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a conEdison, inc. company

November 14, 2022

VIA ELECTRONIC DELIVERY

Carmen D. Diaz
Acting Secretary of the Board
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RE: In the Matter of the Opening Of New Jersey's Third Solicitation for Offshore Wind Renewable Energy Certificates, Docket No. QO22080481

CON EDISON TRANSMISSION COMMENTS TO REQUEST FOR INFORMATION

Dear Acting Secretary Diaz:

Con Edison Transmission, Inc. ("CET") submits the attached comments to the New Jersey Board of Public Utilities' ("the Board") October 28, 2022 Request for Information for the above reference matter.

We appreciate the Board facilitating an opportunity for stakeholders to provide input in the planning of New Jersey's third solicitation for offshore win. As participating developer in the Board's recent State Agreement Approach ("SAA process"), we hope our comments offered below provide valuable insight to facilitate the cost-effective achievement of New Jersey's ambitious offshore wind goals.

Please contact us if you have any questions.

Respectfully submitted,
/s/ *Marie Berninger*

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CON EDISON TRANSMISSION COMMENTS TO REQUEST FOR INFORMATION

CET is responding to the Board's request for information as a Qualified Developer in PJM Interconnection ("PJM") and participant in New Jersey's recent SAA transmission solicitation to support offshore wind ("OSW"). The importance of well-designed transmission solutions for cost-effective OSW development cannot be understated. CET brings years of experience in offshore wind transmission and development of transmission solutions in the Northeast and has brought considerable expertise to our OSW partners to propose reliable, effective interconnections into transmission systems.

Achieving New Jersey's OSW goals in a cost-effective manner will require detailed planning and coordination, especially as the Board contemplates the development of robust, shared transmission corridors that may require phased development and construction. The comments offered below in response to the Board's questions provide suggestions on how to best facilitate this coordination.

In addition, we offer general comments on development of transmission for OSW to align on overall goals that would provide maximum long-term value for customers. As the Board correctly acknowledged in its SAA Order[1] there is significant value in independently designing, constructing, and owning coordinated transmission infrastructure to interconnect and deliver OSW generation. However, in the recent SAA process the Board declined to move forward with offshore and onshore transmission corridor solutions because of the opportunity for savings to customers resulting from the federal Investment Tax Credits ("ITC") as they might apply to high voltage direct current ("HVDC") generator lead lines.

CET encourages the Board to consider how <u>both</u> the full ITC associated with capital investment in the generation lead line <u>*and*</u> the benefits of independent transmission can be preserved and ultimately captured, including developing a regional and ultimately inter-regional meshed network grid that can be constructed to support improved reliability, resilience and access to clean power for customers in New Jersey and along the eastern seaboard. We believe this can be achieved through commercial partnerships between and among

[1] New Jersey Board of Public Utilities Order on the State Agreement Approach SAA Proposals No. 8A, October 26, 2022; Docket No. QO20100630.

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transmission developers and generation developers, and the Board should encourage OSW bidders to partner with a transmission developer in this next OSW solicitation. The role of the transmission developer not only improves the transmission solution, it also sets up a structure where the ownership and operation of the transmission assets can be transferred to the transmission partner after the full ITC benefits are realized (5 years post commercial in-service date). This structure also captures the benefits and preserves optionality of independent transmission development and long-term ownership in the event that the HVDC elements of the generator lead line are not eligible for the ITC, or if it is more economical for the OSW project to utilize Production Tax Credits ("PTC"s). Finally, structuring the procurement to encourage and enable independent ownership of transmission infrastructure will facilitate future expansion and simplify operation of shared Prebuild Infrastructure. Moreover, the Board may be able to specify some elements of such a structure so that expansion, including developed of a meshed network, is more easily implemented as it is studied and planned in coordination with system operators.

