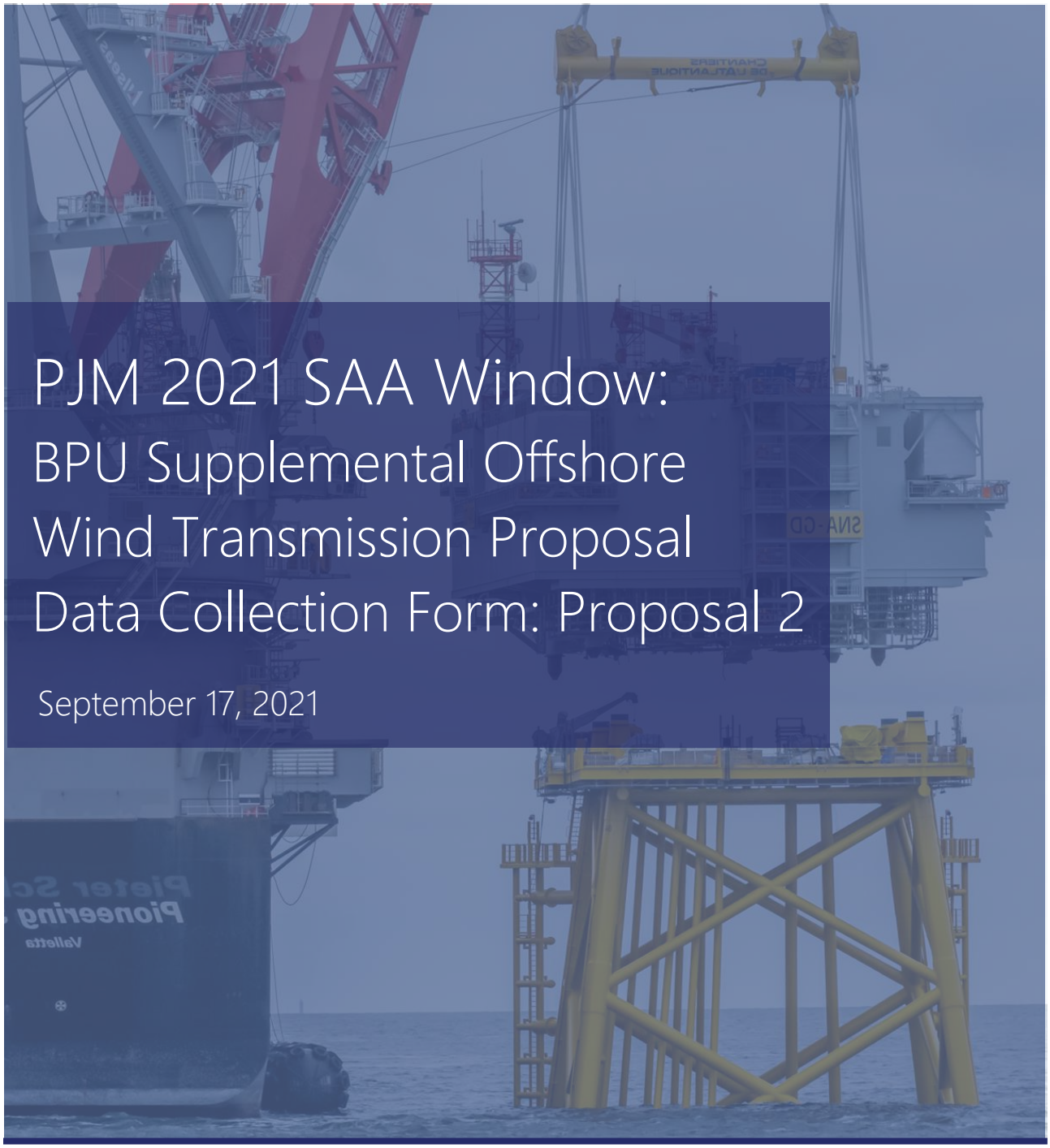
Mid-Atlantic Offshore Development



PJM 2021 SAA Window: BPU Supplemental Offshore Wind Transmission Proposal Data Collection Form: Proposal 2

September 17, 2021

MID-ATLANTIC OFFSHORE DEVELOPMENT

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I. Introduction

This proposal is being submitted by Mid-Atlantic Offshore Development, LLC (Mid-Atlantic or MAOD), a 50/50 joint venture of EDF Renewables North America (EDFR) and Shell New Energies US, LLC (Shell New Energies). EDFR's parent is Électricité de France S.A., one of the world's largest electricity generators. Shell New Energies is an affiliate of Shell Oil Company US, which is a subsidiary of Royal Dutch Shell plc (Shell), the fifth largest company in the world when measured by revenues, which operates technically complex energy facilities in harsh environments where reliability is critical. Both companies have extensive experience in transmission development, construction and operation as well as offshore wind generation.

EDFR and Shell New Energies have a separate 50/50 joint venture, Atlantic Shores Offshore Wind, LLC (ASOW), which is developing a BOEM lease area with the potential for upwards of 3,000 MW of offshore wind and was awarded an OREC contract by the Board of Public Utilities (BPU) on June 30, 2021. Mid-Atlantic has a separate and distinct management team from ASOW and operates independently. [redacted]. Mid-Atlantic will be providing transmission service on an open access basis and is offering flexibility with respect to the location of the offshore HVDC platforms to meet market needs. Mid-Atlantic is proposing a state-of-the-art offshore transmission system providing a high level of reliability and a strong constructability.

II. Project Proposal Identification

Proposing Entity Name:	Mid-Atlantic Offshore Development, LLC (Mid-Atlantic or MAOD)
Company ID:	MAOD
Project Title:	Option 2 MAOD Proposal 2
PJM Proposal ID:	2021-NJOSW-551

III. Project Summary

Narrative Description of Proposed Project

Provide a narrative description of the project(s) proposed in response to the PJM Problem Statements describing primary technical features, interconnection points (default or alternative POIs) and the associated transfer capability, timeframe for development, and how the project(s) will support New Jersey's policy to cost-effectively develop 7,500 MW of offshore wind.

[redacted]

TABLE III-1: SUMMARY OF MID-ATLANTIC OPTION 2 PROPOSAL 2 TECHNICAL SOLUTION

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

The HVDC circuits' commissioning dates (COD) have been defined in order to match the BPU's planned CODs for offshore wind generation.

[1] Mid-Atlantic is able to change the location of the offshore substations to best meet market needs. This may have an impact on project costs to the degree that the length of offshore cables changes.

Figure III-1 below provides the layout for Proposal 2 showing the location of the offshore and onshore cable corridors and associated interlinks, illustrative locations for the offshore HVDC platforms, the respective locations of existing lease areas (OCS-A-498 and OCS-A-499) and one of the proposed New York Bight lease areas (OCS-A-543), [redacted]. Actual locations could be updated during detailed design and once more details from the offshore wind generators that would connect to these offshore substations are available.

FIGURE III-1: MID-ATLANTIC OPTION 2 PROPOSAL 2 TECHNICAL SOLUTION LAYOUT

The transmission solutions being proposed by Mid-Atlantic are focused on providing highly reliable, cost-effective transmission pathways to deliver the energy from the offshore wind turbines in various BOEM lease areas to the New Jersey/PJM bulk electrical grid and by so doing allow New Jersey to achieve its target of 7,500 MW of offshore wind energy by 2035. Using the cost metric proposed by PJM as part of this State Agreement Approach of Net offshore wind Transmission Costs, Mid-Atlantic's Proposal 2 would save New Jersey ratepayers over $1.8 billion over the forty-year life of the proposed facilities. On an annual basis this represents about $1.7/MWh reduction in retail electricity rates for New Jersey consumers.

Mid-Atlantic is proposing HVDC transmission systems to enhance the flexibility offered and by so doing realize high reliability and overall availability, all within a single cable route ROW. Doing so minimizes environmental impacts and corresponding permitting risks and achieves a high degree of constructability. The project's electrical architecture was designed to maximize reliability and flexibility for the operation of the offshore wind generation and the broader PJM electrical grid, while keeping construction cost and deliverability risks low. [redacted]

The proposed solution is predicated on known future lease areas and associated estimated future generating capacity of the lease areas. The key criteria influencing the design of the solution were:

- To match future lease areas generating capacity with possible headroom while achieving New Jersey's 7.5 GW offshore wind target by 2035
- To minimize grid reinforcements and grid extensions
- To maximize reliability and availability with state-of-the-art technology
- To provide flexibility in terms of operation as well as in design adjustments
- To minimize the footprint of cable corridors and the onshore substation, with the realization of the attendant environmental benefits and reduced permitting risks

[redacted]

[redacted]

Project Optionality, Flexibility, and Modularity

Describe the optionality, flexibility, and modularity offered by the proposed projects, including: ability of project proposals to achieve efficient outcomes through combinations of solutions for Options 1a, 1b, 2 and 3 needs, or ways in which proposed solutions, or portions of proposed solutions, can be combined, integrated, and sequenced to more cost effectively achieve the State's overall public policy and risk mitigation objectives; ability of the proposed solution to accommodate future increases in offshore wind generation above current plans; innovative solutions that yield a transmission investment schedule that is optimally aligned with the planned schedule of offshore wind generation procurements.

Mid-Atlantic's technical solution offers a high degree of optionality, flexibility and modularity, which ultimately allows it to deliver efficient outcomes by allowing solutions to be combined, integrated and sequenced to more cost-effectively meet the State's objectives. Furthermore, this optionality and flexibility also extends to how Mid-Atlantic 's technical solution can be operated, which enhances its overall reliability.

