Great Lakes transmission system helps offshore wind energy proposals

Challenges with developing projects in Great Lakes include icing

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By **CORINA RIVERA-LINARES**

Developers are banking on the calmer waters of the Great Lakes to build offshore wind energy, compared to the waves, tides and currents associated with the oceans, but challenges remain, including icy conditions. Still, optimism remains high.

According to the American Wind Energy Association (AWEA), there are 13 offshore wind energy projects in various stages of development spanning 10 states off the East and West coasts, as well as off the coasts of Texas and the Great Lakes

Those projects represent more than 5,100 MW of offshore development with turbine sizes ranging from 3 MW to 6 MW, and include **Cape Wind Associates**' Cape Wind project off of the coast of Massachusetts, **Fishermen's Energy**'s project off the coast of New Jersey, **Deepwater Wind**'s projects off the coast of Rhode Island, and the Lake Erie Energy Development Corporation's (LEEDCo)'s Icebreaker project in Cleveland Bay, off the coast of Ohio.

Cape Wind is owned by **Energy Management**.

AWEA also said that in December 2012, the U.S. Department of Energy announced seven winners, including LEEDCo's Icebreaker project, for its advanced technology demonstration project initiative, whose goal is to provide funding to verify innovative technology and help lower costs.

The Great Lakes Commission, an interstate compact agency, has taken positions on the need for regulatory clarity and federal coordination associated with working with states on regulatory elements of offshore wind siting, Victoria Pebbles, program director with the commission, told *TransmissionHub*.

The commission's involvement with offshore wind has mainly been as secretariat for the Great Lakes Wind Collaborative, which is a multi-stakeholder group whose mission is to advance sustainable wind development in the bi-national Great Lakes region, she said.

Among the efforts, the group has published a best practices guidebook and helped states do a request for information for offshore wind, she said.

Also, the group facilitated the review of a federal/state memorandum of understanding (MOU) on offshore wind in the Great Lakes that was signed by 10 federal agencies and five governors of the Great Lakes states in March 2012.

"[W]e have begun working with the White House Counsel on Environmental Quality to implement the MOU, which calls for developing a regional regulatory roadmap by June," she said.

Among other things, she said, "[T]he transmission element must be dealt with in order to have a robust wind industry," adding that such proposals as the Atlantic Wind Connection (AWC) on the East Coast are "important for us to look at."

AWC, which is led by **Trans-Elect Development Company** with **Atlantic Grid Development** as the project developer and **Google**, **Bregal Energy**, **Marubeni Corporation** and **Elia** as sponsors, could carry up to 7,000 MW.

Icebreaker

LEEDCo President Lorry Wagner told *TransmissionHub* that besides Icebreaker, the demonstration project in Lake Erie, other projects proposed in the Great Lakes include **Trillium Power**'s Trillium Power Wind 1 project.

"[S]omehow or other, we wound up being the poster child or the one out front and anytime you have something that hasn't been done before in an area, it's tough getting started," Wagner said. "I think what will happen is that once our project gets done, then everybody else is going to be saying, 'Hey, they did it, we can do it.'"

Icebreaker's proposed location is about seven miles from downtown Cleveland, Ohio. The project's size is still being determined but will be somewhere between 20 MW to 30 MW.

"The typical issue to wrestle with is if we put in nine wind turbines at 3 MW each, our cost of energy is going to be lower than if we put five turbines in but the total project cost of five turbines is quite a bit less, so it comes down to the financing and power sales that will really dictate the size of the project," Wagner added.

If nine turbines are built, the project will cost about $150m.

LEEDCo has already sold 25% of the project's output to the municipal utility, **Cleveland Public Power**, he said.

Also, the project has completed almost all of the environmental studies and will have all permits applied for this year, he said.

On the United States side, there are essentially two parallel permitting paths, with one involving the U.S. Army Corps of Engineers. Also, each state has a mechanism for gaining their approval. Ohio, for instance, has the Ohio Power Siting Board as its lead agency.

If all goes as planned, based on the timeline, in concert with the $4m DOE funding, LEEDCo hopes to begin construction in 2016, with the project entering service in 2017, he said.