<u>Design Considerations for the Prebuild Infrastructure</u>

1. Please identify any requirements that should be included in the solicitation guidance document ("SGD") to support the design and timely construction of the Prebuild Infrastructure. Please provide any recommendations for specification of these requirements.

Consistent with the objective of minimizing cost and environmental / community impact, the SGD should seek to clearly specify key elements of the Prebuild Infrastructure for New Jersey's third OSW solicitation. Clarity on these elements is necessary to successfully capture the synergies of this approach and achieve smooth integration of multiple HVDC cables into the corridor as multiple offshore wind projects come online. The following are details that we recommend the SGD specify:

- That the Prebuild Infrastructure contemplates building underground conduits and cable vaults for one HVDC cable, with room for three additional HVDC circuits (or a different number, as desired by the Board for future growth and potentially a spare for reliability and resiliency as a meshed network is developed);

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- Whether all four cables should make landfall at the same property, or multiple landfalls on different parcels;
- Whether this corridor would include all four duct banks from the horizontal directional drill ("HDD") landfalls to the Larrabee Tri-Collector Solution, or if there is a benefit / option to split duct bank routing at certain pinch points (e.g., onshore trenchless crossings where HDD offsets would be required);
- Separation distances between each circuit;
- Requirement for cable vaults / manhole as opposed to direct buried splices. The former is necessary if the duct banks are to be built prior to installing cable, and is also desirable for ongoing operations and maintenance;
- That cable vaults / manholes should not be shared between circuits, each circuit needs its own set of vaults / manholes for reliability;
- The desired number of spare duct banks, if appropriate;
- The desired number of conduits for fiberoptic communication cables to be included in the duct bank;
- Laydown areas for future cable pulling operations (both initial and future).

2. Are there major challenges or significant limitations to installing up to four circuits for independent projects in a common ROW? If yes, please summarize the nature of these challenges/limitations.

There are several physical and electrical design challenges to installing four circuits within a single right of way ("ROW"), specifically within public ROWs and at trenchless crossing locations. From a physical perspective, the footprint of four circuits within a road or public ROW may necessitate road closures and traffic impacts during construction. Meetings and collaboration with the New Jersey Department of Transportation and with local communities will be required to determine and develop acceptable traffic management planning. At HDD and other trenchless crossing locations, the duct bank alignments will need to be offset 40' to 50' from each other. This will necessitate additional construction workspace that may be challenging for a single transmission corridor. Finally, if the transmission corridor is sited within an existing utility corridor, any routing will have to take into consideration the existing overhead infrastructure (e.g., tower foundations).

An option to mitigate overall duct bank footprint would be to install the duct banks vertically. This makes the transmission corridor cross-section narrower, but also deeper. In cases with shallow groundwater or where soils may be contaminated, this may not be a viable solution. In those cases, a wider/shallower duct bank alignment would be required, and this will increase the ground disturbance along the transmission corridor.

Electrically, there are concerns with installing all four circuits in close proximity and may require considering de-rating of the cables power transfer capacity for a given conductor size, potentially increasing the cable sizes required. We recommend that the project be designed to ensure resiliency and reliability so that one circuit is not affected or damaged at same time as any of the others to limit power transfer loss due to fault or damage. This would require not sharing manholes/vaults. With all four circuits in the same corridor, the design must stagger the vaults (to minimize overall transmission corridor footprint). However, the overall transmission corridor will be extensive and finding space for all the separate manhole/vaults could be challenging and may lead to more existing utility interferences that will need mitigation.

<u>Cost Recovery Structure for Costs Associated with the Prebuild Infrastructure</u>

3. **Board Staff expects to require applicants to submit separate an OREC schedule for their offshore wind project with and without the Prebuild Infrastructure included. Over what period of years should the cost of the Prebuild Infrastructure be recovered?**

The cost of the Prebuild Infrastructure should be recovered over at least the term of the OREC contract, if not over a longer life. Costs of transmission are typically recovered over a longer life of 40 to 50 years, which can save customer money. The Board could consider an approach that anticipates the transfer of transmission ownership (and associated Prebuild Infrastructure) to an independent transmission owner once full federal tax benefits are realized; this structure could facilitate a transition to regulated cost recovery of the transmission and Prebuild Infrastructure post OREC contract, capturing the savings of a longer recovery timeline that is typical with transmission assets.

