Deans to Hudson South 1

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 2.1
PJM Proposal ID	841
Project title	Deans to Hudson South 1
Project description	This project proposes a 1,400 MW offshore transmission link connecting the Hudson South 1 (“HS1”) offshore wind lease area (Wind Energy Area A in Hudson South Call Area) to the 500 kV Deans substation located in South Brunswick, New Jersey (identified as one of the default Point of Interconnections by PJM Interconnection). This 1,400 MW offshore transmission link project is referred to as Boardwalk Power Option 2.1 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, 500 kV HVAC underground cable segment, and necessary upgrades to the Deans 500 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.
Email	jfuller@anbaric.com
Project in-service date	01/2031
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 500 kV Deans Substation
2. 400 kV HVDC Submarine Cable
3. 400 kV HVDC Underground Cable
4. 500 kV HVAC Underground Cable
5. Offshore Substation Platform (OSP) at Hudson South 1 (“HS1”) offshore wi...
6. Offshore Substation Platform (OSP) at Hudson South 1 (“HS1”) offshore wi...
7. Offshore Substation Platform (OSP) at Hudson South 1 (“HS1”) offshore wi...
8. New Onshore Converter Station - Onshore Converter Station at Deans
9. New Onshore Converter Station - Onshore Grid Interface Transformer

Substation Upgrade Component

Component title	Upgrade/Expansion of 500 kV Deans Substation
Project description	Upgrade the PSE&G's existing Deans substation (a 500-230 kV AC facility) located within South Brunswick Township in Middlesex County, New Jersey to accommodate the new 500 kV AC, 1400 MW underground cable connection from the new onshore HVDC converter station (1x1400 MW, ±400 kV DC) with the potential for build-out of a second 500 kV AC, 1400 MW underground cable connection in the future to accommodate a total of 2800 MW of offshore wind power injection at Deans substation. 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 substation at Deans to reliably interconnect the 500 kV underground HVAC cable from the new onshore converter station.
Substation name	Deans 500 kV Substation
Substation zone	1826 - PJM500-PSE&G

Substation upgrade scope	The Deans substation is an existing 500-230 kV AC facility located within South Brunswick Township in Middlesex County, New Jersey. The existing 500 kV yard consists of three bays in a breaker-and-a-half arrangement. A new breaker-and-a-half bay will be installed south of the existing bays. The initial buildout of the new bay will consist of two breaker positions with the tie breaker position being reserved for future use. This configuration will accommodate one new 500 kV AC, 1400 MW underground cable connection from the new onshore HVDC converter station (1x1400 MW, ±400 kV DC). The new 500 kV AC underground line will be terminated in the eastern position of the new bay. 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 23 of the project analysis attachments.

