Sewaren to Atlantic Shores 3 (SM Cable)

General Information

Proposing entity name	ANBARD
Does the entity who is submitting this proposal intend to be the Designated Entity for this proposed project?	Yes
Company proposal ID	Boardwalk Power Option 2.12
PJM Proposal ID	131
Project title	Sewaren to Atlantic Shores 3 (SM Cable)
Project description	The project proposes a 1,400 MW offshore transmission link connecting the Atlantic Shores 3 (“AS3”) offshore wind lease area to the 230 kV Sewaren substation located in Woodbridge Township, Middlesex County, New Jersey. This 1,400 MW offshore transmission link project is referred to as Boardwalk Power Option 2.12 and can be categorized as “Option 2 – Offshore New Transmission Connection Facilities” as outlined in the PJM/NJBPU SAA solicitation problem statement. The proposed project consists of a new offshore substation platform, 400 kV HVDC submarine and underground cable segments, a new onshore converter station, 230 kV HVAC underground cable segment, and necessary upgrades to the existing Sewaren 230 kV substation. Further details for each of the project components are provided in subsequent sections of this submission in brief and discussed in extensive details in the project analysis attachments provided with this submission.
Email	jfuller@anbaric.com
Project in-service date	01/2033
Tie-line impact	No
Interregional project	No
Is the proposer offering a binding cap on capital costs?	Yes

Additional benefits	The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Project Components

1. Upgrade/Expansion of the 230 kV Sewaren Substation
2. 400 kV HVDC Submarine Cable
3. 400 kV HVDC Submarine Cable Extension
4. 230 kV HVAC Underground Cable
5. Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore...
6. Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore...
7. Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore...
8. New Onshore Converter Station - Onshore Converter Station at Sewaren
9. New Onshore Converter Station - Onshore Grid Interface Transformer

Substation Upgrade Component

Component title	Upgrade/Expansion of the 230 kV Sewaren Substation
Project description	Upgrade the PSE&G's existing Sewaren substation (a 230 kV AC facility) located within Woodbridge Township in Middlesex County, New Jersey to accommodate the new 230 kV AC, 1400 MW underground cable connection from the new onshore HVDC converter station (1x1400 MW, ±400 kV DC). The upgrade will include building a transition yard adjacent to the existing Sewaren 230 kV Station which will serve to facilitate the transition from underground solid dielectric 230 kV cable to traditional overhead construction. Anbaric plans to exercise the "Option to Build" provision outlined in Section 3.2.3 of PJM Open Access Transmission Tariff to assume the responsibility for the design, procurement, and construction of the required expansion/upgrade of the existing Sewaren substation to reliably interconnect the 230 kV underground HVAC cable from the new onshore converter station.
Substation name	Sewaren 230 kV Substation

Substation zone	Zone 251
Substation upgrade scope	The Sewaren substation is an existing facility located adjacent to Sewaren Generation Station within Woodbridge Township in Middlesex County, New Jersey. The main 230kV station yard of Sewaren substation is a five-bay breaker-and-a-half arrangement with one spare position that is partially built out. This spare position will be used for the new 230 kV AC, 1400 MW underground line from the onshore HVDC converter station (1x1400 MW, ±400 kV DC). Due to the limitations of below grade 230 kV dielectric cable and the ampacities required, a separate transition yard will be required. This yard will be constructed adjacent to the existing Sewaren 230 kV Station and serve to facilitate the transition from underground solid dielectric 230 kV cable to traditional overhead construction. The substation upgrade scope consists of civil/structural work and physical equipment installation (major electrical equipment, bus and insulators, grounding systems, protection/control/monitoring systems, and metering systems). The detailed scope of the proposed substation upgrade along with illustrative layouts is provided in the Appendix A of the project "Technical Description" documentation.

Transformer Information

None

New equipment description	"Major Equipment(s): Install three (3) 230kV MOV type station class surge arresters Bus and Insulators: New station bus rated at 4000 Amps will connect the new 230 kV riser structures and surge arresters to the existing spare positions line switch. This section of bus will be strain bus, composed of (2) 2000kcmil AAC conductors per phase. Substation Grounding System: Install a 20’x20’ ground grid consisting of 19#6 copperweld conductor for the new 230kV transition yard (approximately 2,250’ of 19#6 copperweld conductor required). Install two (2) grounding conductors connecting the new 230kV transition yard and the existing 230kV switch yard ground grids (approximately 1,000’ of 19#6 copperweld). Equipment and Structure Grounds: Two (2) 19#9 grounding pigtails shall be connected to all new equipment and structures from the ground grid. Grounding Connections: All below grade connections shall be exothermically welded. All equipment and structure grounding connections shall be compression or mechanical type per PSE&G standards. Low Voltage Power, Instrumentation and Control Cable: The existing substation equipment control cable will assume to be replaced, allowing for more direct connections between the new protective relaying and the equipment without jumping rack to rack within the control building. Install 1400’ of 12/C #10, 600V cable for control, relaying, and indication of the exiting circuit breakers. Install 4200’ of 4/C #10, 600V cable for new instrumentation and relaying current and voltage circuits. Install 1000’ of 1/C #14 600V SIS wire in the control house relay racks. High Voltage Underground Cable System: The new 230 kV AC underground line will consist of four (4) XLPE solid dielectric cable per phase. The new underground line will also include a 48 fiber single mode ADSS cable. The cable system components installed within the substation are as follows: 230 kV AC underground line duct bank with conduits to each termination structure and communication conduits to fiber optic splice enclosure. 230 kV AC cable terminators and terminal hardware, including hardware for primary and grounding/bonding connections. Link boxes, mounting hardware and insulated cables for sheath grounding/bonding system. Conduits between each single-phase termination structure for underground cable grounding/bonding system."