Construction and Operating Considerations for the Prebuild Infrastructure

4. **What terms and conditions for construction of the Prebuild Infrastructure between the Board and constructor should be specified in the SGD?**

Generally, the construction of the Prebuild Infrastructure should not be much different from any other component of the combined generation / transmission project. Presumably, the Board wishes the Prebuild Infrastructure to be built at the same time as the initial HVDC circuit to interconnect the selected offshore generation project. Accordingly, the Prebuild Infrastructure should be constructed in parallel to avoid additional cost inefficiencies of multiple mobilizations and disturbance to the surrounding community and environment.

5. What terms and conditions for operation of the Prebuild Infrastructure between the Board, constructor and future users should be specified in the SGD?

The terms and conditions for the maintenance and operation of the Prebuild Infrastructure, including any repair of the Prebuild and/or energized cables could be complex assuming different ownership of the two components (duct banks vs. cables). To the extent each conduit or apportion of the underground civil infrastructure associated with each circuit could be discretely owned and transferred post-construction to the owner of the energized HVDC circuit, the ongoing terms for operations and maintenance would be significantly simpler and easier to administer over the life of the asset.

If the Prebuild and the HVDC circuits remain owned by different entities, the first priority should be to endeavor to have a single O&M Provider manage the duct bank and cables, if possible. An independent transmission owner / operator would be an ideal option.

Cable failures that are caused by integrity failures of the duct banks, adjacent cable failures, contractor damage, other external factors, and/or any other ambiguous failure could raise challenging issues with respect to the cost of repair, and any other potential adverse effect to the offshore generation facility energy delivery, especially if an offshore mesh network is not in service. Failure to clearly specify roles, responsibilities and limitations for additional operational costs could lead to extended outages, lengthy litigation and ultimately materially adverse outcomes to customers. The Board should make the cost and liability responsibility of the Prebuild Infrastructure owner clear up front, so that both the initial developer and future users are clear about the full slate of operational risks they must price into their projects. Additionally, the Board should designate an entity responsible for cable repair, and provide certainty of cost recovery, regardless of the reason for the outage. This will safeguard against extended outages that are due to finger pointing and litigation over cost responsibility. Well-developed contract language should be offered up front to reduce ambiguity and future conflict.

6. Are there any potential challenges for cable installation in the Prebuild Infrastructure for future solicitation awardees? If yes, how might they be mitigated?

Prebuilt duct banks left vacant for several years without any cable inside may create several challenges for subsequent cable installation and could require additional work to ensure the structure is in good condition for the future cable installs. At a minimum, the duct banks should be maintained for the time horizon contemplated for cable installation, plus a safety factor. This may come at additional cost. However, despite best efforts, the integrity of duct banks can be compromised due to external factors. Often the partial or complete collapse of a cable duct bank does not affect the operation of the underground cable, rather it usually only becomes problematic upon replacement when new cables need to be pulled through the conduit. Similar to spare duct bank installation, sometimes this same issue is encountered with a vacant duct bank prior to the initial cable pull that occurs years after the initial duct bank construction. Responsibility for repair costs should be made clear up front.

Additionally, the Prebuild Infrastructure should be designed and constructed with the future cable installation in mind, with cable duct banks and splice vaults sized for specified cables and accessories. The Prebuild Infrastructure specification should contemplate the possibility of potential changes to technology and future solicitation requirements such as increase in cable diameters or future requirements that require larger cable vaults. The specifications should provide for these possible changes by either upsizing the size of the duct banks and vaults for future use and considering spare duct banks. Future cable installation will also require additional permits as roads will need to be closed to access manholes, space will need to be provided for cable pulling equipment, manholes and duct banks may need to be de-watered and cleaned before pulling cables.

