisdiction or governing body exists for the high seas. As such, offshore wind on the high seas would be too great a risk for any company to invest in.

Chatham Partners notes that precedents for international cooperation in order to take advantage of valuable resources already exist in the scope of current legislation. For example, fishing is regulated in the high seas by Regional Fisheries Management Organizations. The International Seabed Authority (ISA) acts as a governing body to authorize public and private organizations to extract minerals from the deep seabed outside their states' jurisdiction. In addition, a treaty for biodiversity beyond national jurisdiction is currently proposed that may introduce so-called "area-based management tools" as well as various forms of governance — concepts that could include or serve as an example for a framework concerning offshore wind.

However, these precedents provide an example for the offshore wind industry of how many years a legal framework can take to be built. The ISA took more than 20 years of negotiation between member states to formally establish. The treaty concerning biodiversity has been negotiated since 2004 and will likely stay a draft for several years to come.

"Currently, offshore wind developers are only able to consider a third of the available sea when planning new sites," said Felix Fischer, partner at Chatham Partners. "The high seas could have the potential to further unlock the expansion of offshore wind beyond what can be developed along coastlines if the industry deems it feasible from an economic and technical perspective. However, the technology to allow development in these areas could outpace the legislation."

"Without a legal framework, these sites will remain out of reach for developers for decades to come," he said. "If the high seas should become part of the answer to expanding offshore wind development and contribute to global decarbonization, building a viable legal framework is critical."

MORE INFO chatham.partners/en/downloads

Ducted Wind Turbines wins grant from Department of Energy

Ducted Wind Turbines, the company formed by Clarkson University Associate Professor of Mechanical & Aeronautical Engineering Ken Visser and his team has won a grant from the U.S. Department of Energy.

The DOE's National Renewable Energy Laboratory (NREL), with funding from the DOE's Office of Energy Efficiency and Renewable Energy Wind Energy Technologies Office, works with dozens of small business across the United States to enable wind technology as a distributed energy resource through the Competitiveness Improvement Project. The goals of the CIP are to make distributed wind energy cost-competitive, improve its interoperability with other distributed energy resources, and increase the number of small and mid-scale wind-turbine designs certified to national testing standards.

Launched in 2013, the CIP supports manufacturers of distributed wind turbines through competitively-awarded, cost-shared funding to optimize their designs for increased energy production and grid support, test turbines and components to national standards to verify performance and safety, and develop advanced manufacturing processes to reduce hard-

ware costs. Beyond funding support, awardees can receive technical assistance from NREL to improve their turbine designs and testing plans. Since 2013, NREL has awarded 36 subcontracts to 20 companies, totaling just more than $8.4 million in investment, while leveraging millions in additional private-sector funding.

Ducted Wind Turbines will use the grant to advance the pre-prototype design of their new ducted 3-kW wind system, including a detailed technical review of their preliminary design and initial testing results.

The concept for the turbine came out of Visser's research and led to the incorporation of a company (Ducted Wind Turbines) through the Shipley Center. Faculty, staff members, alumni, and many students have been involved in the work on the project to get to this point. Operation of the wind turbine will provide on-going opportunities for student research and design projects and will be a showcase for DWT.

Ducted Wind Turbines (DWT) is a wind-turbine company that focuses on providing the lowest cost per kilowatt hour in the small turbine market. DWT's design produces more than two times the energy of a conventional open bladed wind turbine of the same rotor diameter.

MORE INFO www.energy.gov

Ducted Wind Turbines will use the DOE grant to advance the pre-prototype design of their new ducted 3-kW wind system. (Courtesy: Ducted Wind Turbines)

Equinor cuts floating wind costs by 40% in design revamp

Equinor will use new installation techniques, concrete substructures and a shared mooring design to slice costs at its ground-breaking Hywind Tampen floating wind project in Norway, Halvor Hoen Hersleth, Operations Manager at Hywind Tampen, told the Offshore and Floating Wind Europe 2019 conference.

Developed by Equinor, Norway's state-owned oil and gas group, the 88-MW Hywind Tampen facility will be 140 kilometers from shore in water depths of 260 to 300 meters. Due online in 2022, the facility will supply 35 percent of the power needs of five platforms on the Snorre A and B and Gullfaks A, B, and C licenses.

In October, Equinor and oil field partners agreed to build the project at a total cost of NOK5 billion ($545 million). Norwegian state fund Enova has agreed to fund NOK 2.3 billion and Norway's NOX fund will provide NOK 566 million.Norway is increasing its support for floating wind, aiming to turn oil and gas expertise into renewable trade exports.