Mid-Atlantic's technical solution relies on interlinks (HVDC circuits) between two offshore HVDC platforms that support the operation of the HVDC transmission system as multi-terminal system when in degraded mode. When maintenance is being performed or if a fault occurs on one of the export cables or onshore converters, the HVDC interlink could be used to operate the HVDC transmission system in three-terminal mode with two offshore platforms and one onshore platform to maximize energy deliverability during the outage. [redacted] With offshore

[2] Mid-Atlantic has access to over 40 studies of the physical, biological, cultural, and socioeconomic resources associated with the proposed and optional onshore and offshore cable corridors that constitute its Monmouth (main proposed corridor) and Cardiff Transmission Corridors (optional corridor) completed by Atlantic Shores and its contractors that inform the planning and design of its transmission proposals.

[redacted]

wind output typically below the project's rated capacity, this capability significantly reduces the impacts of such outages on the delivery of offshore wind energy.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Interdependency of Options

Describe any interdependence issues or benefits associated with any other proposal also submitted by your company. Namely, describe whether selection of another specific proposal will impact this proposal, and if so – how. Describe whether your project is severable, and the conditions that would be associated with selection of this single proposal (i.e. one option 1b proposal for one POI). Describe any benefits to cost, cost-containment mechanisms, phasing, or other relevant elements of the proposal that would stem from co-selection of other proposals. Explain any benefits from selection of multiple proposals that may not be available if a single proposal is selected.

[redacted]

Given the flexibility and modularity noted previously, this does not preclude Mid-Atlantic's Option 2 proposals from being able to integrate with other Option 1a or 1b solutions that may be selected and address the onshore upgrades that Mid-Atlantic 's technical solutions require.

Overview of Project Benefits

Describe the benefits that the project offers in support of New Jersey's policy goals to reduce customer costs, advance offshore wind, maintain reliability, mitigate environmental impacts, and

[redacted]

achieve other policy goals as outlined above. Explain how any project options or alternatives offered may create value in furtherance of the BPU's stated policy goals as described above.

Mid-Atlantic 's proposed technical solutions offer numerous benefits to New Jersey and the broader PJM electricity grid. These benefits include lowering costs to customers, mostly related to the costs of achieving the state's 7,500 MW offshore wind goal; advancing offshore wind development in the state; maintaining and where possible enhancing reliability; mitigating environmental impacts; and furthering other BPU policy goals. How Mid-Atlantic 's proposals support the realization of these various benefits is addressed further below.

Lowering Customer Costs & Advancing Offshore Wind

Mid-Atlantic's proposals reduce OREC costs, resulting in lower customer costs, by lowering the cumulative risk profile of offshore wind projects. The proposals eliminate the risk of unanticipated transmission upgrade costs and project delays and pre-build critical civil works that derisk landfalls. The offshore wind developers largely are able to avoid the risks associated with interconnecting their projects with the onshore grid.

[redacted]

[redacted]

Environmental Benefits

Mid-Atlantic 's proposals advance offshore wind development in New Jersey without drastically increasing the impacts to the environment. Mid-Atlantic 's solutions are founded on the fact that utilizing HVDC technology and co-locating electrical infrastructure in common offshore and onshore corridors and ROW is not only more efficient but less detrimental to neighborhoods and the environment.

Promoting Reliability

Mid-Atlantic's technical solutions enhance reliability by utilizing proven HVDC technology, low cost onshore and offshore HVDC interlinks and including an AC switchyard capable of rerouting power if needed. Interlinks enhance reliability by providing alternative transmission path for offshore wind projects when circuits are out. [redacted]

Mitigating Environmental Impacts

Mid-Atlantic is committed to providing effective, technologically advanced transmission solutions that promote environmentally responsible development of New Jersey's offshore wind industry. It is taking deliberate steps to design a robust and flexible transmission solution that delivers on state offshore ambitions while minimizing construction, and overall, impacts on the state's environment and its citizens. Mid-Atlantic has carefully sited onshore and offshore project components and designed proposals that avoid the recurring constructions cycles associated with independent radial transmissions systems.

[redacted]

[redacted]. Mid-Atlantic will complete the most intrusive construction in one cycle so that its substation, trenches, conduits, and vaults are in place and can be accessed for future project expansion with minimal ground disturbance. In this regard, over the operational lifetime of Mid-Atlantic 's projects, environmental impacts are minimized compared to the piecemeal development of offshore transmission that would occur under the alternative generator lead-line model required to serve multiple, future offshore renewable energy projects.

Our approach maximizes the long-term environmental benefits of our transmission solution and interconnecting offshore wind energy projects while significantly diminishing the relatively short construction period when effects are most likely to occur. Compared to analogous radial solutions, the Mid-Atlantic proposals result in significant reductions in environmental impacts. Proposal 2 reduces the acreage of land conversion for substation expansion, land disturbance from onshore underground cable installation, and seafloor disturbance by 46%, 41%, and 52%, respectively. An overview of how Mid-Atlantic's proposed transmission solution and environmental protection plan maximizes environmental benefits and reduces potential impacts when compared to an analogous radial system is provided in Table III-2.

TABLE III-2: OVERVIEW OF THE REDUCTION OF ENVIRONMENTAL IMPACTS FROM MID-ATLANTIC 'S TRANSMISSION PROPOSALS COMPARED TO A SYSTEM COMPRISED OF INDEPENDENT RADIAL LINES

Environmental Resource	Anticipated Environmental Benefits or Reduction of Impacts
Air quality	• Reduction of criteria pollutant emissions from fewer construction vessels and vehicles • Concentration of construction emissions offshore and away from New Jersey's coasts
Seafloor conditions and benthic habitat	• Reduction in direct seabed disturbance and habitat disturbance by co-locating circuits and cables into fewer, carefully sited corridors • Additional hard substrate from OSS and cable protection in areas of relatively uniform, soft bottom substrate • Structures lead to more fish and increased biodiversity in local area
Land use	• Reduction in tree clearing and land disturbance by eliminating the need for as many as six onshore substations • Reduction of impacts to coastal resources by identifying one common landfall location for MAOD's circuits compared to at least 7 landfall locations for radial lines
Other marine uses	• Reduction navigational safety risk for commercial and recreational vessels • Reduction in the number of potential crossings with existing cables • Reduction in the potential interference with wrecks, artificial reefs, and munitions and explosives of concern
EMF	• Reduction in the potential for the creation of magnetic fields from 10 radial lines or more
Water quality	• Reduction of potential water quality degradation from increased turbidity and sediment suspension in the ocean because fewer cables would be installed [redacted] • Reduction in soil erosion and sedimentation near wetlands and waterbodies because MAOD's proposal consists of one trench, compared to 8 radial trenches
Public Health and Safety	• Carefully sited cable corridor for all MAOD circuits reduces potential interaction with installed and operational cables

Overview of Major Risks and Strategies to Limit Risks

Identify and describe project-related risks, such as: (a) uncertainties that may cause timeline delays or budget increases; (b) uncertainties that may reduce or delay the benefits to New Jersey customers; and (c) project-on-project risks that may exist between this project and other transmission or offshore wind projects. Describe the strategies that will be utilized to limit these risks and the impacts to New Jersey customers.

As with any large capital project, there are risks associated with project delays or cost increases for Mid-Atlantic 's technical solutions. [redacted]

[redacted]As a transmission project, properly assessing and evaluating the offshore cable routes and onshore rights-of-way is critical to derisking the project. Mid-Atlantic believes that the maturity of its work in this area is a major differentiator of its proposals. Furthermore, Mid-Atlantic has closely engaged with equipment suppliers through a Request for Information process to secure more accurate estimates of equipment costs and schedules for the delivery of major components. Key project risks and the strategies that Mid-Atlantic is employing to mitigate these risks are discussed below.

[redacted]

[redacted]Mid-Atlantic 's development activities include open and regular communications with local fishermen with a willingness to discuss and find reasonable means for co-existence. As part of our goal to co-exist with fishermen, Mid-Atlantic will seek to establish an MOU to determine the best means forward in resolving concerns around project development (e.g., cable placement and burial) and industry needs.

In terms of risks posed by construction techniques, Mid-Atlantic will be employing best practices and doesn't anticipate any construction techniques that pose undue risk. For example, the HVDC cables will be landed using HDD. Specifically, Mid-Atlantic will install conduits from an offshore transition location to an onshore, underground transitory vault on the National Guard Training Facility Center located in Sea Girt, New Jersey. Mid-Atlantic doesn't expect that this application of HDD poses a meaningful risk of project delays or cost overruns. [redacted] has been consulted regarding the design and construction of the HDD at the beach landings and may ultimately be awarded the HDD contract. They have an extensive experience in performing similar work in New Jersey, which further mitigates HDD construction risks.

Once onshore, where the cable crosses thoroughfares (e.g., roads, bike paths) and sensitive features (e.g., wetlands, waterbodies), special installation techniques will be used such as HDD, pipe jacking, or jack and bore. There are no specific construction challenges for this onshore ROW that poses a meaningful risk of project delays or cost overruns. [redacted] has been consulted regarding the construction of the onshore cable civil works and may be engaged to perform this work. Their extensive local experience and knowledge of local

characteristics will facilitate the design and construction of the required infrastructure and limit the risks associated with this work.