7. **Please identify any potential adverse cost or schedule implications ascribable to the Prebuild Infrastructure as it relates to awardees of future New Jersey offshore wind solicitations. How might these impacts be mitigated?**

Potential adverse cost impacts associated with the Prebuild Infrastructure could be seen with civil work requirements. If a wider or deeper excavation is needed for duct banks or additional unanticipated excavation for vaults and manholes, there would be extra costs through more duct banks, concrete, dirt disposal, sheeting, shoring, dewatering, and potentially slower installation production to dig and install additional duct banks in every foot of trench. However, building this infrastructure in parallel with the generator lead line will reduce the amount of construction work that needs to be remobilized for subsequent HVDC lead lines, and should save time and expense over the long-run.

Further, if future solicitations do not use the Prebuilt Infrastructure, there could be sub-optimal use of the Prebuild Infrastructure. The Board should make it clear that full cost recovery will be provided to the constructor of the Prebuild Infrastructure regardless of change in procurement philosophy that may lead to an underutilization of the Prebuild Infrastructure.

<u>**Enabling Potential Future Development of a Mesh Network**</u>

8. **Do you have any general recommendations regarding how preparation for a future mesh network can be implemented in the Third Solicitation?**

Preparation for a future mesh starts with standardization of requirements for an efficient and effective build-out of the mesh over time. Standardized requirements are critical because the mesh only works if all meshed elements are using the same voltage and compatible equipment.

First, the Board should target between 300 and 600 MW transfer between each offshore wind platform utilizing 230kV AC submarine cables. While this may change over time as technologies advance, and while this specification is not the only option, it achieves a reasonable balance between the reliability value of the offshore mesh and the cost to implement. Further, it is consistent with NYSERDA's meshed ready requirement as specified in its open ORECRFP2022-01 and will thus facilitate a shared mesh between New York and New Jersey that may materialize among the same NY Bight lease areas.

Additionally, CET suggests a separation of the mesh and offshore converter station platforms as this enhances flexibility for future connectivity and reduces risk of unutilized installed capacity. Lastly, CET recommends that the generators should have modular offshore substations and converter stations so mesh ready components can also be as modular, flexible and as standardized as possible. Last, the structure that allows for flexibility for future enhancements will allow for technology improvements in design that might increase transfers among offshore converter stations and may also allow for effective use of spare transmission capacity that can bring power to shore that will enhance overall reliability and resilience in a regional and inter-regional structure.

9. What additional equipment would need to be specified and installed at the time of project construction in order to enable future connectivity to a mesh network, as opposed to equipment that would not need to be installed until the mesh network is implemented?

As this question contemplates, a mesh design philosophy should be established and shared with all interested stakeholders up front. The key issues that need to be optimized and addressed include system voltages for generation (typically 66kV) and mesh grid voltage (we recommend 230kV), electrical equipment requirements, such as transformers, breakers, and distance limitations between platforms. The design philosophy would also address space requirements for potential reactive compensation equipment, filters, and overall mesh controller along with its communications needs.

During initial construction phase, offshore converter stations are typically pre-built with all equipment installed at a shipyard and floated out to the lease area to be lifted onto the foundations offshore. If a separate platform is used for mesh ready equipment, the space for mesh related transformers, reactors and other equipment would not have to be specified during the initial construction phase. However, if this is done on the same platform as the offshore converter, space for such equipment would need to be specified and provided for. There is likely a cost trade-off between achieving flexibility with a modular design and separate platform and oversizing a single platform for future equipment. Depending on which approach is taken, different combinations of equipment could be built later when the mesh is built out.