Transformer Information

None

New equipment description	A new breaker-and-a-half bay will be installed south of the existing bays. The initial buildout of the new bay will consist of two breaker positions with the tie breaker position being reserved for future use. Following are the list of main equipment: Major Equipment: Install Two (2) 500 kV, 3000 A, 63 kA, SF6 Dead Tank Circuit Breakers Install Six (6) 500 kV, 3000 A, Motor Operated Vertical Break Disconnect Switches w/Ground Switches Install Three (3) 500 kV CCVTs Install Three (3) 500 kV Station Class MOV Type Surge Arresters Bus & Insulators: Install Forty-three (43) 500 kV Station Post Insulators Install 2100’ of 5” SCH 80 Tubular Aluminum Bus w/795 kcmil ACSR Damping Conductor Install 200’ of 2-2167 kcmil ACSR for Equipment Jumpers Install One (1) Lot of EHV Substation Connectors and Hardware Substation Grounding System: Equipment and Structure Grounds: Two (2) 19#6 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: Install 10,000’ of 4/C #10 Shielded Control Cable Install 8,000’ of 4/C #8 Shielded Control Cable Install 8,000’ of 7/C #10 Shielded Control Cable Install 8,000’ of 12/C #10 Shielded Control Cable Install 8,000’ of 1/C #4 Power Cable Install 1,500’ of 1/C #14 SIS Wire for Intra-panel Wiring High Voltage Underground Cable System: The new 500 kV AC underground line will consist of one (1) 5000 kcmil 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: 500 kV AC underground line duct bank with conduits to each termination structure and communication conduits to fiber optic splice enclosure. 500 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 Deans 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 500 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 aerial lugs for the new 500kV AC cable terminators inside Deans 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 Deans 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. 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).
Real-estate description	Substation fence expansion is not required for the interconnection of 1x1400 MW underground cable at Deans 500 kV substation. The fence expansion will be required for interconnection of a second underground circuit. The upgrades discussed for the 2x1400MW (or similar MW injection) substation expansion of offshore wind injection on the 500 kV system at Deans substation. PSE&G Deans substation is an existing 500-230 kV AC facility. The existing 500 kV yard consists of three bays in a breaker-and-a-half arrangement. A new breaker-and-a-half bay will be installed south of the existing bays to accommodate two new 500 kV AC, 1400 MW underground cable connections from the new onshore HVDC converter station (2x1400 MW, 400 kV DC). One of the new 500 kV AC underground lines will be terminated in the eastern position of the new bay. To avoid terminating both new underground lines in the same bay, the existing 500 kV Smithburg overhead line will be relocated to the western position of the new bay. A 100’ x 125’ fence expansion is required on the west side of the 500 kV yard to accommodate a new 500 kV A-Frame dead-end. The new A-Frame will allow the second 500 KV AC underground line to transition to overhead and connect to the terminal position previously occupied by the Smithburg line. A detailed layout of the substation expansion is included as Attachment 24 Detailed Layout of 2800 MW Expansion of Deans Substation. All the improvements including the fence expansion proposed is entirely within property owned by PSEG specifically Block 24, Lot 14.10 consisting of 94.34 acres. Under the option to build the fence relocation would be included in the developer’s substation expansion scope.
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	$11,206,639.00
Component cost (in-service year)	$14,345,447.00

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 Hudson South 1 (“HS1”) offshore wind lease area (Wind Energy Area A in Hudson South Call Area) to the landfall location at Keyport, 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 the Hudson South 1 (“HS1”) offshore wind lease area (Wind Energy Area A in Hudson South Call Area)
Point B	Landfall location at Keyport, New Jersey
Point C	

	Normal ratings	**Emergency ratings**
Summer (MVA)	1424.000000	1424.000000
Winter (MVA)	1424.000000	1424.000000
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 Hudson South 1 platform to the landfall location at Keyport, NJ is approximately 80.16 mi (129 km). A detailed offshore cable route map can be found in Attachment 25 Option 2.1 Offshore Transmission Route Map. The cable system is expected to be installed in water depths of up to approximately 131 ft (40 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 "Technical Description" documentation provided 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 Keyport, passing through Raritan Bay. The sea floor in this area of the OSP is relatively flat and shallow (approximately 131 ft [40 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 platform (OSP) to the landing site is approximately 80.16 mi (129 km) in length and requires a 400-ft or 800-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,Which Side of Converter Station, Option 2.1,40.486068,-74.157015,line,NOAA Charted Submarine Cables,266,Power Line - Effective Date: 9/5/2007,Offshore,before landfall, Option 2.1,40.490787,-74.003598,line,NOAA Charted Submarine Cables,266,Power Line - Effective Date: 9/5/2007,Offshore,before landfall, The offshore transmission link crosses 2 electrical transmission infrastructure, both 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 application review commenced in May 2019 and is still ongoing and BOEM is presently completing internal and National Environmental Policy Act compliance review via a more expedient Environmental Assessment public review process. The portion of the submarine transmission link traversing through New Jersey State Waters, out and around to Sandy Point, then south back into state waters near Atlantic City, 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	$350,546,259.00
Component cost (in-service year)	$448,728,847.00

Greenfield Transmission Line Component

Component title	400 kV HVDC Underground Cable

Project description	A 400 kV underground HVDC cable connecting the new onshore converter station to the landfall location at Keyport, New Jersey. The HVDC underground cable will consist of two cables insulated for ±400 kV with a copper conductor. 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 underground 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	Landfall location at Keyport, New Jersey
Point B	New Onshore Converter Station located adjacent to the Deans 500 kV substation
Point C	