Mid-Atlantic also has assessed critical elements of its required supply chain for risks. Based on this assessment Mid-Atlantic identified one possible supply chain constraint and material procurement risk: the relatively limited availability of HVDC cable suppliers. Mid-Atlantic is managing this risk through early contact and engagement with these suppliers. In addition, Mid-Atlantic has engaged the HVDC cable suppliers in a Request for Information (RFI) procurement exercise to obtain an up-to-date market assessment of the cost of these cables and as well as to understand the equipment delivery schedule. Mid-Atlantic is considering various contractual arrangements to secure a position in the manufacturing queue. Finally, Mid-Atlantic expects that the strength of supplier relationships possessed by its affiliates will strengthen Mid-Atlantic 's position when negotiating with these suppliers and assist in ensuring contract compliance. One element of such a contract will be liquidated damages for late delivery of HVDC cables.

Another supply chain risk is vessel availability for cable laying (i.e., Cable Laying Vessel or CLV) and installing the offshore platforms, requiring a heavy-lift DP vessel. Mid-Atlantic will mitigate this risk by engaging with vessel owners early in the development process and ensuring that its vessel strategy is fully integrated with its equipment procurement strategy. Cable laying vessels are likely to be provided by the cable provider as part of a bundled package. In addition, Mid-Atlantic will carefully vet is vessel suppliers; select these suppliers based in part on their ability to guarantee the schedule as well as provide Liquidated Damages that provide strong incentives for performance. Here as well, Mid-Atlantic expects that the depth of supplier relationships possessed by its affiliates will strengthen Mid-Atlantic 's position when negotiating with these suppliers.

Overview of Project Costs, Cost Containment Provisions, and Cost Recovery Proposals

Summarize the project cost, any cost containment provisions that will be utilized to limit cost impacts on New Jersey customers, and the cost recovery approach.

For Mid-Atlantic 's Proposal 2 the projected overnight capital cost in 2021 dollars and allowance for funds used during construction (AFUDC) are estimated to be [redacted], respectively.

Further, Mid-Atlantic 's proposals provide flexibility to adjust offshore substation (OSS) location within the corridors (within the offshore Proposed Cable End Area beyond the fixed points noted within proposal(s) ("Modification of OSS Location"). [redacted]

[redacted]

[redacted]

If selected by the BPU, Mid-Atlantic will file a formula rate with FERC under Section 205 of the Federal Power Act to provide for cost recovery. Mid-Atlantic 's proposed formula rate would allow Mid-Atlantic to recover its costs pursuant to just, reasonable and not unduly discriminatory rates, terms and conditions. Mid-Atlantic 's filing and proposed formula rate will reflect Mid-Atlantic 's agreed-upon cost containment mechanisms and all other terms and conditions that are necessary based on PJM's solicitation process.

[redacted]

IV. Proposal Benefits

The PJM submission form provides space to identify the reliability criteria violations that the solution resolves and the Market Efficiency flowgate(s) the proposed project mitigates. We provide an opportunity here to identify additional information concerning the benefits of the proposed project.

Reliability Benefits:

Please explain the proposed project's ability to satisfy any applicable reliability criteria that may impact the evaluation of the project even if it was not explicitly stated as part of the original problem statement.

Mid-Atlantic is offering Option 2 proposals, which by definition aren't focused on satisfying PJM and NERC reliability criteria. Nonetheless, Mid-Atlantic 's technical solutions enhance reliability by utilizing proven HVDC technology and low cost HVDC interlinks. Interlinks enhance reliability by providing an alternative transmission path for offshore wind projects when circuits are out. When maintenance or if a fault occurs on one of the export cable systems or onshore converters, the HVDC interlink could be used to operate the HVDC transmission system in three-terminal mode

with two offshore platforms and one onshore platform to maximize energy deliverability during the outage. [redacted]. With offshore wind output typically below the project's rated capacity, this capability significantly reduces the impacts of such outages on the delivery of offshore wind energy.

[redacted]

- *Please explain the proposed project's ability to provide additional benefits associated with reliability criteria, including reduce the need for must-run generation and special operating procedures, extreme weather outages and weather-related multiple unforced outages, reduced probability of common mode outages due to electrical and non-electrical causes, islanding, power quality degradation.*

[redacted]

Public Policy Benefits:

- *Please explain the proposed project's ability to maximize the energy, capacity, and REC values of offshore wind generation delivered to the chosen POIs, including reduce total costs of the offshore wind generation facilities (including generator leads to the offshore substations), mitigation of curtailment risks, and the level and sustainability of PJM capacity, congestion, or other rights created by the proposed solution that increase the delivered value of the wind generation or provide other benefits.*

The analysis presented below presents the desired information on energy, capacity and REC benefits and the reduction in total costs of transmission for offshore wind facilities.

Net OSW Transmission Costs

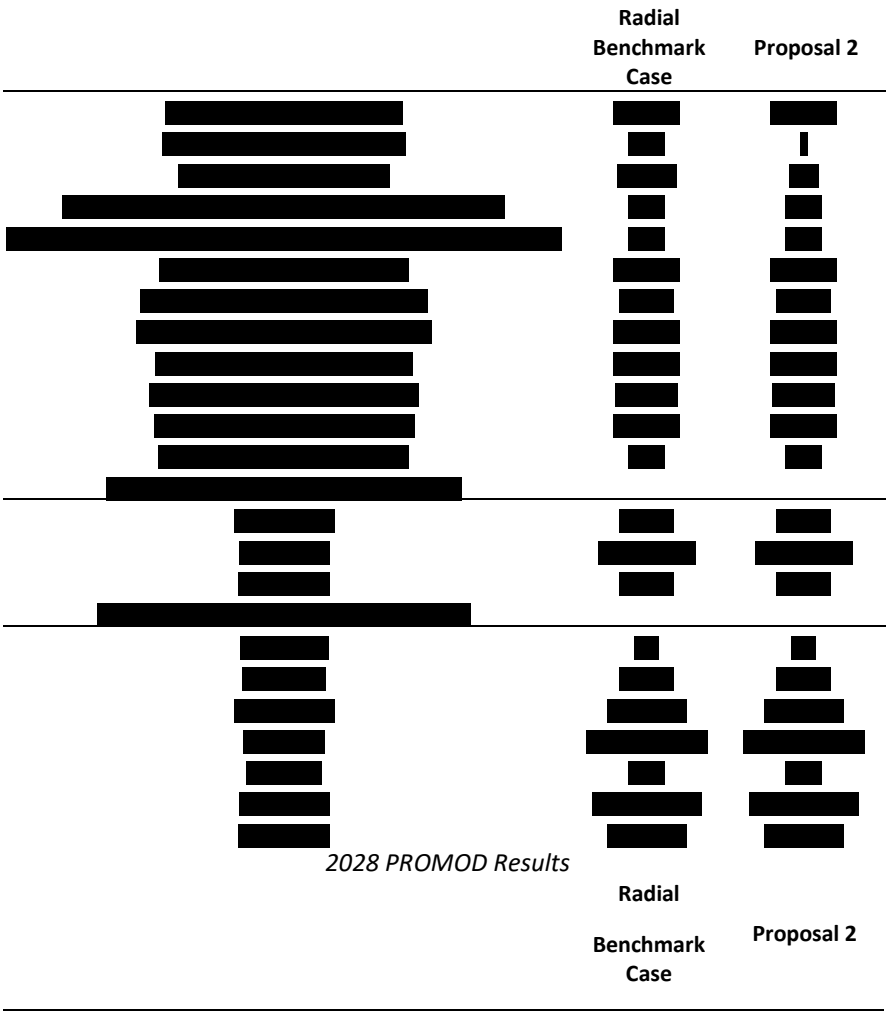
Process

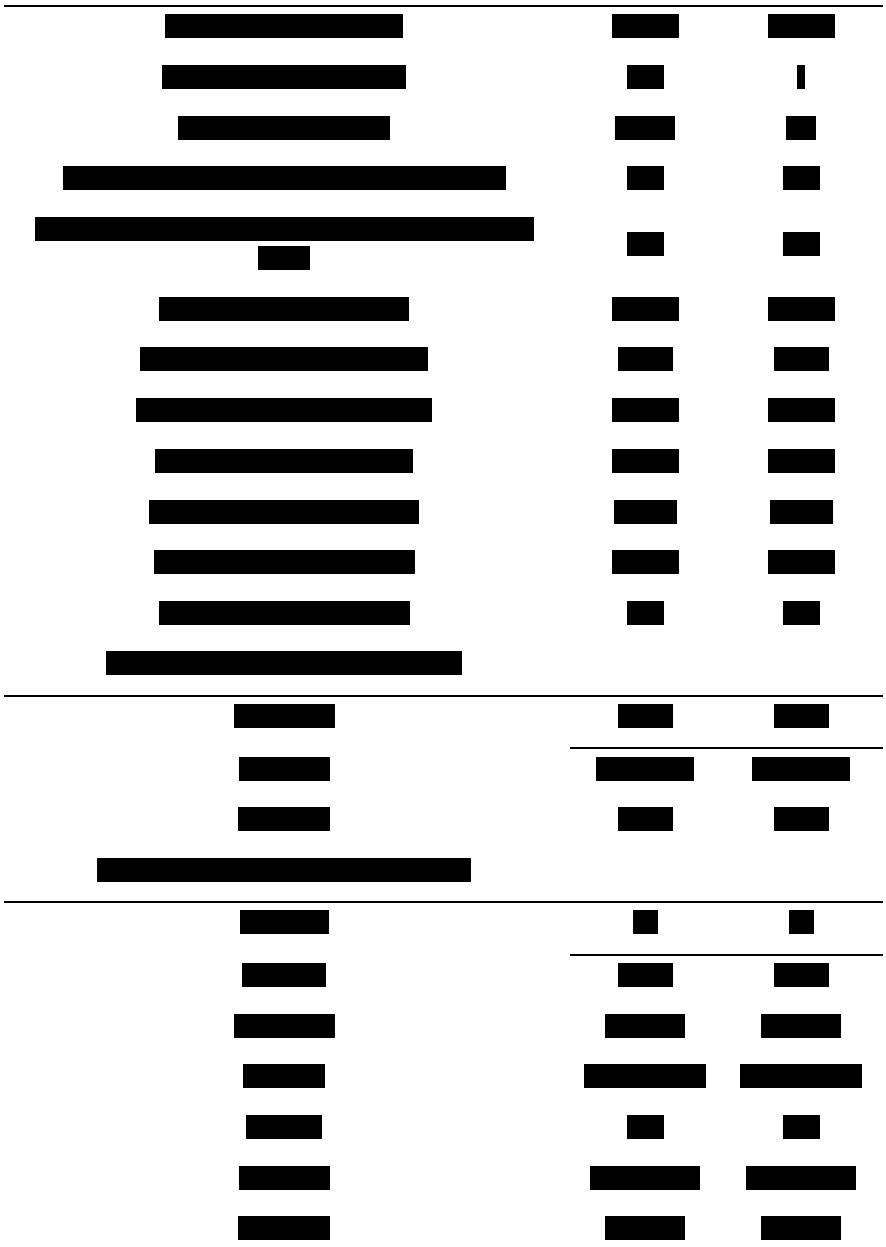
Hitachi ABB Power Grids was contracted by Mid-Atlantic to study New Jersey Offshore Wind Integration under PJM's State Agreement Approach (SAA) component of the Regional Transmission Expansion Plan (RTEP). The PROMOD model "2021SAA_PJM_Base_2028_v04_05_2021" from PJM was used as the starting point for this analysis and includes the best available topology (2025 RTEP) and the forecasted 2028 market conditions as currently used for the 2020/21 Long-Term Window for Market Efficiency analyses. The scope and results of the PROMOD analysis can be found in full detail in the Appendix 1.12 of the Proposal Technical Description.