Additionally, the initial project should consider standard compatible electrical equipment and associated protection schemes for the future mesh. There should be standardization of the mesh voltage, power transfer, reactive compensation, and harmonic considerations for all mesh ready converters. The developers may also need grid forming converters and have synchronizing ability to raise or lower frequency as needed.

During the time when the mesh network is installed, the specified standard equipment should be used. There should also be additional communication and protection devices installed as well as coordinated with the existing system for a reliable operation between the mesh.

Finally, CET strongly recommends that the offshore mesh when implemented is independently owned and operated, for many of the reasons the Board has already identified, which is consistent with the long-standing principle and value of independent transmission ownership for the onshore grid.

10. What physical requirements would enable the offshore substation to support the additional equipment, including additional platform space?

If using an approach where mesh network equipment is included on the exiting platform, that platform must provide for sufficient space, with adequate clearances, to allow equipment required for lifting and

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handling of equipment not pre-installed. If the mesh platform is separate, there is still a need for the access to such area for its modular construction. Other considerations may include provisions for a more distant connection, via DC through a converter, to a farther adjacent converter (i.e., interregional interconnection). There may also need to be changes to equipment ratings in future due to a possible change in short circuit current depending on the complexity and distance of the mesh connections.

11. How would your suggestions regarding what engineering, operational and/or regulatory information should be specified in the SGD to support a future mesh network differ if the mesh network includes (i) only New Jersey projects, (ii) New Jersey and other PJM states' projects, or (iii) New Jersey, other PJM states and downstate New York projects?

Once standard requirements are set and they become the industry standards, these standards can be followed by adjacent states to facilitate connection and operation of the mesh similar to the onshore grid (*i.e.*, in particular New Jersey should coordinate and standardize its requirements with New York and potentially other PJM states).

It is critical that in all scenarios, the offshore mesh network is owned and operated independently from generation. This will ensure independent, cost-effective operation of the offshore transmission system. The operation of the mesh should be coordinated through PJM and/or jointly coordinated with NYISO. Efficient operation of a mesh is feasible using a standardized approach to the mesh design and control philosophy similar to the existing onshore grid interconnection and operation. Procedures for how outages are managed, and equipment is repaired should mirror those used for the onshore grid. Moreover, PJM should have the ability to monitor power factor, voltage, and frequency and control as needed.

12. What might be the advantages or disadvantages associated with the Board's adoption of the mesh network framework put forth by NYSERDA in ORECRFP22-1?

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There are numerous advantages to a standardized mesh design and control philosophy between New Jersey and New York and will facilitate in interregional offshore grid. In fact, since New England is also considering an offshore meshed grid, they should also be included in discussions. It will add reliability and resiliency to the overall transmission reliability and resiliency to the region and offshore grid. Further, it will likely be the same lease areas in the NY Bight that will supply offshore wind energy to both States. The meshed ready design specification put forth by NYSERDA in its ORECRFP22-1 is a good example of a reasonable and reliable design for the offshore mesh network that the Board should consider adopting in part or in whole. The only principle we believe requires further thought is the independent operation of the mesh network, which we think the NYSERDA RFP could further elaborate on with respect to how it relates to the NYISO. We encourage the Board (in coordination with New York) to leverage the established independent operation at PJM and NYISO as the foundation for how the offshore mesh should be operated. Not only do these independent entities have the infrastructure, procedures and expertise to do so reliability and efficiently, the two regional operators have extensive expertise in coordinating with one another over decades.

13. What voltage would you recommend for the future mesh network and why?

Availability of materials and should be considered to accommodate the future offshore mesh network. Currently 230kV three-core submarine AC cables have the most availability and are capable to support large power transfers over long distances. The cable suppliers and the wind industry are considering adopting 275kV voltage, but it is unclear if this small increase in power transfer is beneficial to mesh systems. It is recommended to keep the voltage level at a standard well established 230 kV level.

<u>Other</u>

14. Please provide any additional information that you would like Board Staff to consider in development of the SGD.

No additional comments.

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