Substation assumptions	"The area in and around the existing substation will be available to accomplish the proposed upgrades in support of the timeline for this project. Alternative upgrades may be required if the facility is modified before these upgrades are realized. Facility upgrades at Sewaren not directly associated with the terminal used to tie-in the new 1400 MW transmission circuit will be covered by the Option 1A solutions submitted for the 2021 SAA Proposal Window to Support New Jersey Offshore Wind. Right of way can be obtained to the locations indicated for the new 230 kV AC underground line. There is sufficient space in the existing control building and relay racks to support the new protection and control equipment without the need for expansion. The POI demarcation is assumed to be at the existing 230 kV dead-end inside Sewaren substation. Revenue metering equipment will be located at the onshore converter station and may need to be compensated for losses depending on final metering plan, asset ownership and service agreements. The existing Sewaren substation RTU is adequate to support the proposed upgrades and does not require replacement or significant expansion. The existing substation protection and control system utilizes a traditional substation network and does not employ IEC 61850 standards. The existing AC and DC station service systems are adequate to support the proposed upgrades for this project. The new 230 kV transition yard will not have lighting or electronic security equipment requiring AC or DC power. Due to an increase in available fault current; a grounding study will be required during detailed design to demonstrate that the substation ground grid meets the requirements of IEEE 80 (this includes the existing ground grid and any new/expanded areas). Direct lighting stroke protection and insulation coordination studies will be conducted during detailed design to determine the lightning protection design and surge arrester parameters. Property rights for a new 100’ x 150’ transition yard can be obtained as well as right of way to connected overhead between the existing station and new transition yard."
Real-estate description	"The proposed HVDC Converter Substation lies upon real estate within Woodbridge Township that are owned by Buckeye Port Reading Terminal, LLC (Block 760.02, Lot 1). Acquisition of lands necessary to construct the Converter Station and the HVDC cables supplying the Converter Station is ongoing and advanced. The proposed HVAC connection between the converter station and the PSE&G’s Sewaren substation extends from the Converter Station to a proposed POI Expansion Facility (generally consisting of surge arresters and single-phase terminations) via an underground cable array. The POI Expansion Facility will connect to the existing substation via three overhead cables. The proposed underground HVAC connection will require property acquisition or easements from the following entities: Buckeye Port Reading Terminal, LLC (this will part of the Converter Station property acquisition discussed above). Con-Rail Corp Tax Dept, easement PSEG Power, LLC, easement The proposed POI. Expansion and Overhead Connections require property acquisition only from PSEG Power, LLC. "
Construction responsibility	External

Benefits/Comments	The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION
Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$4,194,128.00
Component cost (in-service year)	$5,640,636.00

Greenfield Transmission Line Component

Component title	400 kV HVDC Submarine Cable

Project description	A 400 kV submarine cable connecting the offshore substation platform located at Atlantic Shores 3 (“AS3”) offshore wind lease area to the landfall location at Buckeye Port Reading within Woodbridge Township in Middlesex County, New Jersey. The cable system will be designed for installation underground on land and in water, buried in the seabed, and will be rated for the transfer of 1400 MW. The cables will be insulated with solid extruded cross-linked polymer (XLPE) and will not contain any oil or other type of insulating fluid. The strength and flexibility of this type of cable makes it well suited for installation conditions underground on land and beneath the seabed, as planned for the Project. Further details regarding this 400 kV HVDC submarine cable system (including ampacity, insulation system design, key components, and installation methods) are outlined in the "Technical Description" documentation provided in the project analysis attachment section.
Point A	Offshore Converter Station (housed in offshore substation platform) located close to theAtlantic Shores 3 (“AS3”) offshore wind lease area.
Point B	Landfall location at Buckeye Port Reading within Woodbridge Township in Middlesex County, New Jersey.
Point C	

	Normal ratings	**Emergency ratings**
Summer (MVA)	1423.000000	1423.000000
Winter (MVA)	1423.000000	1423.000000
Conductor size and type	1x2250mm2 Cu 400kV	
Nominal voltage	DC	
Nominal voltage	400 kV DC	
Line construction type	Submarine	

General route description	The submarine part of the route from the Atlantic Shores 3 offshore substation platform to the landfall location at Woodbridge Township in Middlesex County, NJ is approximately 90.3 mi (145.3 km). A detailed offshore cable route map can be found in Attachment 24 Option 2.12 Offshore Transmission Route Map provided in the "Technical Description" documentation provided in project analysis attachments. The cable system is expected to be installed in water depths of up to approximately 85.4 ft (26 m). The preliminary assessments show that sharp gradients of the water depth are not present along the proposed route. This will be confirmed with further detailed bathymetry surveys during the development stage. The seabed material encountered along the route is mostly sand, gravel and some clay. A detailed description of the proposed route is presented in the project analysis attachments along with figures and associated route maps.
Terrain description	The offshore transmission link route connects the offshore substation platform (OSP) to the landfall site at Buckeye, passing through Raritan Bay and up Artheur Kill. The sea floor in this area of the OSP is relatively flat and shallow (approximately 85.4 ft [26 m]), and the sea depth gets progressively shallower towards the landfall site.
Right-of-way width by segment	The offshore transmission link route from the offshore substation plateform (OSP) to the landing site is approximately 90.3 mi (145.3 km) in length and requires a 200-ft, 800-ft of 1000 ft wide area, depending on the number of circuits, for work activities. The OSP location and the portion of the offshore transmission link route located in federal waters requires a new Right of Way/Right of Use Grant or Easement Grant from BOEM. Right-of-way for the section of the offshore transmission link route located in state waters (from the landfall site to 3 nautical miles from the shore) will be obtained in the form of a new In-Water Waterfront Development Individual Permit from the NJDEP.
Electrical transmission infrastructure crossings	Bid,Lat,Long,Type,Database,Feature Name/ID,Info,Onshore/Offshore, Option 2.11,40.488647,-74.256682,line,HIFLD,113313,"Owner: Not Available, In Service, Underground, AC, Voltage: 500, Voltage Class: 500",Offshore, Option 2.11,40.490841,-74.003701,line,NOAA Charted Submarine Cables,266,Power Line - Effective Date: 9/5/2007,Offshore, Option 2.11,40.505446,-74.259944,polygon,UtilityAreaFeature,FE0000000715,Cable Area,Offshore, Option 2.11,40.512797,-74.257646,polygon,UtilityAreaFeature,FE0000000710,Cable Area,Offshore, The offshore transmission link crosses 4 electrical transmission infrastructure, all in service.
Civil infrastructure/major waterway facility crossing plan	N/A