Results

A summary of results for 2028 market conditions from the PROMOD simulation can be found in the table below.

PROMOD simulations results





Following the instructions in "BPU SAA Economic Evaluation Attachment A 6.8.21", an estimate of Net OSW Transmission Costs has been provided for each evaluated package of proposed transmission solutions. As is shown by this analysis, the proposed solutions are more cost-effective (from an overall New Jersey cost perspective) than the alternative of developing the necessary OSW-related transmission needs through generation tie lines from individual OSW plants to shore.

The Net OSW Transmission Costs were calculated using the following PJM specified formula:

Net OSW Transmission Costs = *OSW Transmission Project Costs – OSW Generation Cost Reduction – PJM Market Cost Reduction – Risk Mitigation Benefits and Option Values*

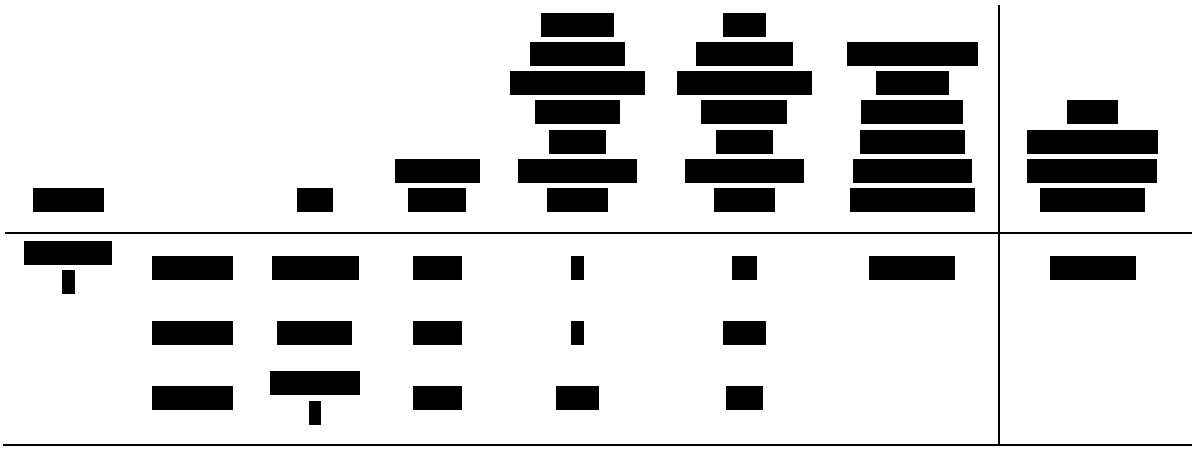
The *Net OSW Transmission Costs* are comprised of the following subcomponents. They are fully described in "BPU SAA Economic Evaluation Attachment A 6.8.21" and are estimated by Mid-Atlantic as follows.

1. **OSW Transmission Project Costs:** [redacted]
2. **OSW Generation Cost Reduction:** This evaluation component measures the extent to which a proposed transmission solution is expected to reduce the cost of OSW generation compared to the benchmark radial OSW integration solution. The reduction in OSW generation-related costs is due to factors such as:
    - Reduced OSW generation project costs: This is the cost of the benchmark radial transmission system that the proposed transmission solutions would replace.
    - Increased value of the delivered OSW generation in PJM's energy market (by injecting OSW generation in higher priced POIs and recognizing that the PJM LBMP revenues of OSW generation will reduce NJ contract payments for OSW).
3. **PJM Market Cost Reduction:** this evaluation component measures the extent to which a package of proposed transmission solutions is expected to reduce PJM market costs for NJ ratepayers compared to the selected benchmark radial OSW integration solution (i.e., NJ annual gross load payment).
4. **Risk Mitigation Benefits and Option Values:** this evaluation component considers the extent to which a package of proposed transmission solutions mitigates risks and provides valuable options compared to a selected benchmark OSW integration solution. The proposed solutions may (1) mitigate risks to New Jersey ratepayers, including environmental, permitting, constructability, project-on-project, or cost overrun risks; and (2) provide more valuable options, such as the ability to enable more competitive wind solicitations, access more or better wind lease areas, defer costs, or allow for low-cost expansion of OSW generation. This report will only consider risk mitigation benefits and option values qualitatively rather than quantitatively and will thus be considered as $0 benefit in the Net OSW Transmission Costs formula.

[redacted]

The Net OSW Transmission Costs subcomponents are estimated as follows for the proposed transmission solution.

1. **OSW Transmission Project Costs:**



2. OSW Generation Cost Reduction:

Reduced OSW generation project costs: Each proposal allows for different combinations of otherwise radially connected lines to be integrated through the proposed transmission solution.

Benchmark case radial line costs in 2021

Proposal 2 could eliminate radial connections for ASOW Project 2, NY Bight South 1, and NY Bight South 2. The reduced OSW generation project costs are thus summarized as follows.

[redacted]

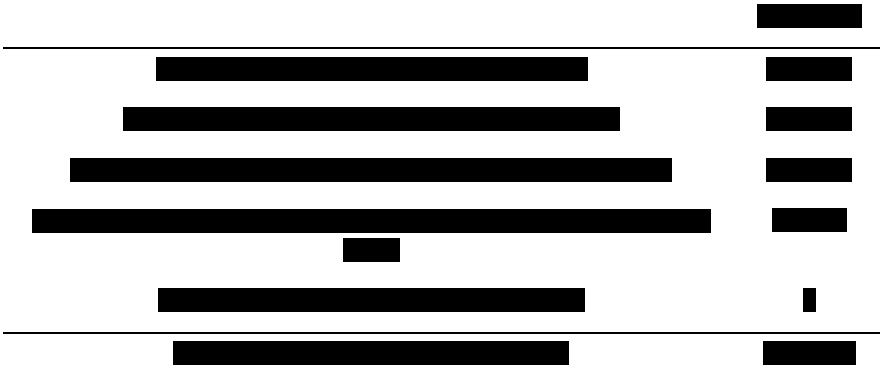
Proposal 2

[redacted]

3. PJM Market Cost Reduction:

[redacted]

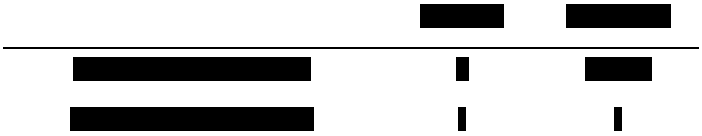
Net OSW Transmission Costs = OSW Transmission Project Costs – OSW Generation Cost Reduction – PJM Market Cost Reduction – Risk Mitigation Benefits and Option Values

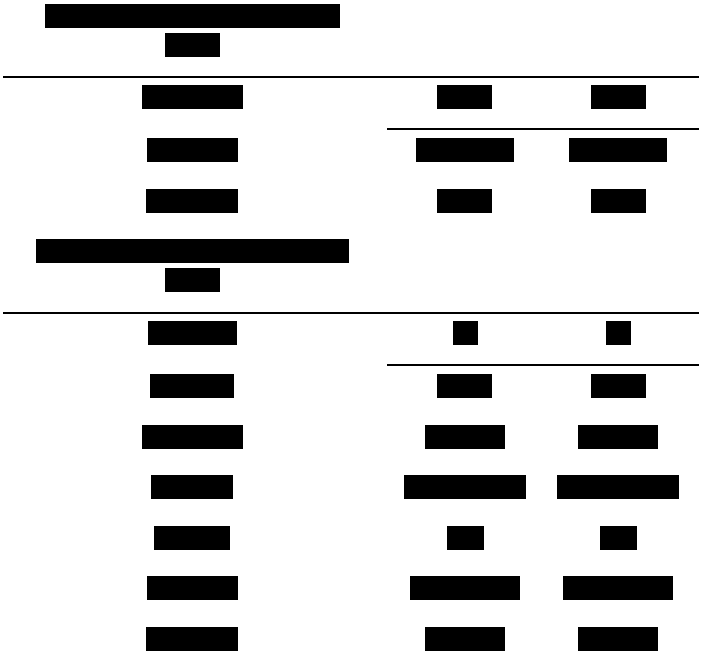


The *New OSW Transmission Costs* is in fact negative which indicates the proposed solutions are more cost-effective (from an overall New Jersey cost perspective) than the alternative of radial OSW-related transmission relying on generation tie lines from individual OSW plants to shore.

