May 20, 2022

Board of Public Utilities
44 South Clinton Avenue, 1st Floor
Post Office Box 350
Trenton, New Jersey 08625-0350

Re: Docket No. QO20100630

Please accept Community Offshore Wind's ("COSW") response to the New Jersey Board of Public Utilities' ("NJBPU") detailed questions related to the State Agreement Approach ("SAA").

1. **What are the most significant risks to completing your OSW generation project(s) on time and within budget if your project relies on one or more SAA transmission projects? How can those risks be best mitigated?**

    The biggest risk is that SAA Projects are not operational in time to begin WTG commissioning. The risk varies with scale or SAA upgrades. In the instance of Option 1 projects where the onshore POI is already available, there is less risk that upgrade work would prevent on time commissioning since the grid connection could be available, even if not to the full OSW output (subject to a PJM interim deliverability study). In any case, full grid access will be required to reach commercial operation and completion of the project.

    More ambitious projects carry higher risks. Nominally the expected COD pushes close to the required timeline for WTG commissioning. There is generally increased construction risk that put further pressure on OSW delivery timelines. Interconnection between the SAA project and OSW becomes more complicated as well.

2. **For new Bureau of Ocean Energy Management ("BOEM") leaseholders, are there concerns about obtaining a PJM queue position given that a Board decision on the SAA may constrain the potential points of interconnection ("POIs") for future New Jersey OSW projects? Please describe the considerations related to utilizing SAA POIs and how OSW developers might switch from their queue positions (if already acquired) to the SAA-provided POI.**

The risk is that we cannot enter the queue with a POI that does not yet exist. It's unclear when PJM would officially recognize a new POI and allow an OSW developer to select the new POI in an existing interconnection request.

Switching the POI of a preexisting queue position may be allowed but may also trigger material modifications or require an entirely new queue position. The process of switching POIs is likely to be deemed material by PJM, as it could increase the cost allocation of other Interconnection Customers assuming there are other projects trying to connect in the area.

The implementation of the newly proposed PJM Queue Interconnection reform could add additional schedule issues to the ability to change POIs. Assuming FERC approves the new process, new projects in queues AH2 and beyond may need to wait until Q3-2023 to enter the PJM queue for a new POI. Also, once the Phase 1 cluster study starts in Q1-2026, there could be limited instances within the cluster process to modify POIs.

3. **If the Board were to select one or more Option 2 proposals under the SAA—onshore substations to offshore collector platforms (see, the November 18, 2020 Board Order under this same docket for more information on the Options[1])—please provide additional details and considerations for connecting and coordinating OSW generation projects in terms of the costs, timing and operability of the OSW generation projects.**

The offshore collector platform needs to be complete before the OSW developer could begin commissioning of WTG. If full grid connection is not available that WTGs are to be commissioned OSW developers would need to run fossil generators for partial commissioning. This can add considerable costs and environmental impacts. For full commissioning, synchronization and eventual commercial operation access to grid through the offshore platform will be needed.

Developers also need to know the specifications of the offshore platform with enough advanced noticed to begin design on offshore route, cable size, and P&C schemes. Developers will need guidance on the appropriate point of interface between systems.

Both transmission and OSW developers will need to know the total number of cables expected on the platforms. How many bay positions and at what voltage will the offshore platforms require? How will developers manage cable crossing if more than one developer is interconnecting into the same platform? Essentially design of the offshore wind export cannot begin until these and other questions are answered, adding considerable time, perhaps years, to the project.

A major consideration would be the location of the offshore collector station. In some locations a 66kV array cable can be feasible, but if it is too far away it may trigger the need for additional 66kV cables or even the need to step up voltage to get to the collector station, which would require another platform.

4. **If the Board were to select one or more Option 3 proposals under the SAA—offshore network connecting lease areas and substations to each other—please provide additional details and considerations for connecting and coordinating OSW generation projects in terms of the costs, timing and operability of the OSW generation projects.**

Option 3 presents all the same risks as Option 2 plus additional market and operational uncertainty. For both Options 2 and 3 to work, offtake agreements should have mechanisms to adjust revenue and risk in the instances where those systems are not available.

From a commissioning perspective, interconnection of the collector platforms will require system outages and downtime OSW projects should be compensated for downtime during these outages

If such an offshore network is selected, it would be important to share technical details with developers. In particular, there should be information on how the Option 3 would be integrated in the market and how LMPs would be defined. This would be important so developers can perform analysis to understand commercial risk such as congestion and curtailment. It would be important as well to understand how this network would be built over time, and what would be the final design injection capacity at each offshore substation.