	Normal ratings	**Emergency ratings**
Summer (MVA)	1424.000000	1424.000000
Winter (MVA)	1424.000000	1424.000000

Conductor size and type	1x2250mm2 Cu 400kV
Nominal voltage	DC
Nominal voltage	400 kV DC
Line construction type	Underground
General route description	Anbaric has fully permitted a single underground cable circuit route from the Keyport landfall location to the new onshore converter station adjacent to the Deans substation. Full details on the complete permitting status can be found in "Attachment 17 Permitting Plan" of the project "Technical Description" documentation. The route is also engineered to accommodate a potential second independent 1400 MW ±400 kV HVDC circuit. The underground cable route from the landfall location to the new onshore converter station located close to the Deans substation is approximately 21 miles (34 km) long, and passes through suburban area, patches of empty lands and forests. The submarine cable route landfall location is at the beachfront in Keyport, New Jersey. 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 a beach parcel formerly used as a marina. Anbaric has site control through an option to purchase this site. The onshore transmission link route from the landfall site to the converter station is located in flat (0-50 m above sea level) developed areas with patches of woodland and wetlands.
Right-of-way width by segment	The landfall site and onshore coverter 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 mostly remain within existing road rights-of-way. These road rights-of-way total 21 mi (34 km) in length and range in width from approximately 30 to 70 ft. The onshore transmission link will deviate from the existing road rights-of-way at a few locations to cross streams and/or wetlands by way of horizontal directional drilling. These deviations will require permits from the NJDEP, but no new or expanded right-of-way.

Electrical transmission infrastructure crossings

Option 2.1,40.351942,-74.289264,line,HIFLD,117068,"Owner: Jersey Central Power & LT CO, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,landfall to converter station, Option 2.1,40.403997,-74.487469,line,HIFLD,143695,"Owner: Not Available, In Service, Overhead, AC, Voltage: 500, Voltage Class: 500",Onshore,converter station to substation, Option 2.1,40.404457,-74.289186,line,HIFLD,158379,"Owner: Jersey Central Power & LT CO, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,landfall to converter station, Option 2.1,40.404783,-74.487834,line,HIFLD,128004,"Owner: Not Available, In Service, Overhead, AC, Voltage: 500, Voltage Class: 500",Onshore,converter station to substation, Option 2.1,40.405205,-74.487921,line,HIFLD,127046,"Owner: Not Available, In Service, Overhead, AC, Voltage: 500, Voltage Class: 500",Onshore,converter station to substation, Option 2.1,40.406604,-74.485662,line,HIFLD,174771,"Owner: Public Service Elec & Gas Co, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,converter station to substation, Option 2.1,40.40673,-74.485661,line,HIFLD,100184,"Owner: Public Service Elec & Gas Co, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,converter station to substation, Option 2.1,40.406842,-74.485658,line,HIFLD,106035,"Owner: Public Service Elec & Gas Co, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,converter station to substation, Option 2.1,40.406916,-74.48566,line,HIFLD,139619,"Owner: Public Service Elec & Gas Co, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,converter station to substation, Option 2.1,40.408304,-74.268606,line,HIFLD,105725,"Owner: Jersey Central Power & LT CO, In Service, Overhead, Voltage Class: Not available",Onshore,landfall to converter station, Option 2.1,40.408328,-74.268503,line,HIFLD,127341,"Owner: Jersey Central Power & LT CO, In Service, Overhead, Voltage Class: Not available",Onshore,landfall to converter station, Option 2.1,40.409028,-74.486002,line,HIFLD,139619,"Owner: Public Service Elec & Gas Co, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,landfall to converter station (then falls same line going from converter station to substation), Option 2.1,40.409073,-74.486062,line,HIFLD,106035,"Owner: Public Service Elec & Gas Co, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,landfall to converter station (then falls same line going from converter station to substation), Option 2.1,40.409117,-74.486121,line,HIFLD,113003,"Owner: Public Service Elec & Gas Co, In Service, Overhead, AC, Voltage: 138, Voltage Class: 100-161",Onshore,landfall to converter station (then falls same line going from converter station to substation), Option 2.1,40.409153,-74.486171,line,HIFLD,132348,"Owner: Public Service Elec & Gas Co, In Service, Overhead, AC, Voltage: 138, Voltage Class: 100-161",Onshore,landfall to converter station (then falls same line going from converter station to substation), Option 2.1,40.409357,-74.23002,line,HIFLD,113368,"Owner: Jersey Central Power & LT CO, In Service, Overhead, AC, Voltage: 230, Voltage Class: 220-287",Onshore,landfall to converter station, Option 2.1,40.40989,-74.347714,line,HIFLD,134490,"Owner: Jersey Central Power & LT CO, In Service, Overhead, Voltage Class: Not available",Onshore,landfall to converter station, Option 2.1,40.409898,-74.347883,line,HIFLD,117071,"Owner: Jersey Central Power & LT CO, In Service, Overhead, Voltage Class: Not available",Onshore,landfall to converter station, This portion of the onshore transmission link crosses 16 electrical transmission infrastructure, all in service. As some lines are crossed more than once, there is a total of 20 electrical transmission infrastructure crossings.