Qualitative Benefits

Compared to the case without OSW development, there are benefits in the form of State energy sufficiency, reduced emissions, and less dependence on fossil-based thermal resources. A comparison of emissions in PROMOD simulations for year 2028 can be made for the three proposal cases against a case without any NJ OSW.





Conclusion

Using the models provided by PJM, and the independent evaluation of economic benefits conducted by Hitachi ABB Power Grids, it has been demonstrated that the proposed solutions are more cost-effective (from an overall New Jersey cost perspective) than the alternative of developing the necessary OSW-related transmission needs through generation tie lines from individual OSW plants to shore.

- *Please explain the proposed project's ability to accommodate future increases in offshore wind generation above current plans.*

Mid-Atlantic 's technical solution provides a strong foundation for future expansion of an offshore and onshore transmission network that would accommodate increases in offshore wind generation beyond New Jersey's current 7,500 MW target. First of all, with anticipated advances in HVDC technology it would be possible to increase the transfer capability of each of these HVDC transmission circuits to beyond 1,200 MW, which would cost-effectively support additional offshore wind generation beyond the current 7,500 MW target. In addition, the use of HVDC technology and interlinks provides the foundation for the development of an expanded offshore transmission network that would deliver desired higher reliability.[10] Mid-Atlantic 's technical

[10] With New Jersey reliant on 7,500 MW of offshore wind generation, the reliability of this electricity supply is likely to become increasingly important. The redundancy that Mid-Atlantic 's technical solutions offer deliver this higher reliability.

solution effectively establishes the foundation for a broader offshore wind transmission network and could be used as an element of a future HVDC backbone that can be utilized to address future offshore wind needs and enhance reliability of offshore wind delivery. Once again, the interlinks Mid-Atlantic is offering represent a low-cost first step in developing such network without a major financial commitment. [redacted]

Market Efficiency Benefits:

Please explain for each item below the proposed project's ability to provide additional onshore-grid-related benefits that improve PJM market performance and provide New Jersey ratepayer cost savings.

- *Energy market benefits, such as ratepayer cost savings (the primary evaluation metric); production cost savings; or other benefits:*

Some of the most significant energy market benefits and ratepayer cost savings from Mid-Atlantic's technical solutions are not readily quantifiable. Nonetheless, these benefits and cost savings are real. They include:

(1) offshore cost reductions associated with the lower offshore wind interconnection costs.[11] Included within these cost savings are the savings to the developer from avoiding an offshore substation at an estimated cost of about [redacted] for a 1,200 MW project. The competitive tension in the BPU's procurement framework will cause these savings to be shared with ratepayers.

(2) lower OREC costs as a result of enhanced competition for subsequent procurement Rounds. With Mid-Atlantic 's offshore HVDC transmission substations serving as POIs for offshore wind developers, interconnection for these developers is simplified. As a result, offshore wind developers will be able to compete more effectively on the basis of price and other sources of value. The flexibility that Mid-Atlantic is offering with respect to the location of these OSPs can also support lower OREC costs by allowing a level of optimization in the location of offshore wind developers' POIs such that the costs of the offshore wind project can be further reduced.

(3) lower OREC costs can also be realized by allowing lease areas to be fully developed and avoiding the stranding of portions of the lease area that would otherwise not be able to

[redacted]

be cost-effectively interconnected to the onshore grid.[12] This can be particularly important as lease areas become close to fully developed and where the project sizes achievable with the remaining undeveloped acreage wouldn't fit with cost-effective transmission development (e.g., recently in 400 MW increments).

(4) Mid-Atlantic 's technical solution which results in the prebuilding of civil works, conduits and other infrastructure significantly reduces transmission interconnection risks for offshore wind developers. This is particularly true for subsequent procurement rounds where Mid-Atlantic will have secured permitting approvals and critical transmission components (i.e., civil works and conduits) in among the most environmentally sensitive locations at the landfall will likely have been built. This will derisk offshore wind projects. This benefit should flow through in terms of lower OREC costs.

(5) cost savings associated with the provision of various ancillary services including reactive supply and voltage control and various frequency response services given the controllability of HVDC technology and ability to support required increases and decreases in MW and MVAR output.

Interestingly, studies of offshore transmission costs in the U.K. indicate that competition between independent offshore transmission owners, such as enabled by this State Agreement Approach, reduced costs 20–30% compared to generator-owned transmission. With these savings produced by lower operating costs and financing costs from improved allocation of risk and reduced risk premium.[13]

- *Transmission system benefits, such as synergies with transmission facilities associated with ongoing OFFSHORE WIND procurements, replacement of aging transmission infrastructure, and other transmission cost savings to New Jersey customers:*

Mid-Atlantic believes that it offers Ocean Wind 2 a more cost-effective interconnection option than its current interconnection proposal and is willing to work with the BPU and Ocean Wind to put in place a cost-sharing framework that offers savings to New Jersey customers. As Option 2 proposals, Mid-Atlantic 's technical solutions don't replace existing aging transmission infrastructure. However, Mid-Atlantic believes that on an aggregate basis, particularly when cost

[redacted]

[13] Cambridge Energy Policy Associates, "Evaluation of OFTO Tender Round 2 and 3 Benefits," March 2016

savings enabled by reduced future requirements for transmission investment are considered, that its technical solutions offer cost savings to New Jersey customers.

- *Capacity market benefits, that may give rise to New Jersey ratepayer cost savings (which is the primary evaluation metric), including through CETL increases, improved resiliency/redundancy, avoided future costs (such as future reliability upgrades or aging facilities replacements):*

[redacted]

Mid-Atlantic technical solutions will also enhance the resiliency of electricity service in New Jersey and in PJM more broadly.[14] Having 3,600 MW of offshore wind energy that operates at high capacity factors and is delivered through four separate HVDC transmission systems that have a high degree of operating flexibility, as well as the enhanced reliability of power supply that is provided by interlinks, will enhance the resiliency of electricity service in New Jersey and PJM.

- *Other benefits, including State energy sufficiency, reduced emissions, less dependence on fossil-based thermal resources, improvements in local transmission and distribution outages, improvements in local resiliency*:

Mid-Atlantic 's technical solutions will assist New Jersey realize other benefits including: (1) increasing the state's energy sufficiency by delivering 3,600 MW of offshore wind energy to the New Jersey electric grid; and (2) maximizing the available energy output from offshore wind generators with OREC contracts given the high availability of HVDC transmission system, which will in turn reduce GHG, NOx and particulate emissions from fossil fuel generators. As Option 2 proposals, Mid-Atlantic 's technical solutions are likely to only have modest impact on reducing local transmission and distribution outages. [redacted]

[14] FERC has defined resilience as "The ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event." With PJM proposing a working definition as "The ability to withstand or quickly recover from events that pose operational risks."

Please attach any relevant supporting analyses and benefits quantifications (including assumptions and analyses, if any) to support the benefits described above that have not been already submitted through the PJM submission forms.

No additional supporting analyses and benefits qualifications not already submitted through the PJM Submission forms are attached.

V. Proposal Costs, Cost Containment Provisions, and Cost Recovery

Proposals with cost containment options that limit New Jersey ratepayer exposure to cost overruns are strongly preferred. Examples of cost caps or cost control measures that the developer should consider proposing include, but are not limited to:

- *Total or partial construction cost caps, similar to the cost control measures requested by the PJM submission forms;*
- *Total or partial operations and maintenance cost caps;*
- *Limits on capital structure and return on equity (ROE);*
- *Fixed revenue requirements over the expected life of the project; and*
- *Innovative cost recovery approaches.*

Developers can propose several (equally-acceptable) alternative cost control and cost recovery mechanisms for each proposal. Such cost control and cost recovery alternative may include:

1. *Standard Regulated Cost Recovery: If developers are requesting cost recovery via a standard revenue requirement, please submit projected project and financing cost information and any proposed cost-cap mechanisms via the PJM submission forms. Indicate below that standard regulated cost recovery will be requested.*
2. *Pre-determined Revenue Requirements: If developer is requesting cost recovery via pre-determined, pre-committed revenue requirements, please submit the committed-to annual revenue requirement amounts over the economic life of the assets below. In this case, the developer does not need to submit project and financing cost information via the PJM submission forms.*
3. *Alternative Cost Recovery: If developer is requesting an alternative cost recovery (e.g., levelized regulated cost recovery, fixed-priced contract costs, or other mechanism), please submit the projected cost recovery information via the PJM submission forms and describe the alternative cost recovery approach below.*

Standard Regulated Cost Recovery will be requested. Mid-Atlantic has submitted projected project and financing cost information and proposed cost-cap mechanisms as requested above via the PJM submission forms.