Wagner said the project is fortunate to have the Lake Erie Loop, “which is a several thousand megawatt transmission system that goes around Lake Erie, and on our side of the lake, there’s actually five spots we can plug into. Some of them are decommissioned power plants or ones that will be decommissioned” in the coming years.

He said LEEDCo has had conversations with different developers about developing a utility-scale project in the future “where we would essentially partner with them and work on the permitting and the land lease and things like that.”

On benefits of developing offshore wind energy in the Great Lakes, he noted, “[W]e already have a tremendous transmission system, both in Lake Ontario and Lake Erie, so when you look at the infrastructure required, there certainly is a wealth of assets.”

Other benefits include that the lakes have freshwater, as opposed to the ocean’s salt water, and the waves are a lot less intense than in the ocean. Also, there is “tremendous manufacturing capability,” as well as great wind resources, no risk of hurricanes and relatively short distances to ports, he said.

One challenge with developing offshore wind energy in the Great Lakes involves that segment of the industry being new to the country, he said.

“We have a challenge where we are very good at what we do – we are industrialists – and in some respects, we created the modern world, but the downside is that as Midwesterners, we tend to be somewhat conservative,” Wagner said. “So, the biggest challenge is getting people to realize that we need to keep reinventing ourselves and we have to explore opportunities.”

Ultimately, it comes down to selling the power and getting the utilities to buy in, which is “really the toughest challenge,” Wagner said.

An engineering challenge involves lake ice, he said, noting that many structures have been built around the world in places where it ices over. “[W]e know how to do that and the challenge is to be able to do that more cost-effectively,” he said.

Trillium Power Wind 1

Trillium Power CEO and Director John Kourtoff told *TransmissionHub* that the company “pioneered” offshore wind in North America in the mid-1990s, with its first project registered in 2000. “We couldn’t obtain the rights to the lake bed on the Ontario side until 2004, so we applied as soon as that was available in the spring of 2004,” he said, adding that the company’s portfolio of four sites would account for about 3,600 MW.

The private investment required for the four sites would be about $14.8bn, he said, noting that the first site, Trillium Power Wind 1, is proposed in eastern Lake Ontario, would cost about $1.6bn and be up to 600 MW.

“There would be about 120 turbines at 5 MW,” he said, adding that Trillium had completed all of the studies and were ready to begin the regulatory hearings when the Ontario government decided to put a moratorium on offshore wind energy development.

Kourtoff said that just before the moratorium, Trillium was on track to obtain a feed-in tariff contract, “but since we were chopped, there was no ability to complete that.”

The company was also unable to obtain the final permit, or renewable energy approval, for the project due to the moratorium.

Kourtoff said Trillium has litigated against the moratorium and is optimistic in light of the change in leadership in Ontario. He said the province's new premier, Kathleen Wynne, is "a breath of fresh air," who is working on cleaning up the problems she inherited from the previous administration.

The Great Grid/Great Lakes Grid

On transmission, Kourtoff noted that Trillium has been proposing for many years 'The Great Grid' or 'Great Lakes Grid," which, he said is a bi-national opportunity that the U.S. and Canada must harness to strengthen the reliability of their electricity grids.

The idea is to have a cross-border grid that would tie together Canada, namely, Ontario, and the eight U.S. Great Lakes states and connect them through underwater HVDC cables from major connection points on the grid on the U.S. side and Canada, in the Ontario side, to move power to both sides of the border. Offshore wind farms and substations would be used as nodes, he said.

A similar proposal, he said, is the Supergrid, which according to the Friends of the Supergrid website, will be the transmission backbone of Europe's decarbonized power sector.

Benefits of developing in the Great Lakes include the consistent and "tremendous wind" resource that comes over the lakes, he said. Additionally, compared to ocean waves, the waves in the Great Lakes are smaller, with the average wave height in eastern Lake Ontario being less than three feet 94% of the time.

The climate conditions are also beneficial compared to the East Coast, which battles hurricanes and Nor'easters, he said. Furthermore, since there is no salinity, corrosion is not a problem. "[I]n some cases, in certain Great Lakes, compared to the North Sea and the oceans, it's like building in a bathtub," Kourtoff said.

Lake Erie is a bit more complicated, he said, as developers must deal with thick ice, which raises the cost of offshore wind energy development in that lake.