Environmental impacts	"Installation activities for the offshore transmission link may impact physical resources (air quality, geological resources, water quality), biological resources (avian and bat species, benthic and shellfish resources, finfish and essential fish habitat, marine mammals and sea turtles), cultural resources (marine archaeology), and socioeconomic resources (commercial and recreational resources, commercial shipping, environmental justice populations, existing infrastructure, tourism, public health and safety, workforce and demographics). The environmental Protection Plan (Attachment 15) includes a preliminary evaluation of potential impacts to these resources and proposes preliminary avoidance, minimization, and mitigation measures. Studies and assessments to be completed once the solicitation bid is awarded include geologic hazards, air emissions, water quality, seagrass and macroalgae, benthic resources, marine mammals and sea turtles, fish and fish habitats, birds and bats, marine archaeology, visual resources, socioeconomics, electric and magnetic fields, in-air and underwater acoustics, commercial and recreational fisheries, military activities, radar, and navigational aids. The portion of the submarine transmission link located on the Outer Continental Shelf will require a Bureau of Ocean Energy Management (BOEM) Right of Way/Right of Use Grant or Easement. The portion of the submarine transmission link traversing through New Jersey State Waters, out and around to Sandy Point, then north up through Arthur Kill, is currently under review by the New Jersey Department of Environmental Protection and United States Army Corps of Engineers. Anbaric will obtain all required federal and state permits and authorizations as described in Attachment 18 Permitting Plan and will comply with all permitting requirements resulting from the permitting process."
Tower characteristics	N/A
Construction responsibility	Proposer
Benefits/Comments	The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION

Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION
Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$383,580,252.00
Component cost (in-service year)	$515,872,794.00

Greenfield Transmission Line Component

Component title	400 kV HVDC Submarine Cable Extension
Project description	The 400 kV HVDC submarine cable will be extended using direct bury trench and armor clamps to connect the new onshore converter station located close to the Sewaren 230 kV substation to the landfall location in Woodbridge Township, New Jersey. Further details regarding this 400 kV HVDC submarine cable system extension (including ampacity, insulation system design, key components, and installation methods) are outlined in the "Technical Description" documentation provided in the project analysis attachment section.
Point A	Landfall location at Buckeye Port Reading within Woodbridge Township in Middlesex County, New Jersey.
Point B	New Onshore Converter Station located adjacent to the 230 kV Sewaren substation
Point C	

	Normal ratings	**Emergency ratings**
Summer (MVA)	1423.000000	1423.000000
Winter (MVA)	1423.000000	1423.000000
Conductor size and type	1x2250mm2 Cu 400kV	
Nominal voltage	DC	
Nominal voltage	400 kV DC	

Line construction type	Underground
General route description	The cable route from the landfall location to the new onshore converter station located close to the Sewaren substation is approximately 0.1 miles (0.2 km) long. The new onshore converter station will be located in flat, urban, and industrialized area with existing industrial establishments, patches of empty lands, and Arthur Kill strait in the surrounding areas. The submarine cable route landfall location is essentially same as the onshore converter station location. Further details on the complete route description can be found in of the project "Technical Description" documentation.
Terrain description	The landfall site is located on an industrial parcel that will also host the converter station. The 0.1 miles (0.2 km)onshore transmission link route from the landfall site to the converter station is located on a flat (0-2 m above sea level) developed industrial parcel.
Right-of-way width by segment	The landfall site and onshore converter station are located on private properties and therefore do not require a right-of-way. The onshore transmission link from the landfall site to the converter station will remain within the private parcel hosting the converter station. No new or expanded right-of-way is necessary.
Electrical transmission infrastructure crossings	This portion of the onshore transmission link does not cross any electrical transmission infrastructure.
Civil infrastructure/major waterway facility crossing plan	N/A
Environmental impacts	Installation activities for the onshore transmission link from the landfall site to the converter station may impact physical resources (air quality, geological resources, water quality, wetlands and waterbodies), biological resources (avian and bat species, coastal and terrestrial habitat, and terrestrial wildlife), cultural resources (terrestrial archaeology), and socioeconomic resources (commercial and recreational resources, environmental justice populations, land use and zoning, existing infrastructure, tourism, public health and safety, workforce and demographics). Studies and assessments to be completed once the solicitation bid is awarded include geologic hazards, air emissions, water quality, terrestrial vegetation and wildlife, birds and bats, terrestrial archaeology, historic properties and protected lands, socioeconomics, electric and magnetic fields, and in-air acoustics. Anbaric will obtain all required federal, state and local permits and authorizations as described in Attachment 18 Permitting Plan and will comply with all permitting requirements resulting from the permitting process. This includes completing a Stormwater Pollution Prevention Plan, an Erosion and Sediment Control plan, and a Spill, Prevention, Control and Countermeasure plan.
Tower characteristics	N/A
Construction responsibility	Proposer

Benefits/Comments	The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION
Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$17,095,002.00
Component cost (in-service year)	$22,990,877.00

Greenfield Transmission Line Component

Component title	230 kV HVAC Underground Cable
Project description	A 230 kV HVAC underground cable connecting the new onshore converter station to the Sewaren substation. The cable system will have three single core cables installed in a concrete encased duct bank. Extruded polymer insulation (e.g., XLPE) will be used. Cable to air terminations will be used on both ends of the cable (unless the converter station AC switchyard is implemented as GIS, in which case a cable to GIS connection assembly will be used). The new 230 kV AC underground line will consist of four (4) 4500 kcmil XLPE solid dielectric cable per phase. Further details regarding this 230 kV HVAC underground cable system are outlined in the "Technical Description" documentation provided in the project analysis attachment section.

Point A	New Onshore Converter Station located adjacent to the 230 kV Sewaren substation	
Point B	Sewaren 230 kV Substation	
Point C		
	Normal ratings	**Emergency ratings**
Summer (MVA)	1400.000000	1400.000000
Winter (MVA)	1400.000000	1400.000000
Conductor size and type	3x4x4500 kcmil Cu 230kV AC	
Nominal voltage	AC	
Nominal voltage	230 kV AC	
Line construction type	Underground	
General route description	The onshore converter station will be located very close to the Sewaren 230 kV substation and the approximate cable segment length is expected to be 4,996 ft (1,523 m). The underground cable route passes through existing industrial infrastructure, empty lands, and patches of forests before terminating at the Sewaren 230 kV Sewaren substation. A detailed description of the proposed route is presented in the project analysis attachments along with figures and associated route maps.	
Terrain description	The 4,996 ft (1,523 m) onshore transmission link route from the converter station to the Sewaren onshore substation is located in flat (approximately 2-4 m above sea level) industrial parcels.	
Right-of-way width by segment	The onshore converter station and onshore substation are located on private properties and therefore do not require a right-of-way. The onshore transmission link from the converter station to the substation will remain within the private parcel hosting the converter station and substation. No new or expanded right-of-way is necessary.	
Electrical transmission infrastructure crossings	This portion of the onshore transmission link does not cross any electrical transmission infrastructure.	
Civil infrastructure/major waterway facility crossing plan	N/A	