Based on the approach, please provide the following information for the BPU to evaluate the costs of the proposed solutions to New Jersey ratepayers:

- *Any additional cost information not included in PJM's submission forms, including ongoing capital expenditures:*

Mid-Atlantic does not assume ongoing capital expenditures in this proposal submission including the cost recovery and containment proposed.

- *For the cost estimates submitted via PJM's submission forms, the cost estimate classification and expected accuracy range consistent with AACE International standards:*

[redacted]Mid-Atlantic is able to achieve this higher class of cost estimate and resulting greater precision given the work that has been performed evaluating the ROW, onshore substation location and offshore cable routes. Also, the HVDC solution proposed has a proven track-record with multiple similar systems in operation for more than 5 years, offering greater certainty in costs.

- *The estimated energy losses of the proposed facilities*:

[redacted]

- *The physical life and/or economic life (i.e., length over which the facility will request cost recovery) of the facilities:*

[redacted]

- *A description of each cost structure proposed for the project, including cost containment mechanisms and cost recovery approach:*

If selected by the BPU, Mid-Atlantic will file a formula rate with FERC under Section 205 of the Federal Power Act to provide for cost recovery. Mid-Atlantic 's proposed formula rate would allow Mid-Atlantic to recover its costs pursuant to just, reasonable and not unduly discriminatory rates,

terms and conditions. Mid-Atlantic 's filing and proposed formula rate will reflect Mid-Atlantic 's agreed-upon cost containment mechanisms described below and all other terms and conditions that are necessary based on PJM's solicitation process.

Mid-Atlantic is pleased to offer PJM and New Jersey ratepayers a cap on construction costs for this Proposal 3 solution. [redacted]

- *If a fixed revenue requirement is being requested, files specifying the annual revenue requirements over the economic life of the proposal. Similar to the proposed cost cap mechanisms submitted to PJM, please include proposed contractual revenue requirement commitment language to be included in the Designated Entity Agreement. The Contractual revenue requirement commitment language must be identical to that submitted in the PJM Competitive Proposal Template.*

Mid-Atlantic will request Standard Regulated Cost Recovery. Appendix 1 provides estimated annual revenue requirements over the economic life of the proposed Proposal 3 facilities.

The proposed contractual cost containment language submitted in the PJM Competitive Proposal Template for Mid-Atlantic's Proposal is as follows:

Non-Standard Terms and Conditions

1. SECTION 1. Construction Cost Cap

   1.1. Mid-Atlantic agrees that it will not seek recovery through its Annual Transmission Revenue Requirement of any Construction Costs in excess of an amount equal to the lesser of (i) the Construction Cost Cap Amount of the proposed solution[15] or (ii) the aggregate amount of actual Construction Costs associated with the proposed solution.

[15] Proposed solution includes the ability for PJM/NJBPU to modify location of Offshore Collector Station (OCS) within the permitting corridor subject to a Construction Cost Cap Amount adjustment to account for incremental costs related to implementing the OCS location change. Refer to Schedule B for description of adjustment amount and exceptions.

1.2. As used herein, the following terms have the following meanings:

a) "Annual Transmission Revenue Requirement" means the rate determined by the FERC following a filing by Mid-Atlantic under Section 205 of the Federal Power Act and FERC's rules and regulations thereunder and submitted to Transmission Provider for recovery pursuant to the Transmission Provider's Open Access Transmission Tariff.

b) [redacted]

c) [redacted]

[redacted]

d) [redacted]

e) [redacted]

f) "Scope of Work" means the approved scope of work for the Project, as more particularly described in Schedule B to this Agreement.

g) [redacted]

[redacted]

2. SECTION 2. Security

   2.1. The amount of security required under this Designated Entity Agreement is based upon the reasonable cost estimate developed independently by PJM and considered in evaluating the project pursuant to section 1.5.8(e) of Schedule 6 of the Operating Agreement, not the cost commitment amount proposed by Mid-Atlantic.

3. SECTION 3. Uncontrollable Force

   3.1. For purposes of the Construction Costs detailed in Section 1 of Schedule E of this DEA, in the event the Project is impacted by an Uncontrollable Force, Mid-Atlantic shall use Reasonable Efforts to mitigate such impact. Mid-Atlantic shall notify Transmission Provider within a reasonable time after the occurrence of an Uncontrollable Force, which notice shall describe, in reasonable detail, the actions Mid-Atlantic plans to take to mitigate the impact of the Uncontrollable Force.

Schedule B - Scope of Work

[Refer to the Mid-Atlantic Technical Document submitted via the PJM Tool for the proposed Scope of Work. A Scope of Work checklist of components to be installed would be included here as part of the cost containment legal language for a transmission solution selected by PJM and NJ BPU]

Modification to Offshore Collector Station (OCS) within Permitting Corridor:

[redacted]

- *Please explain how the costs of the proposed projects may be impacted by selection of a subset of the options versus the entire proposed project:*

There are cost savings from the integrated technical solutions offered by Mid-Atlantic. If a subset of the elements of the technical solution were selected these cost savings and synergies would be lost. Mid-Atlantic is willing to work with the BPU and PJM to refine its cost estimates if a portion

of the proposed technical solution were ultimately selected. Mid-Atlantic 's Proposals 1 and 2 could be considered subsets of this Proposal 3.

- *Please explain any additional cost control mechanisms provisions for the BPU to consider that were not included in the PJM submission forms*:

The cost control mechanisms offered by Mid-Atlantic are outlined in the submission forms provided through the PJM Competitive Planner tool and described in the responses above.

Mid-Atlantic is also proposing to index the cost of its HVDC cables and the HVDC converters to the cost of copper and lead and steel, respectively. The magnitude of recent increases in the price of copper, lead and steel suggest that this strategy is likely to yield lower costs to New Jersey ratepayers.

Investment Tax Credit Benefit - Proposed Treatment if Change in Law Enacted

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

VI. Project Risks and Mitigation Strategy

Please provide the following items to describe the project's risk and risk mitigation strategy:

Site Control

- *Discuss the project's plan for site control and the ability to achieve site control.*

[redacted]

- *Identify whether the project will require the issuance of a right-of-way, a right of use and easement, or similar authorization from the U.S. Bureau of Ocean Energy Management ("BOEM"), and the project's plan and timetable for obtaining such any required authorization.*

[redacted]

- *Discuss the project stakeholder engagement plan's ability to minimize public opposition risk from the fishing industry, coastal and beach communities, and other stakeholder groups.*

Mid-Atlantic 's development activities include open and regular communications with local fishermen with a willingness to discuss and find reasonable means for co-existence. As part of our goal to co-exist with fishermen, Mid-Atlantic will seek to establish an MOU to determine the best means forward in resolving concerns around project development (e.g., cable placement and burial) and industry needs.

As part of an 'early and often' engagement strategy, and in building trust with the fishing industry, Mid-Atlantic views this type of arrangement, based on scientific principles, as an effective way to move forward in building co-existence between our project activities and the commercial fishing industry in New Jersey.

Mid-Atlantic Environmental Lead,

ontinues to be an active participant, helping to lead efforts in educating fishermen on various elements of offshore wind development. Mid-Atlantic has provided subject matter expertise in organizing and executing educational forums under the Task Force to help educate fishermen on developer approaches to project siting, design, and operations.

Further, Mid-Atlantic continues to leverage RODA to build trust and engagement with the surf clam industry and support efforts by the Task Force to improve communication tactics and tools between industries and to jointly address navigational concerns of the commercial fishing industry.

[redacted]

In addition to serving active leadership roles in these organizations, Mid-Atlantic scientists serve as Advisory Members to national programs such as the Department of Energy and National Renewable Energy Laboratory programs, including the US Offshore Wind Synthesis of Environmental Effects Research and the National Offshore Wind Research & Development Consortium, each working towards synthesizing existing knowledge and/or advancing technological innovations in offshore wind research that overlaps aspects of fisheries science.

Mid-Atlantic 's parent company, Shell New Energies, is also leading efforts on a national level. In 2019, Shell took a leading role at the 2019 White House Summit on Partnerships in Ocean Science and Technology, which brought together over 100 leaders and experts to identify opportunities for partnerships to develop and employ science and technology for the conservation, management, and balanced use of America's resources, including offshore wind energy and fisheries.

These actions are only a start to the science-based approach underpinning Mid-Atlantic's Project development. It will continue to invest in research and data that serves the collective interests of New Jersey fishermen, scientists, and government agencies as our Project progresses. We remain committed to participating and funding ROSA and other regional science efforts, along with advancing technology innovation that can help serve to further document and study fisheries in and around our Offshore Project Area to understand the potential impacts – positive and negative – of our activities at a local and regional level.

In addition, Mid-Atlantic is committed to finding ways to integrate fishermen into the Project as part of the team, by planning, brainstorming, and executing early economic opportunities. In the early development phases, Mid-Atlantic will work to use fishermen as scouts in advance of survey vessels to identify and map gear in the survey area. Building on this model advanced by Atlantic Shores, Mid-Atlantic will actively pursue avenues to help fishermen meet our health, safety and environmental standards for vessels and workforce, so that they can be eligible to apply as contractors to support environmental surveys as well as Project construction and operations activities. There is precedent for these activities in the Gulf of Mexico and Alaska by the oil and gas industry. Such efforts include:

- Co-locating project equipment and vessels at local fish docks.
- Hiring local fishermen with technical expertise in vessel O&M (e.g., engine repair welding) and marine operations to support project vessel maintenance and management.
- Using the local fishing fleet as scout, guard, or supply boats during construction activities.
- Using local fish vessels to support environmental monitoring programs by deploying or retrieving equipment or to transport scientists and observers.