"[P]eople need to value that the Great Lakes won't be affected by rising oceans to that extent [as in the East Coast, for instance]," he said. "The power can be more reliable from the Great Lakes area on a bi-national basis, but it can only be more reliable if you have a solid, strong cross-border transmission grid to move the power that's generated. At the present time, the Great Lakes are not being used in a proper way to provide the quality, secure underwater transmission lines that could be there."

Ontario's moratorium

Pebbles said Ontario's moratorium, which was announced in 2011, affected the Great Lakes Commission because Ontario had been active in the commission's Great Lakes Wind Collaborative, which is a multi-sector coalition of wind energy stakeholders.

"When [the Ontario Green Energy Act of 2009] came out, it seemed like they might be the first jurisdiction in the Great Lakes that would move forward with some offshore wind project, even a pilot, but when the moratorium came out, their participation in our wind collaborative has been slow – it even stopped for a while," she said. "Now, we have their participation again, but they were more the leader before and now they're maybe just a low-level participant."

Pebbles noted that while Ontario said the moratorium was based on the fact that more scientific studies were needed: "I'm just not convinced that that was the full motivation for that. I think there [were] political considerations that came in and it was a combination of change in political leadership and negative responses from some of the coastal communities."

Andrea Arbuthnot, media and issues officer with the Ontario Ministry of Energy and Ministry of Infrastructure, told *TransmissionHub* that the Ontario Ministry of Environment said on Feb. 11, 2011, that the province would not proceed with offshore wind development until further science, regulatory work and coordination with U.S. partners is complete.

“Offshore wind, especially in freshwater, is still in the early stages of development,” Arbuthnot said. “We want to make sure that in Ontario it’s done right and that is why we are taking a cautious approach. There are thousands of land-based wind turbines worldwide, and Ontario has 35 years of experience with land-based turbine projects. More research and science is necessary before Ontario moves forward on offshore wind development.”

Arbuthnot said that any future decisions to proceed will depend on the length of time required to obtain an adequate amount of scientific study to develop a sound policy framework that is protective of the environment. “Ontario’s position is that we need to take a cautious approach to all potential offshore wind development,” Arbuthnot said. “We want to ensure the protection of the Great Lakes, coordinate with our U.S neighbors and ensure any offshore development in Ontario is protective of human health and the environment.”

Optimism for offshore wind's future

Jim Lanard, president of the Offshore Wind Development Coalition, told *TransmissionHub* that offshore wind energy provides an opportunity for economic development in the Great Lakes region, which has seen a reduction in the trained workforce related to the manufacturing of steel and the auto industry.

While governors of several Great Lakes states a few years ago saw offshore wind as a potential replacement for other industries, some of that enthusiasm has waned after elections when some of those governors left office, he said. Therefore, the coalition is “hoping that [LEEDCo’s Icebreaker project] serves as a catalyst and as an inspiration for government decision-makers and other stakeholders up there to be engaged and really push offshore wind in an aggressive way,” he said.

He also noted that since the states own the lakebed floor, the federal government would not be the landlord. “[T]he whole leasing process would be managed by the state, which is the same entity that’s going to be involved with the selection of the developers and the markets where those developers would sell their power,” Lanard said.

Kourtoff said offshore wind energy development should not happen ad hoc. “There needs to be a sensible plan as to where power will be built out from the beginning,” he said.

Offshore wind should be considered jointly among the U.S. states surrounding the Great Lakes and Ontario. Parallel to that, he added, the independent system operators need to coordinate their actions so that transmission is planned adequately.

Wagner said he is optimistic that offshore wind energy will be developed in the U.S. While projects off of the Atlantic Coast and in the Great Lakes have moved forward, “their ultimate challenge probably has come down to either selling the power or the permitting,” he said.

Also, the industry faces a non-level playing field, he said. The federal government has, in the past, paid for original projects in other industries like nuclear energy, and then put policies in place so that those industries could be immediately cost effective, but it has only partially funded offshore wind energy.

“[Y]ou’re subsidized, but your competition is subsidized more, so when you try to sell, people go, ‘Why, should I buy from you?’ and essentially, we’re selling the future,” he said.

Wagner added, “A lot of times, I feel like the Wright brothers,” noting that if they had listened to the naysayers, instead of traveling by plane “we’d still be walking and riding on horse carriages.”

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