Environmental impacts	"Installation activities for the onshore transmission link from the landfall site to the converter station may impact physical resources (air quality, geological resources, water quality, wetlands and waterbodies), biological resources (avian and bat species, coastal and terrestrial habitat, and terrestrial wildlife), cultural resources (terrestrial archaeology), and socioeconomic resources (commercial and recreational resources, environmental justice populations, land use and zoning, existing infrastructure, tourism, public health and safety, workforce and demographics). Studies and assessments to be completed once the solicitation bid is awarded include geologic hazards, air emissions, water quality, terrestrial vegetation and wildlife, birds and bats, terrestrial archaeology, historic properties and protected lands, socioeconomics, electric and magnetic fields, and in-air acoustics. Anbaric will obtain all required federal, state and local permits and authorizations as described in Attachment 18 Permitting Plan and will comply with all permitting requirements resulting from the permitting process. This includes completing a Stormwater Pollution Prevention Plan, an Erosion and Sediment Control plan, and a Spill, Prevention, Control and Countermeasure plan."
Tower characteristics	N/A
Construction responsibility	Proposer
Benefits/Comments	The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION

Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$21,115,698.00
Component cost (in-service year)	$28,398,265.00

Greenfield Substation Component

Component title	Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore wind lease area - OWF Interface Transformer # 1
Project description	The project consists of building a new Offshore Substation Platform (OSP) which will house the offshore 66 kV switchyard, the interface transformer, the offshore converter, and the offshore HVDC switchyard to facilitate the 1,400 MW HVDC transmission facility connecting the Atlantic Shores 3 offshore Wind Energy Area to the onshore POI at PSE&G's Sewaren 230 kV substation. Due to the complex nature of HVDC systems, different vendors have developed different standardized system solutions which meet comparable high-level requirements such as capacity, AC/DC voltage levels, and high-level performance criteria such as availability and efficiency. Even though solutions from different vendors are comparable and similar technologies are used on a system level, on a component level there can be substantial differences. As a result, the detailed design of the HVDC converter systems will only be known once a vendor has been selected, which can only take place if the Project is selected for development. A general overview and additional details regarding the OSP can be found in the "Technical Description" documentation provided in the project analysis attachment section.
Substation name	Atlantic Shores 3 OSP
Substation description	The new Offshore Substation Platform (OSP) will house the offshore 66 kV switchyard, the interface transformer, the offshore converter, and the offshore HVDC switchyard. The offshore wind turbine generators (WTG) in the Atlantic Shores 3 offshore Wind Energy Area will connect directly into the OSP at the 66 kV level. A general overview and additional details regarding the OSP can be found in the "Technical Description" documentation provided in the project analysis attachment section.
Nominal voltage	DC
Nominal voltage	±400 kV DC

Transformer Information

	Name	Capacity (MVA)
Transformer	OWF Interface Transformer # 1	940 MVA

	High Side	Low Side	Tertiary
Voltage (kV)	413 kV	66 kV	66 kV

Major equipment description

"The new offshore substation will contain two 3-phase transformers to step-up the 66 kV required by the OWF to the HVAC required by the HVDC valves, while galvanically isolating the DC grid and valves from the AC grid. The exact value of the primary voltage is vendor specific. The transformers are rated to at least half of the project’s capacity. For a 1,400 MW project, transformer ratings up to 940 MVA are foreseen. The transformers will be able to operate independently from each other and can be overrated to provide additional levels of redundancy in case of an outage of one of the two transformers. This improves the overall system availability. The transformers are typically of the oil-immersed type with an oil forced water forced (OFWF) cooling system. The interface transformers are typically three-winding transformers with two 66 kV windings and one HV winding to reduce space and weight. Each of the four 66 kV switchgear sections are connected to a dedicated transformer secondary winding. The primary windings are typically configured in delta connection, although some vendors also deliver star-connected alternatives. The HVDC system grounding is typically located onshore, so no primary star-point grounding or grounding reactors will be applied in the offshore substation. Since the transformers are used in a symmetrical monopole converter configuration, they do not experience DC voltage stress during normal operation. Furthermore, since modular multi-level converter (MMC) technology will be used, the transformers do not experience excessive harmonic stresses. The secondary windings will be connected in star connection to enable star-point grounding of the 66 kV grid. Some vendors offer delta connected secondary windings to reduce the winding currents, but this requires additional grounding transformers to be installed. There will be no tap changer in the offshore interface transformers to reduce weight, footprint, and the need for maintenance, as well as improve reliability. Any regulation of the 66 kV AC voltage will be done through adjustment of the modulation of the valves. Any variations in onshore AC voltage will be compensated for by the tap changers in the onshore converter. To further optimize maintenance, reduce forced outages and reduce the need for offshore operations/inspections, the offshore interface transformer will be equipped with online oil monitoring."

	Normal ratings	Emergency ratings
Summer (MVA)	940.000000	940.000000
Winter (MVA)	940.000000	940.000000