Mid-Atlantic has identified opportunities to employing local fishermen and their facilities for scouting and dock-side vessel support during project construction. It will expand these opportunities with local fishermen and businesses over time. Mid-Atlantic will capitalize on the previous successes of Atlantic Shores, including a formal request for interest (RFI) process to identify fishing businesses that had available docks and port real estate that could be shared by Mid-Atlantic and support our construction and operations efforts. It will continue to broaden and advance these efforts, in coordination with New Jersey, to include local fishermen to the maximum extent possible into the Mid-Atlantic workforce as our Projects mature.

Construction & Schedule

Identify any construction techniques will be needed – benthic substrate, long HDD spans, existing cables, pipelines or other infrastructure, sandwaves/megaripples, contaminated sediment, dredging, or onshore waterbody crossings – that may result in project delays or cost overruns.

The Export Cable Corridor is traversed by subsea communications cables. Mid-Atlantic understands that Atlantic Shores has identified and spoken with representatives of the cable owners to engage with them on proper setbacks, as well as to initiate discussions around the execution of crossing agreements where required. An exhaustive identification of both active and inactive cables physically crossing the Export Cable Corridors has been done. Adapted strategies have been evaluated for each type of cables and considered in Mid-Atlantic s proposal. Inactive cables will be recovered and cut prior to the cable installation to clear the path; crossing arrangements for active cables will be agreed with the cable owners. The cable crossing arrangements will involve the installation of external protection means such as concrete mattresses or rock layers

The expected presence of mobile sand bedforms (i.e., ripples, megaripples, and sand waves) within the Export Cable Corridor may necessitate the removal of the tops of some sand bedforms prior to offshore cable installation to ensure the cables can be installed within stable seabed. Sand bedform removal will be limited only to the extent required to achieve adequate cable burial depth. Expected sand bedform removal techniques are involving using one or a combination of the following: Trailing Suction Hopper Dredger, Controlled Flow Excavation and Route Clearance Plow.

The HVDC cables will be landed using HDD, an underground construction technique that will install conduits from an offshore transition location to an onshore, underground transitory vault on the National Guard facility. HDD will either be initiated or exit landward of the beach to avoid impacts to the beach. At the Monmouth Landfall Site, the HDD trajectory for each cable is expected to be approximately 3,281 ft (1,000 m) long. At each landfall site, the depth of HDD is approximately 16 to 131 ft (5 to 40 m) below the seabed. Mid-Atlantic doesn't expect that this application of HDD poses a meaningful risk of project delays or cost overruns. Carson Corp, a New Jersey company, has been consulted for the design and construction of the HDD at the beach landings and may ultimately be awarded the HDD contract. They have an extensive experience in performing similar work in New Jersey, which further mitigates HDD construction risks.

Once onshore, the cable corridor follows previously disturbed and developed areas along roadway ROWs and bike paths. However, where the cable crosses thoroughfares (e.g., roads, bike paths) and sensitive features (e.g., wetlands, waterbodies), special installation techniques will be used such as HDD, pipe jacking, or jack and bore. In total, the onshore cable will extend 12.4 mi (20 km) from the landfall site to the Mid-Atlantic substation. There are no specific construction challenges for this onshore ROW that poses a meaningful risk of project delays or cost overruns.

- *Identify known or potential time of year restrictions on construction activity, particularly related to listed species or beach restrictions.*

Mid-Atlantic is proposing to adhere to seasonal construction restrictions for certain portions of the onshore interconnection cable routes to avoid impacts during peak usage. For the Larrabee Onshore Interconnection Cable Route, no summer construction (generally from Memorial Day to Labor Day) will occur from the Monmouth Landfall Site, west of the Garden State Parkway, to where the route exits the bike path near Allaire State Park at Hospital Road (subject to ongoing coordination with local authorities). This restriction will minimize traffic and recreational disruptions.

The HDD construction schedule will be developed in accordance with municipal noise ordinances, and seasonally restricted to occur outside of the period from Memorial Day to Labor Day. Certain activities, such as conduit pull-in, cannot stop once they are started, so work may need to continue into the night or occur on the weekend. Mid-Atlantic will coordinate with municipal officials to finalize the onshore construction schedule and hours.

In addition, Mid-Atlantic anticipates time of year restrictions to be required for the piling of the offshore substation foundations based on BOEM and NOAA consultations for offshore wind COPs. Any time of year restrictions and other mitigation measures, such as monitoring requirements, would be part of the federal consultation and review process associated with Mid-Atlantic 's GAP approval. In our Environmental Protection Plan mitigations and the project schedule, we have

accounted for potential time of year restrictions that would occur for the North Atlantic right whale migrating in and near to the project area.

- *Identify anticipated construction-related outages and expected duration on existing PJM transmission facilities.*

[redacted]

- *Identify supply chain constraints or material procurement risks that may impact the project.*

Mid-Atlantic has assessed critical elements of its required supply chain for risks. Based on this assessment Mid-Atlantic identified two possible supply chain constraints and material procurement risk: the relatively limited availability of HVDC cable suppliers and HVDC converter station suppliers. Mid-Atlantic is managing these risks through early contact and engagement with these suppliers. In addition, Mid-Atlantic has engaged the HVDC cable and HVDC converter station suppliers in a Request for Information (RFI) procurement exercise to obtain an up-to-date market assessment of the cost of these cables and as well as to understand the equipment delivery schedule. The information gathered in this RFI is reflected in Mid-Atlantic 's project schedule. Mid-Atlantic intends to enter into early and proactive negotiations with potential cable and converter station suppliers (along with other key suppliers) and is considering various contractual arrangements to secure a position in the respective manufacturing queues. Finally, Mid-Atlantic expects that the strength of supplier relationships possessed by its affiliates will strengthen Mid-Atlantic's position when negotiating with these suppliers and assist in ensuring contract compliance. One element of such a contract will be liquidated damages for late delivery of HVDC cables.

Another supply chain risk is vessel availability for cable laying (i.e., Cable Laying Vessel or CLV) and installing the offshore platforms, requiring a heavy-lift DP vessel. Mid-Atlantic will mitigate this risk by engaging with vessel owners early in the development process and ensuring that its vessel strategy is fully integrated with its equipment procurement strategy. Cable laying vessels are likely to be provided by the cable provider as part of a bundled package. In addition, Mid-Atlantic will carefully vet is vessel suppliers; select these suppliers based in part on their ability to guarantee the schedule as well as provide Liquidated Damages that provide strong incentives for performance. Here as well, Mid-Atlantic expects that the depth of supplier relationships possessed by its affiliates will strengthen Mid-Atlantic 's position when negotiating with these suppliers.

– *Identify project-on-project risks related to the timing or completion of other transmission and offshore wind projects built to achieve the New Jersey public policy requirement.*

[redacted]

The time-related project-on-project risks with offshore wind facilities and Mid-Atlantic 's transmission facilities are largely associated with schedule delays for Mid-Atlantic 's facilities. Mid-Atlantic has devoted considerable resources to mitigating this risk. Mid-Atlantic 's project development schedule is realistic and aligns with delivery schedules for key components as established by the RFI that Mid-Atlantic issued. Mid-Atlantic believes that its project permitting and construction schedules dovetail with those for offshore wind developers in a manner that mitigates project risks. Specifically, in most instances Mid-Atlantic 's construction schedule fits within that for offshore wind developers so that the schedule risks that it poses are limited.

– *Describe and provide proposed contractual language for any project schedule guarantees, including but not limited to guaranteed in-service date(s), financial assurance mechanisms, financial commitments contingent on meeting targeted commercial online dates, and delay damage or liquidated damage payment provisions, that have been proposed.*

Mid-Atlantic agrees to the form of project schedule guarantees that are outlined in the Designated Entity Agreement and is prepared to accept the relevant terms and conditions outlined in the Designated Entity Agreement.

- *Identify any additional risks associated with the project that could lead to increased costs, reduced project benefits (reliability, market efficiency, and/or public policy), or delayed development and delivery of the proposed offshore wind generation.*

There are a range of project risks that lead to increased costs or delayed development of the proposed transmission infrastructure that would be utilized to deliver the proposed offshore wind generation. [redacted]

[redacted]

- *Provide any relevant technical studies or documentation related to efforts taken to mitigate the risks identified above.*

Mid-Atlantic has design drawings for the onshore route HDD. In addition, Appendix 2: Risk Inventory and Mitigation Strategies provides documentation related to Mid-Atlantic's efforts to identify and mitigate the risks discussed in the supplemental responses above.

- *Identify compensatory mitigation estimates needed for wetland impacts and any potential risk with availability of wetland credits.*

Mid-Atlantic anticipates temporary, localized impacts during construction to wetlands and/or wetland transition areas for access roads or staging areas. No permanent impacts to wetlands or waterbodies are anticipated.

Onshore interconnection cables have been routed along previously disturbed ROWs (roadways, existing utility corridors) and the landfall site has been sited in previously disturbed lands. All electrical transmission infrastructure will be installed underground. Trenchless cable installation is proposed at all wetland/waterbody crossings to avoid direct impacts. An HDD inadvertent release plan will be implemented. All construction activities will be conducted in accordance with an approved and certified Soil Erosion and Sediment Control Plan and NJDPES Permit. Furthermore, all disturbed soils will be stabilized after construction and to the maximum extent practicable return to preconstruction conditions.

Four wetland banks are available if compensatory mitigation measures are needed: Manasquan River, Marsh Bog Brook I and II, and Mullica River. All four banks have approval to sell credits to third parties and availability of credits.