Whether the offshore network and onshore connections are AC or DC will impact the degree of market issues. Full DC control mitigates some market issues because flows can be directed. However, no such offshore DC grid yet exists anywhere in the world.

5. **If an SAA Option 2 or Option 3 proposal is selected, is there any situation in which an OSW generation project would not be able to use the SAA Option 2 or Option 3 solution?**

If the collector platforms in Option 2 or Option 3 have adequate space to accommodate AC interconnection, then an OSW develop should be able to connect.

6. **How should the Board consider the optimal locations for Option 2 substations? Should such determinations occur at the time of the Board's SAA decision or following the Board's OSW generation solicitations? If the location is determined *after* the generation solicitations, what type of coordination between generation and transmission developers would be required?**

OSW developers will need approx. locations to develop cable cost estimates. Selecting beforehand would give clear preference/advantage to lease areas located close to the platform location. A major consideration is which locations will be able to reach the Option 2 offshore substation with 66kV array cables, or which ones will need to step up the voltages which would require another offshore substation.

Selecting after OSW award, allows NJBPU to minimize total cost by optimizing between winners. NJBPU could include a cost adjustment mechanism in the contract structure to mitigate cable cost uncertainty.

7. **Describe if and how the primary transmission line technology used for the Option 2 proposal, HVAC or HVDC, affects the development – timing, sizing, locational considerations and costs – of new OSW projects.**

The optimum technical and economic solution will be very dependent on the location of the POI, the length of the export cable and the size of the project so there is not one-size-fits-all solution.

Option 2 HVAC solutions may not be technically optimum for leases further away from shore. Developers would need to know the length of each solution (either HVAC or HVDC). For HVAC connections beyond 70-80km, there need to be studies to understand the need for mid compensation to offset cable charging and allow for the delivery of power.

If the transmission solution is HVDC, the expectation is that OSW developers would connect to that platform via AC. First, there would be concerns about coordinating the HVDC systems. Second, the HVDC collector stations would need to be located within 70-80km of the OSW developer's collector platform, since this is the limit of HVAC technology without mid compensation.

Below are additional notes on the tradeoffs between different transmission configurations:

Offshore AC substations:

- ***Transmission Network***: more expensive than onshore AC substation, longer lead time and design certainty likely to be required at an earlier stage for interface with OSW.
- ***OSW Developer using AC transmission*:**
    - If offshore substation located close to, and in consultation with, OSW developer, potential to connect OSW arrays directly and hence avoid need for OSW developer to deliver transmission assets.
    - If offshore substation located close to shore, this avoids the OSW developer delivering nearshore, landfall and onshore works.
- ***OSW Developer using HVDC transmission:***
    - Offshore AC substations would be cost inefficient if there is a need for HVDC transmission to shore (due to route length). The OSW converter platform would transmit HVDC power requiring conversion back to AC before connection to the offshore substation

Offshore HVDC substations:

- ***Transmission Network*:** more expensive than onshore AC substation, longer lead time and design certainty required much earlier.
- ***OSW Developer using AC transmission*:**
    - Transmission link to shore could instead connect to HVDC platform. Avoids OSW developer delivering landfall and onshore transmission assets
- ***OSW Developer using HVDC transmission:***
    - If located close to shore, then a multi-vendor, multi-terminal HVDC system required? i.e., Onshore and offshore transmission network HVDC converters, plus developer selected offshore HVDC converter?

8. **For an Option 2 or Option 3 scenario, do you believe that the selection of HVAC or HVDC will affect the ability to receive federal funding that may prioritize "innovative" technologies? Please address availability of federal funding for transmission and/or federally backed loans/loan guarantees.**

    No comment.

9. **Describe how risks of cable outages are managed with HVAC versus HVDC technology, particularly where using large single HVDC lines for any offshore segment.**

In either arrangement cable outage risk is managed at the design phase via a robust Cable Burial Risk Assessment. The assessment seeks to identify all risks to the cable over its expected operational life and design measure to mitigate identified risks. Mitigation could take the form on increased burial depths, or additional cable armoring or laying of protective stone mattresses

When a failure does occur, the impact varies between system design. HVAC can operate at partial output utilizing the cable legs that are not damaged, if the cables were laid with adequate spacing to allow for repair work to proceed on the damaged segment.