Environmental assessment	"Installation activities for the offshore substation platform may impact physical resources (air quality, geological resources, water quality), biological resources (avian and bat species, benthic and shellfish resources, finfish and essential fish habitat, marine mammals and sea turtles), cultural resources (marine archaeology), and socioeconomic resources (visual resources, commercial and recreational resources, commercial shipping, environmental justice populations, existing infrastructure, tourism, public health and safety, workforce and demographics). The environmental Protection Plan (Attachment 15) includes a preliminary evaluation of potential impacts to these resources and proposes preliminary avoidance, minimization, and mitigation measures. Studies and assessments to be completed once the solicitation bid is awarded include geologic hazards, air emissions, water quality, seagrass and macroalgae, benthic resources, marine mammals and sea turtles, fish and fish habitats, birds and bats, marine archaeology, visual resources, socioeconomics, in-air and underwater acoustics, commercial and recreational fisheries, military activities, airspace and aviation construction, radar and navigational aids. The offshore substation platform located on the Outer Continental Shelf will require a Bureau of Ocean Energy Management (BOEM) Right of Way/Right of Use Grant or Easement. Anbaric will obtain all required federal, state and local permits and authorizations as described in Attachment 18 Permitting Plan and will comply with all permitting requirements resulting from the permitting process."
Outreach plan	Anbaric has engaged with municipal, county, and community leaders of the communities our project will impact since inception and intend to continue that dialogue throughout project development and the operational life of a project. We have built a team with local expertise to help guide that process, and upon successful award of a project, will expand upon that team. We plan to establish a project website as we as an online Virtual Open House with project details available to the public and provide the ability for any member of the public to engage with the Anbaric team to ask questions, express concerns, and make suggestions. For Anbaric’s two-plus decades of project development, of projects which focus on public interest, we identify stakeholders at the earliest stages of developing a project and engaging them throughout the development process. We think it’s the only way to create successful projects, by ensuring that the projects have community and stakeholder understanding and support from the inception. This engagement philosophy seeks stakeholder input early on, when it can lead to better routes, fewer environmental effects, greater community acceptance, and de-risking of the development process. Rather than only a project specific approach, we have worked with stakeholders to develop a sustainable approach to offshore wind transmission. We are committed to a process that sees stakeholder engagement as a never-ending process, from concept inception through completion of construction and ongoing operation through the life of a project.
Land acquisition plan	Anbaric has applied to BOEM for a Right of Way/Right of Use Easement Grant for rights of way in federal waters of the outer continental shelf off the New Jersey Shore. This application was noticed in the Federal Register on June 19, 2018. Anbaric will either amend this application to reflect the proposed right of way for this project or file a new application with BOEM.
Construction responsibility	Proposer

Benefits/Comments	The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION
Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$850,997,852.00
Component cost (in-service year)	$1,144,497,501.00

Greenfield Substation Component

Component title	Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore wind lease area - OWF Interface Transformer # 2

Project description	The project consists of building a new Offshore Substation Platform (OSP) which will house the offshore 66 kV switchyard, the interface transformer, the offshore converter, and the offshore HVDC switchyard to facilitate the 1,400 MW HVDC transmission facility connecting the Atlantic Shores 3 offshore Wind Energy Area to the onshore POI at PSE&G's Sewaren 230 kV substation. Due to the complex nature of HVDC systems, different vendors have developed different standardized system solutions which meet comparable high-level requirements such as capacity, AC/DC voltage levels, and high-level performance criteria such as availability and efficiency. Even though solutions from different vendors are comparable and similar technologies are used on a system level, on a component level there can be substantial differences. As a result, the detailed design of the HVDC converter systems will only be known once a vendor has been selected, which can only take place if the Project is selected for development. A general overview and additional details regarding the OSP can be found in the "Technical Description" documentation provided in the project analysis attachment section.
Substation name	Atlantic Shores 3 OSP
Substation description	The new Offshore Substation Platform (OSP) will house the offshore 66 kV switchyard, the interface transformer, the offshore converter, and the offshore HVDC switchyard. The offshore wind turbine generators (WTG) in the Atlantic Shores 3 offshore Wind Energy Area will connect directly into the OSP at the 66 kV level. A general overview and additional details regarding the OSP can be found in the "Technical Description" documentation provided in the project analysis attachment section.
Nominal voltage	DC
Nominal voltage	±400 kV DC

Transformer Information

	Name	**Capacity (MVA)**	
Transformer	OWF Interface Transformer # 2	940 MVA	
	High Side	**Low Side**	**Tertiary**
Voltage (kV)	413 kV	66 kV	66 kV

Major equipment description	"The new offshore substation will contain two 3-phase transformers to step-up the 66 kV required by the OWF to the HVAC required by the HVDC valves, while galvanically isolating the DC grid and valves from the AC grid. The exact value of the primary voltage is vendor specific. The transformers are rated to at least half of the project's capacity. For a 1,400 MW project, transformer ratings up to 940 MVA are foreseen. The transformers will be able to operate independently from each other and can be overrated to provide additional levels of redundancy in case of an outage of one of the two transformers. This improves the overall system availability. The transformers are typically of the oil-immersed type with an oil forced water forced (OFWF) cooling system. The interface transformers are typically three-winding transformers with two 66 kV windings and one HV winding to reduce space and weight. Each of the four 66 kV switchgear sections are connected to a dedicated transformer secondary winding. The primary windings are typically configured in delta connection, although some vendors also deliver star-connected alternatives. The HVDC system grounding is typically located onshore, so no primary star-point grounding or grounding reactors will be applied in the offshore substation. Since the transformers are used in a symmetrical monopole converter configuration, they do not experience DC voltage stress during normal operation. Furthermore, since modular multi-level converter (MMC) technology will be used, the transformers do not experience excessive harmonic stresses. The secondary windings will be connected in star connection to enable star-point grounding of the 66 kV grid. Some vendors offer delta connected secondary windings to reduce the winding currents, but this requires additional grounding transformers to be installed. There will be no tap changer in the offshore interface transformers to reduce weight, footprint, and the need for maintenance, as well as improve reliability. Any regulation of the 66 kV AC voltage will be done through adjustment of the modulation of the valves. Any variations in onshore AC voltage will be compensated for by the tap changers in the onshore converter. To further optimize maintenance, reduce forced outages and reduce the need for offshore operations/inspections, the offshore interface transformer will be equipped with online oil monitoring."

	Normal ratings	**Emergency ratings**
Summer (MVA)	940.000000	940.000000
Winter (MVA)	940.000000	940.000000