VII. Environmental Impacts and Permitting

Please provide an Environmental Protection Plan which describes all associated onshore and/or offshore environmental impacts from the planning, construction, and operation phases of the project, including, but not limited to:

- *Physical Resources- air quality, electric and magnetic fields (EMF), geological resources, airborne sound, water quality, underwater acoustics, wetlands and waterbodies.*
- *Biological Resources- avian and bat species, benthic and shellfish, coastal and terrestrial habitat, finfish and essential fish habitat, marine mammals and sea turtles, terrestrial wildlife*

- *Cultural Resources- above-ground historic properties, marine archaeology, terrestrial archaeology*
- *Socioeconomic Resources- visual resources, commercial and recreational fisheries, commercial shipping, environmental justice, land use and zoning, existing cables, tourism, public health & safety, workforce, economy, demographics*
- *GIS Desktop Study of potential impacts to sensitive resources including tabular summaries of acreage and distance calculations*
- *Shapefiles of cable routes, landfall locations, offshore platforms, and onshore interconnection points that show:*
- *Width of individual cable routes or shared power corridors*
- *Footprint of onshore substation including expansion needed and acreage calculations of habitat disturbance, especially related to wetlands, forested areas, or other sensitive habitats*
- *Descriptions of cable installation methods with locations identified*
- *General footprint and extent of Horizontal Directional Drilling (HDD) boreholes and cable landings*
- *Footprint and extent of associated pre-construction and construction activities*
- *Projected vessel traffic and/or vehicles needed for project surveys, construction, operation, and project closeout including emissions estimates from vessel and/or vehicle activity*
- *Any needed exclusion zones around project infrastructure including offshore platforms*
- *Plan to address the identified impacts described above, including innovative measures to avoid, minimize or mitigate impacts.*

Mid-Atlantic's Environmental Protection Plan is attached as Appendix 3

Please provide a description of the anticipated environmental benefit of a particular transmission proposal in comparison to radial lines:

- *How does the project reduce environmental impacts to fisheries, habitat, and sensitive resources in comparison to radial lines?*
- *What is the reduction in impacts (approximate area) compared to radial lines, temporary and permanent?*
- *A description of whether and how the project infrastructure, including offshore platforms, could provide direct ocean and ecological observations throughout the water column;*

[redacted]

Table VII-1. Estimation of Onshore and Offshore Area Impacts from Seven Radial Transmission Solutions injecting 7,500 MW into PJM.

Radial Project	Technology	MW	POI Substation	Assumed Acreage of Substation Expansion	Onshore Cable Corridor Temporary and Permanent Disturbance (acres)	Offshore Cable Corridor Temporary and Permanent Disturbance (acres)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]		[redacted]		[redacted]	[redacted]	[redacted]

[redacted]

Table VII-1. Estimated Reduction of Onshore and Offshore Impacts by Implementing the MAOD Proposal 2 (3,600 MW Solution)

MAOD Proposal Number	Technology	MW	POI Substation	Reduced Area of Anticipated Substation Expansion (acres)	Reduction of Onshore Cable Corridor Temporary and Permanent Disturbance (acres)	Reduction of Offshore Cable Corridor Temporary and Permanent Disturbance (acres)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Please provide a Fisheries Protection Plan that must include the following information:

- *A scientifically rigorous description of the marine resources that exist in the Project area, including biota and commercial and recreational fisheries, that is informed by published studies, fisheries-dependent data, and fisheries-independent data, and identifies species of concern and potentially impacted fisheries;*
- *A scientifically rigorous plan to detect impacts to marine resources, including biota and recreational and commercial fisheries;*
- *Identification of all potential impacts on fish and on commercial and recreational fisheries off the coast of New Jersey from pre-construction activities through project close out;*
- *A plan that describes the specific measures the Applicant will take to avoid, minimize, and/or mitigate potential impacts on fish, and on commercial and recreational fisheries;*
- *An explanation of how the Applicant will provide reasonable accommodations to commercial and recreational fishing for efficient and safe access to fishing grounds;*

- *A description of the Applicant's plan for addressing loss of or damage to fishing gear or vessels from interactions with offshore wind structures, array or export cables, survey activities, concrete mattresses, or other Project-related infrastructure or equipment.*

Mid-Atlantic's Fisheries Protection Plan is attached as Appendix 4.

Please provide a description of how the Applicant will identify (or has identified) environmental and fisheries stakeholders, and how the Applicant proposes to communicate with those stakeholders during preconstruction activities through project closeout, as well as a plan for transparent reporting of how stakeholders' concerns were addressed.

[redacted]

Table VII-*2*: Stakeholder and community groups

Stakeholder Group	Primary Interests
[redacted] Residents and Public Officials	Residents will have a limited view of the OSS, influenced by daily/seasonal factors. The export cable from the wind farm to the Larrabee POI will be routed along existing roads and ROWs within [redacted]
Environmental NGOs	Private, non-governmental environmental interests with specific and/or general environmental resource issues. Some examples of the participating organizations include, but are not limited to, the following: New Jersey Sierra Club, New Jersey Energy Coalition, Clean Water Action, Natural Resources Defense Council, New Jersey Audubon, Surf Rider, National Wildlife Federation, Barnegat Bay Partnership, Conservation Law Foundation, and the Natural Resources Defense Council.
Federal, Tribal, State and Local Governmental Agencies	Governmental agencies and Tribes are included in the regulatory review of the Project. *Please refer to Permitting Plan (later in this section) for details on Mid-Atlantic's regulatory permitting strategy and many governmental permits and authorizations anticipated for the Project*.
Federal and State Elected Officials	Focus has been on Federal and State elected officials that have interest and influence over renewable energy policy.
Commercial and Recreational Fishermen	Project facilities will be in areas actively fished by commercial and recreational fishermen, especially for surf clam. *Please refer to the Fisheries Protection Plan for a detailed discussion about outreach and coordination with Commercial and Recreational Fishermen*.

Stakeholder Group	Primary Interests
Academia & Research/Scientific Institutes	Use of existing educational and technical institutions to support cooperative science, engineering, research, and next generation workforce training that may benefit project development, operation, and regional research efforts.
Business Groups/ Associations	Establishing relationships with business groups aids in awareness of workforce demands and can be beneficial to permitting process.
Commercial and Recreational Boaters	Project facilities will be in areas transited by commercial and recreational boaters.

Mid-Atlantic is committed to working with key stakeholders to address their concerns. The commitment is supported by a well-defined set of operating principles that we promise to adhere to throughout the project life cycle. The operating principles have been refined through a collaborative process to tangibly enumerate Mid-Atlantic's outreach goals and, later, to reflect on success and areas for improvement. To this end, Mid-Atlantic will:

Establish a team of experts and industry innovators who are known for creating positive impact.

Establish trust and accountability with communities through transparent processes that honestly communicate limitations and manage expectations.

Generate community buy-in and excitement for the way in which our transmission solution and offshore wind energy can transform the economy and environment.

Showcase our commitment to communities through meaningful action and active dialogue.

Build a sharp and professional brand through our commitment to stakeholders, and through the creation of clear, polished, and unique materials.

Be good neighbors, acting with empathy, trustworthiness, and accessibility.

Be well-organized and motivated to craft efficient internal processes.

Pursue a triple-bottom line approach to our work, balancing business profitability, environmental sustainability, and community development.

Section VII-4 of Mid-Atlantic's Environmental Protection Plan outlines the key elements of the Mid-Atlantic environmental and community efforts including the team, tools, outreach, and engagement strategies that have been developed and practiced by Shell New Energies, EDFR and Atlantic Shores. It also highlights Mid-Atlantic's vision for creating opportunities for community and stakeholder involvement in our project activities and our approach to ensuring stakeholder issues are transparently addressed throughout the project life cycle. Engagement with Fisheries stakeholders is outlined in Section VII-2-8 of the Fisheries Protection Plan.

Mid-Atlantic's environmental and community stakeholder engagement plan is based on inclusion, openness, and two-way communication. With the clear ambition to coexist with New Jersey's

environment and residents, Mid-Atlantic has identified key stakeholders and will invite them to join us in a conversation about our projects and to voice their concerns. We keep an open door for other stakeholders to join the conversation. Regardless of the challenges of meeting stakeholders in person due to the global pandemic, Mid-Atlantic is dedicated to maintaining transparent communication channels and providing a range of alternatives to reach stakeholders and listen to their input.

Please provide an analysis showing that project infrastructure will not impact overburdened communities in a disproportionate fashion.

[redacted]

[redacted]

[redacted]

Please provide a description of the applicant's permitting plan that includes the following:

- *Identify all local, State and/or Federal permits and/or approvals required to build and operate the Project and the strategy and expected time to obtain such permits and/or approvals;*
- *Provide documentation of consultation with USACE beach replenishment projects and sand borrow areas, if applicable;*
- *Identify all applicable Federal and State statutes and regulations and municipal code requirements, with the names of the Federal, State, and local agencies to contact for compliance;*
- *Submit a land use compatibility / consistency matrix to identify local zoning laws and the consistency of applicant's activities in each local jurisdiction;*
- *Identify each appropriate State or Federal agency the Applicant has contacted for land acquisition issues and provide a summary of the required arrangements;*

- *Include copies of all submitted permit applications and any issued approvals and permits; and*
- *Include copies of all filings made to any other regulatory or governmental administrative agency including, but not limited to, any compliance filings or any inquiries by these agencies.*

Mid-Atlantic's Environmental Permitting Plan is attached as Appendix 5.