Hywind Tampen follows Equinor's 30-MW Hywind Scotland floating wind project in the U.K., the world's first commercial-scale floating wind farm. Operational since October 2017, Hywind Scotland has collected over

In Norway, Equinor will implement design and installation learnings gained since its Hywind Scotland project came online in 2017. (Courtesy: New Energy Update)

two years of operational data on five 6-MW Siemens direct drive turbines in water depths of 95 to 120 meters.

Floating wind developers must reduce costs to become competitive and secure larger commercial projects. The cost of bottom-fixed offshore wind farms has plummeted, and floating wind developers must demonstrate cost reductions and stable operations to lure investors.

Equinor will implement new installation methods and substructure designs to lower the cost of the Hywind Tampen project, Hersleth said. Equinor aims to reduce the cost of Hywind Tampen by 40 percent compared with Hywind Scotland.

"We are now moving onto the cost reduction phase ... Hywind Tampen is the next step in that journey," he said.

Floating wind developers are targeting deeper water sites, typically at depths of more than 60 meters, where bottom-fixed designs are unsuitable. These deepwater sites could host some 4 TW of global offshore wind capacity, according to industry association WindEurope.

Developers are continuing to refine their designs and installation processes to reduce costs. For the early projects, developers are focusing on leaner designs that can be rapidly assembled and installed and towed to site for connection.

MORE INFO analysis.newenergyupdate.com

Chartwell awarded low emission vessel technology prize

Pioneering next-generation naval architect, Chartwell Marine, and independent technical consultancy, Seaspeed Marine Consulting, have been awarded a prize by the Carbon Trust's Offshore Wind Accelerator (OWA) for an innovative vessel design proposal. The OWA competition aims to facilitate the development of technologies aiding the ongoing de-carbonisation of Crew Transfer Vessels (CTVs) in the offshore wind industry.

The funding — 70,000 pounds of a total 300,000 pounds awarded to four winners — will be used to make the design proposal a reality. During the project, Chartwell will undertake the vessel design work, while Seaspeed will carry out R&D, testing, and hull-form development.

CTVs are an integral part of offshore wind activity, providing the backbone of operations & maintenance in the sector. By increasing the cost-effectiveness of vessel operations, the offshore wind industry is able to further consolidate the cost savings that have seen it significantly reduce the levelized cost of energy (LCOE).

The work program will run to May 2020, during which time the design will be modeled, designed, tested, and commercialized by Chartwell. This will lead to opportunities for vessel operators and project owners to benefit from new, cutting edge vessel technologies.

The designs submitted were assessed primarily for their capacity to reduce emissions but also for their cost-effectiveness and safety advantages. This aims to spur further innovation in the industry while enabling the best technologies and designs to be promoted.

Chartwell is able to draw on years of naval architecture experience in the offshore sector to develop designs that are safe, cost-effective, and sustainable — while Seaspeed has proven experience in hull form development for challenging powering, maneuvering, and seakeeping requirements.

"The scope of the competition was broad, which gave us the flexibility to explore new avenues in vessel design," said Andy Page, managing director of Chartwell Marine. "We agree strongly with the Carbon Trust and OWA partners that sustainability should be a focus for support vessels in offshore wind — and this goes hand in hand with increased efficiencies across the board."

"At Chartwell, we have a strong track record in pioneering vessel designs that not only are ready for new hybrid technologies, but are also specified from the outset with efficiency in mind, helping low carbon industries like offshore wind increase their cost competitiveness," he said.

"We are looking forward to supporting the development of the four winning technologies, which have the potential to reduce emissions and fuel consumption in the offshore wind industry," said Dan Kyle Spearman, manager, Offshore Wind, the Carbon Trust. "SMEs, like Chartwell Marine and Seaspeed, have an important role to play in driving innovation, bringing their products and skills to support the cost reduction, and scaling of offshore wind."

"The maritime industry as a whole has come a long way in reducing emissions," said Stephen Phillips, managing director, Seaspeed Marine Consulting. "As the issue of climate change becomes more prominent, we are always looking to find new ways of creating cost-effective solutions for the emissions problem. We are honored to be able to use the award from the Carbon Trust to bring our latest R&D technologies into practice."

The OWA is a collaboration between the Carbon Trust and nine industry partners, that between them account for 76 percent of the installed offshore wind capacity in Europe. The initiative aims to drive down the costs of offshore wind energy and advise on best practice in health and safety.

MORE INFO www.chartwellmarine.com