Environmental assessment	"Installation activities for the offshore substation platform may impact physical resources (air quality, geological resources, water quality), biological resources (avian and bat species, benthic and shellfish resources, finfish and essential fish habitat, marine mammals and sea turtles), cultural resources (marine archaeology), and socioeconomic resources (visual resources, commercial and recreational resources, commercial shipping, environmental justice populations, existing infrastructure, tourism, public health and safety, workforce and demographics). The environmental Protection Plan (Attachment 15) includes a preliminary evaluation of potential impacts to these resources and proposes preliminary avoidance, minimization, and mitigation measures. Studies and assessments to be completed once the solicitation bid is awarded include geologic hazards, air emissions, water quality, seagrass and macroalgae, benthic resources, marine mammals and sea turtles, fish and fish habitats, birds and bats, marine archaeology, visual resources, socioeconomics, in-air and underwater acoustics, commercial and recreational fisheries, military activities, airspace and aviation construction, radar and navigational aids. The offshore substation platform located on the Outer Continental Shelf will require a Bureau of Ocean Energy Management (BOEM) Right of Way/Right of Use Grant or Easement. Anbaric will obtain all required federal, state and local permits and authorizations as described in Attachment 18 Permitting Plan and will comply with all permitting requirements resulting from the permitting process."
Outreach plan	Anbaric has engaged with municipal, county, and community leaders of the communities our project will impact since inception and intend to continue that dialogue throughout project development and the operational life of a project. We have built a team with local expertise to help guide that process, and upon successful award of a project, will expand upon that team. We plan to establish a project website as we as an online Virtual Open House with project details available to the public and provide the ability for any member of the public to engage with the Anbaric team to ask questions, express concerns, and make suggestions. For Anbaric’s two-plus decades of project development, of projects which focus on public interest, we identify stakeholders at the earliest stages of developing a project and engaging them throughout the development process. We think it’s the only way to create successful projects, by ensuring that the projects have community and stakeholder understanding and support from the inception. This engagement philosophy seeks stakeholder input early on, when it can lead to better routes, fewer environmental effects, greater community acceptance, and de-risking of the development process. Rather than only a project specific approach, we have worked with stakeholders to develop a sustainable approach to offshore wind transmission. We are committed to a process that sees stakeholder engagement as a never-ending process, from concept inception through completion of construction and ongoing operation through the life of a project.
Land acquisition plan	Anbaric has applied to BOEM for a Right of Way/Right of Use Easement Grant for rights of way in federal waters of the outer continental shelf off the New Jersey Shore. This application was noticed in the Federal Register on June 19, 2018. Anbaric will either amend this application to reflect the proposed right of way for this project or file a new application with BOEM.
Construction responsibility	Proposer

Benefits/Comments	Note: Component Costs are included in Component Cost Details for Offshore Substation. The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION
Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$.00
Component cost (in-service year)	$.00

Greenfield Substation Component

Component title	Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore wind lease area - Offshore Converter Station

Project description	The project consists of building a new Offshore Substation Platform (OSP) which will house the offshore 66 kV switchyard, the interface transformer, the offshore converter, and the offshore HVDC switchyard to facilitate the 1,400 MW HVDC transmission facility connecting the Atlantic Shores 3 offshore Wind Energy Area to the onshore POI at PSE&G's Sewaren 230 kV substation. Due to the complex nature of HVDC systems, different vendors have developed different standardized system solutions which meet comparable high-level requirements such as capacity, AC/DC voltage levels, and high-level performance criteria such as availability and efficiency. Even though solutions from different vendors are comparable and similar technologies are used on a system level, on a component level there can be substantial differences. As a result, the detailed design of the HVDC converter systems will only be known once a vendor has been selected, which can only take place if the Project is selected for development. A general overview and additional details regarding the OSP can be found in the "Technical Description" documentation provided in the project analysis attachment section.
Substation name	Atlantic Shores 3 OSP
Substation description	The new Offshore Substation Platform (OSP) will house the offshore 66 kV switchyard, the interface transformer, the offshore converter, and the offshore HVDC switchyard. The offshore wind turbine generators (WTG) in the Atlantic Shores 3 offshore Wind Energy Area will connect directly into the OSP at the 66 kV level. A general overview and additional details regarding the OSP can be found in the "Technical Description" documentation provided in the project analysis attachment section.
Nominal voltage	DC
Nominal voltage	±400 kV DC

Transformer Information

	Name	**Capacity (MVA)**	
Transformer	Offshore Converter Station	1469 MVA	
	High Side	**Low Side**	**Tertiary**
Voltage (kV)			

Major equipment description	The project consists of a ±400 kV symmetrical monopole half-bridge modular multi-level converter (MMC) system. The MMCs offer excellent control capabilities, low losses, small footprint, high reliability, good scalability, and low harmonic distortion. Further details are provided in the project analysis attachments.

	Normal ratings	Emergency ratings
Summer (MVA)	1469.000000	1469.000000
Winter (MVA)	1469.000000	1469.000000
Environmental assessment	"Installation activities for the offshore substation platform may impact physical resources (air quality, geological resources, water quality), biological resources (avian and bat species, benthic and shellfish resources, finfish and essential fish habitat, marine mammals and sea turtles), cultural resources (marine archaeology), and socioeconomic resources (visual resources, commercial and recreational resources, commercial shipping, environmental justice populations, existing infrastructure, tourism, public health and safety, workforce and demographics). The environmental Protection Plan (Attachment 15) includes a preliminary evaluation of potential impacts to these resources and proposes preliminary avoidance, minimization, and mitigation measures. Studies and assessments to be completed once the solicitation bid is awarded include geologic hazards, air emissions, water quality, seagrass and macroalgae, benthic resources, marine mammals and sea turtles, fish and fish habitats, birds and bats, marine archaeology, visual resources, socioeconomics, in-air and underwater acoustics, commercial and recreational fisheries, military activities, airspace and aviation construction, radar and navigational aids. The offshore substation platform located on the Outer Continental Shelf will require a Bureau of Ocean Energy Management (BOEM) Right of Way/Right of Use Grant or Easement. Anbaric will obtain all required federal, state and local permits and authorizations as described in Attachment 18 Permitting Plan and will comply with all permitting requirements resulting from the permitting process."	
Outreach plan	Anbaric has engaged with municipal, county, and community leaders of the communities our project will impact since inception and intend to continue that dialogue throughout project development and the operational life of a project. We have built a team with local expertise to help guide that process, and upon successful award of a project, will expand upon that team. We plan to establish a project website as we as an online Virtual Open House with project details available to the public and provide the ability for any member of the public to engage with the Anbaric team to ask questions, express concerns, and make suggestions. For Anbaric’s two-plus decades of project development, of projects which focus on public interest, we identify stakeholders at the earliest stages of developing a project and engaging them throughout the development process. We think it’s the only way to create successful projects, by ensuring that the projects have community and stakeholder understanding and support from the inception. This engagement philosophy seeks stakeholder input early on, when it can lead to better routes, fewer environmental effects, greater community acceptance, and de-risking of the development process. Rather than only a project specific approach, we have worked with stakeholders to develop a sustainable approach to offshore wind transmission. We are committed to a process that sees stakeholder engagement as a never-ending process, from concept inception through completion of construction and ongoing operation through the life of a project.	