The outage impact of HVDC differ across the topologies available. An outage of an HVDC monopole brings whole system down. An HVDC Rigid Bipole configuration (two HVDC cables) could handle a converter pole outage and operate at 50% but a cable outage would bring the system down until repaired. An HVDC Bipole with a metallic return cable (2 pole cables + 1 metallic return) could give 50% capacity in case of either a converter pole issue or a single pole cable issue.

10. **For an Option 2 or Option 3 scenario, please address whether an HVAC or HVDC would better integrate into a multi-state or multi-regional offshore wind transmission grid? Should coordination or future computability opportunities affect the Board's evaluation of proposals?**

The answer to this question may require additional system-wide power system studies. DOE and NREL are currently performing an Atlantic Offshore Wind Transmission Study. These large-scale, long-term planning studies are key to understanding the economies of scale and additional reliability and resource adequacy benefits that a multi-state, multi-regional offshore wind transmission grid could yield.

For the type of goals that States are setting, and assuming future leases would be further away from shore, HVDC-VSC is the more advanced technical solution for GW scale transfers between States and regions. While these type of HVDC grids will require extensive development and are capital intensive, HVDC vendors and consultants are stating that the technologies necessary for a multi-vendor, fully integrated HVDC (such as the DC breaker) are already available (or should be available for full market implementation in few years if there is enough demand). HVDC may also provide other advantages such as full control of flows in order to improve reliability, resource adequacy and minimize congestion, and they also can provide ancillary services and be integrated in parts of the system that have weak grids.

11. **How does the selection of an Option 2 transmission solution affect the permitting risk for OSW generation projects? What about an Option 1b?**

Option 2 mitigates OSW permitting risk if the platform is located in federal waters. May complicate BOEM COP if details of Option 2 platform are not known.

Option 1b mitigates some onshore permitting risk for developers as it reduces the onshore transmission requirements. However, information on these locations would need to be made imminently as works on routing and siting for the project are underway and land discussions would need to be restarted. No change in offshore permitting risks.

12. **Please share any other important risks associated with an Option 2 solution that can impact project development.**

Contractual arrangements will need to consider appropriate measures to compensate OSW for production time lost due to downed export facilities.

From an operations perspective arrangement will need to work out access to the Offshore platform for regular and corrective maintenance.

13. **Through what mechanisms should the risk of Option 2 or Option 3 cable failures be allocated? Does the potential risk for failure impact the preference for HVAC versus HVDC cables?**

Developers should be compensation for lost production in either case. Risk should be borne by the Transmission Owner. With the SAA TO carrying risk it should be their discretion on technology choice and risk profile.

14. **If an Option 2 or Option 3 proposal is selected, please detail the potential reliability and economic benefits.**

Option 3 allows for wheeling power, which may improve total system uptime and reduce curtailment risk. Such a configuration will need to study limitations of neighboring connections to shore.

If platforms in Option 2 or 3 are located in close proximity to OSW, the projects may be able to connect directly, removing need for offshore platform and transmission cables of their own.

15. **For the build out of transmission facilities under the current generator radial lines approach, please provide additional details and considerations on the costs, feasibility, timing and operability of requiring OSW developers of future projects to utilize certain specified technology types, including potentially identifying common Original**

Equipment Manufacturers, requiring mesh-ready[2] offshore substations, or other future-proofing specifications. Further, please detail the anticipated coordination that would be required to eventually interconnect between mesh-ready substations, including any anticipated unavailability of OSW generation or other foreseeable risks.

Any sort of 'future proofing' brings the risk that the upfront capital may potentially go unused if the anticipated future does not materialize.

Specifying a single OEM will drive up costs by giving those vendors tremendous selling power. OEMs need clear guidance on the expectation and design details to build solutions. Engineering and delivery timelines for HVDC systems is upwards of 5 years. The details need to be in place at the front to ensure solutions are delivered.

16. **For an Option 2 and Option 3 proposal, please provide additional details and considerations on the costs, feasibility, timing and operability of requiring OSW developers of future projects to utilize certain specified technology types, including potentially identifying common Original Equipment Manufacturers, requiring mesh-ready[3] offshore substations, or other future-proofing specifications. Further, please detail the anticipated coordination that would be required to eventually interconnect between mesh-ready substations, including any anticipated unavailability of OSW generation or other foreseeable risks.**

No comment

Thank you for your consideration of COSW's comments.

Sincerely,

Kate McKeever
Vice President, Government Affairs Offshore U.S.
RWE Renewables Americas, LLC
Acting on behalf of Community Offshore Wind
A joint venture of RWE and National Grid Ventures
M +1-325-267-0842
Kate.mckeever@rwe.com