Land acquisition plan	Anbaric has applied to BOEM for a Right of Way/Right of Use Easement Grant for rights of way in federal waters of the outer continental shelf off the New Jersey Shore. This application was noticed in the Federal Register on June 19, 2018. Anbaric will either amend this application to reflect the proposed right of way for this project or file a new application with BOEM.
Construction responsibility	Proposer
Benefits/Comments	Note: Component Costs are included in Component Cost Details for Offshore Substation. Anbaric has applied to BOEM for a Right of Way/Right of Use Easement Grant for rights of way in federal waters of the outer continental shelf off the New Jersey Shore. This application was noticed in the Federal Register on June 19, 2018. Anbaric will either amend this application to reflect the proposed right of way for this project or file a new application with BOEM.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION
Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$.00
Component cost (in-service year)	$.00

Greenfield Substation Component

Component title	New Onshore Converter Station - Onshore Converter Station at Sewaren

Project description	The project consists of building a new onshore converter station close to the Sewaren 230 kV substation to convert the offshore wind power from ±400 kV HVDC to 230 kV AC 60 Hz prior to injecting to the AC grid. The new onshore converter station will house the HVDC switchyard, the interface transformer, the onshore converter, and the HVAC switchyard along with other necessary equipment. A general overview and additional details regarding the onshore converter station can be found in the "Technical Description" documentation provided in the project analysis attachment section.
Substation name	Onshore Converter Station at Sewaren
Substation description	The new onshore converter station converts the offshore wind power from ±400 kV HVDC to 230 kV AC 60 Hz prior to injecting to the AC grid. The new onshore converter station will house the HVDC switchyard, the interface transformer, the onshore converter, and the HVAC switchyard along with other necessary equipment.
Nominal voltage	AC
Nominal voltage	230 kV AC

Transformer Information

	Name	Capacity (MVA)
Transformer	Onshore Converter Station at Sewaren	1474 MVA

	High Side	Low Side	Tertiary
Voltage (kV)			

Major equipment description	The project consists of a ±400 kV symmetrical monopole half-bridge modular multi-level converter (MMC) system. The MMCs offer excellent control capabilities, low losses, small footprint, high reliability, good scalability, and low harmonic distortion. Further details are provided in the project analysis attachments.

	Normal ratings	Emergency ratings
Summer (MVA)	1474.000000	1474.000000
Winter (MVA)	1474.000000	1474.000000

Environmental assessment	"Installation activities for the onshore converter station and Sewaren substation may impact physical resources (air quality, geological resources, water quality, wetlands), biological resources (avian and bat species, terrestrial habitat, terrestrial wildlife), cultural resources (terrestrial archaeology), and socioeconomic resources (visual resources, commercial and recreational resources, environmental justice populations, land use and zoning, existing infrastructure, tourism, public health and safety, workforce and demographics). The environmental Protection Plan (Attachment 15) includes a preliminary evaluation of potential impacts to these resources and proposes preliminary avoidance, minimization, and mitigation measures. Studies and assessments to be completed once the solicitation bid is awarded include geologic hazards, air emissions, water quality, terrestrial vegetation and wildlife, birds and bats, terrestrial archaeology, historic properties and protected lands, visual resources, socioeconomics, and in-air acoustics. The onshore converter station will require a land use permit from the local authority. Anbaric will obtain all required federal, state, and local permits and authorizations as described in Attachment 18 Permitting Plan and will comply with all permitting requirements resulting from the permitting process. This includes completing a Stormwater Pollution Prevention Plan, an Erosion and Sediment Control Plan, and a Spill, Prevention, Control and Countermeasure plan."
Outreach plan	Anbaric has engaged with municipal, county, and community leaders of the communities our project will impact since inception and intend to continue that dialogue throughout project development and the operational life of a project. We have built a team with local expertise to help guide that process, and upon successful award of a project, will expand upon that team. We plan to establish a project website as we as an online Virtual Open House with project details available to the public and provide the ability for any member of the public to engage with the Anbaric team to ask questions, express concerns, and make suggestions. For Anbaric’s two-plus decades of project development, of projects which focus on public interest, we identify stakeholders at the earliest stages of developing a project and engaging them throughout the development process. We think it’s the only way to create successful projects, by ensuring that the projects have community and stakeholder understanding and support from the inception. This engagement philosophy seeks stakeholder input early on, when it can lead to better routes, fewer environmental effects, greater community acceptance, and de-risking of the development process. Rather than only a project specific approach, we have worked with stakeholders to develop a sustainable approach to offshore wind transmission. We are committed to a process that sees stakeholder engagement as a never-ending process, from concept inception through completion of construction and ongoing operation through the life of a project.
Land acquisition plan	Anbaric has identified a portion of the Buckeye Port Reading Terminal (Block 760.02, Lot 1 in Woodbridge Township), which lies adjacent to the PSEG Sewaren Substation, for for siting of the proposed HVDC Converter Station. ADP is negotiating for fee simple ownership via a Option to Purchase Agreement of an approximately 8 acre subdivision of the larger parcel.
Construction responsibility	Proposer

Benefits/Comments	The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION
Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$371,298,551.00
Component cost (in-service year)	$499,355,271.00

Greenfield Substation Component

Component title	New Onshore Converter Station - Onshore Grid Interface Transformer
Project description	The project consists of building a new onshore converter station close to the Sewaren 230 kV substation to convert the offshore wind power from ±400 kV HVDC to 230 kV AC 60 Hz prior to injecting to the AC grid. The new onshore converter station will house the HVDC switchyard, the interface transformer, the onshore converter, and the HVAC switchyard along with other necessary equipment. A general overview and additional details regarding the onshore converter station can be found in the "Technical Description" documentation provided in the project analysis attachment section.

Substation name	Onshore Converter Station at Sewaren
Substation description	The new onshore converter station converts the offshore wind power from ±400 kV HVDC to 230 kV AC 60 Hz prior to injecting to the AC grid. The new onshore converter station will house the HVDC switchyard, the interface transformer, the onshore converter, and the HVAC switchyard along with other necessary equipment.
Nominal voltage	AC
Nominal voltage	230 kV AC

Transformer Information

	Name	Capacity (MVA)
Transformer	Onshore Grid Interface Transformer	500 MVA

	High Side	Low Side	Tertiary
Voltage (kV)	230 kV	456 kV	

Major equipment description	The new onshore substation will contain three single-phase transformers to step-up the HVAC required by the HVDC valves to the 230 kV AC to connect to the POI substation, while galvanically isolating the DC grid and valves from the AC grid. The exact value of the primary voltage is vendor specific. Each of the transformers are rated to at least a third of the project's capacity. For a 1,400 MW project, single transformer ratings around 500 MVA are foreseen.

	Normal ratings	Emergency ratings
Summer (MVA)	500.000000	500.000000
Winter (MVA)	500.000000	500.000000

Environmental assessment	"Installation activities for the onshore converter station and Sewaren substation may impact physical resources (air quality, geological resources, water quality, wetlands), biological resources (avian and bat species, terrestrial habitat, terrestrial wildlife), cultural resources (terrestrial archaeology), and socioeconomic resources (visual resources, commercial and recreational resources, environmental justice populations, land use and zoning, existing infrastructure, tourism, public health and safety, workforce and demographics). The environmental Protection Plan (Attachment 15) includes a preliminary evaluation of potential impacts to these resources and proposes preliminary avoidance, minimization, and mitigation measures. Studies and assessments to be completed once the solicitation bid is awarded include geologic hazards, air emissions, water quality, terrestrial vegetation and wildlife, birds and bats, terrestrial archaeology, historic properties and protected lands, visual resources, socioeconomics, and in-air acoustics. The onshore converter station will require a land use permit from the local authority. Anbaric will obtain all required federal, state, and local permits and authorizations as described in Attachment 18 Permitting Plan and will comply with all permitting requirements resulting from the permitting process. This includes completing a Stormwater Pollution Prevention Plan, an Erosion and Sediment Control Plan, and a Spill, Prevention, Control and Countermeasure plan."
Outreach plan	Anbaric has engaged with municipal, county, and community leaders of the communities our project will impact since inception and intend to continue that dialogue throughout project development and the operational life of a project. We have built a team with local expertise to help guide that process, and upon successful award of a project, will expand upon that team. We plan to establish a project website as we as an online Virtual Open House with project details available to the public and provide the ability for any member of the public to engage with the Anbaric team to ask questions, express concerns, and make suggestions. For Anbaric’s two-plus decades of project development, of projects which focus on public interest, we identify stakeholders at the earliest stages of developing a project and engaging them throughout the development process. We think it’s the only way to create successful projects, by ensuring that the projects have community and stakeholder understanding and support from the inception. This engagement philosophy seeks stakeholder input early on, when it can lead to better routes, fewer environmental effects, greater community acceptance, and de-risking of the development process. Rather than only a project specific approach, we have worked with stakeholders to develop a sustainable approach to offshore wind transmission. We are committed to a process that sees stakeholder engagement as a never-ending process, from concept inception through completion of construction and ongoing operation through the life of a project.
Land acquisition plan	Anbaric has identified a portion of the Buckeye Port Reading Terminal (Block 760.02, Lot 1 in Woodbridge Township), which lies adjacent to the PSEG Sewaren Substation, for for siting of the proposed HVDC Converter Station. ADP is negotiating for fee simple ownership via a Option to Purchase Agreement of an approximately 8 acre subdivision of the larger parcel.
Construction responsibility	Proposer

Benefits/Comments	Note: Component Costs are included in Component Cost Details for Onshore Converter Station. The project provides multiple benefits to the PJM transmission grid, such as reliability benefits, energy market benefits, capacity market benefits, congestion benefits, and public policy benefits. The project is a part of multiple offshore wind integration pathways and the project benefits are quantified for each pathway to which this project belongs. The reliability, energy market, and public policy benefits are outlined in Section 4 of the NJBPU Supplemental Data Collection Form. The capacity market benefits are outlined in Section 15 of the Analysis Report. The cost-benefit assessment, including calculation of Levelized Cost of Transmission are provided in Section 16 of the Analysis Report.

Component Cost Details - In Current Year $

Engineering & design	CONFIDENTIAL AND PROPRIETARY INFORMATION
Permitting / routing / siting	CONFIDENTIAL AND PROPRIETARY INFORMATION
ROW / land acquisition	CONFIDENTIAL AND PROPRIETARY INFORMATION
Materials & equipment	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction & commissioning	CONFIDENTIAL AND PROPRIETARY INFORMATION
Construction management	CONFIDENTIAL AND PROPRIETARY INFORMATION
Overheads & miscellaneous costs	CONFIDENTIAL AND PROPRIETARY INFORMATION
Contingency	CONFIDENTIAL AND PROPRIETARY INFORMATION
Total component cost	$.00
Component cost (in-service year)	$.00

Congestion Drivers

None

Existing Flowgates

None

New Flowgates

None

Financial Information

Capital spend start date	01/2022
Construction start date	12/2027
Project Duration (In Months)	132

Cost Containment Commitment

Cost cap (in current year)	$2,074,232,753.00
Cost cap (in-service year)	$2,789,612,449.00

Components covered by cost containment

1. Upgrade/Expansion of the 230 kV Sewaren Substation - External
2. 400 kV HVDC Submarine Cable - Proposer
3. 400 kV HVDC Submarine Cable Extension - Proposer
4. 230 kV HVAC Underground Cable - Proposer
5. Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore... - Proposer
6. Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore... - Proposer
7. Offshore Substation Platform (OSP) at Atlantic Shores 3 (“AS3") offshore... - Proposer
8. New Onshore Converter Station - Onshore Converter Station at Sewaren - Proposer
9. New Onshore Converter Station - Onshore Grid Interface Transformer - Proposer

Cost elements covered by cost containment

Engineering & design	Yes
Permitting / routing / siting	Yes

ROW / land acquisition	Yes
Materials & equipment	Yes
Construction & commissioning	Yes
Construction management	Yes
Overheads & miscellaneous costs	Yes
Taxes	No
AFUDC	No
Escalation	No
Additional Information	Refer to the cost commitment legal language
Is the proposer offering a binding cap on ROE?	Yes
Would this ROE cap apply to the determination of AFUDC?	Yes
Would the proposer seek to increase the proposed ROE if FERC finds that a higher ROE would not be unreasonable?	No
Is the proposer offering a Debt to Equity Ratio cap?	Yes
Additional cost containment measures not covered above	Refer to the cost commitment legal language

Additional Comments

None