Civil infrastructure/major waterway facility crossing plan	The onshore transmission link route crosses 25 waterways, 16 transmission lines, 2 railroads, and 3 highways (under 2 overpasses).
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 has fully permitted a single underground cable circuit route from the Keyport landfall site to the onshore converter station close to the Deans POI. This route is engineered to accommodate two independent 1400 MW 400 kV HVDC circuits while complying with the reliability criteria to maintain 10-feet separation between the circuits. An alternate pathway has been developed where the 10-ft separation is not feasible or other limitations exist that prohibit adherence to the permitted pathway. The alternate pathway is not permitted at this time, but potential effects and potential avoidance, minimization, and mitigation measures have been considered. 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	$167,922,146.00
Component cost (in-service year)	$214,954,543.00

Greenfield Transmission Line Component

Component title	500 kV HVAC Underground Cable
Project description	A 500 kV HVAC Underground Cable connecting the new onshore converter station to the Deans 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 500 kV HVAC underground line will consist of one (1) 5000 kcmil XLPE solid dielectric cable per phase. Further details regarding this 500 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 Deans 500 kV substation
Point B	Deans 500 kV Substation
Point C	

	Normal ratings	**Emergency ratings**
Summer (MVA)	1400.000000	1400.000000
Winter (MVA)	1400.000000	1400.000000
Conductor size and type	3x1x5000 kcmil Cu 500kV AC	
Nominal voltage	AC	

Nominal voltage	500 kV AC
Line construction type	Underground
General route description	The onshore converter station will be located adjacent to the Deans 500 kV substation and the approximate cable segment length is expected to be 1,141 ft (348 m). The underground cable route passes through properties under site control before terminating at the Deans 500 kV 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 onshore transmission link route from the converter station to the Deans onshore substation is located in a flat (approximately 30 m above sea level) suburban area mostly covered by patches of woodlands and wetlands.
Right-of-way width by segment	The onshore converter station and the Deans substation are located on properties owned by the developer and PSE&G, and therefore do not require a right-of-way. The onshore transmission link from the converter station to the substation will remain within existing road right-of-way. This road rights-of-way total 1,141 ft (348 m) in length and approximately 30 ft in width. If this route must deviate from the existing road right-of-way to cross streams and/or wetlands, horizontal directional drilling will be used. 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 converter station to the Deans substation may impact physical resources (air quality, geological resources, water quality, wetlands and waterbodies), biological resources (avian and bat species, 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 has fully permitted a single underground cable circuit route from the Keyport landfall site to the Deans substation, including the portion of the link from the converter station to the Deans substation. This route is engineered to accommodate two independent 1400 MW 400 kV HVDC circuits while complying with the reliability criteria to maintain 10-feet separation between the circuits. 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	$10,062,273.00
Component cost (in-service year)	$12,880,561.00

Greenfield Substation Component

Component title	Offshore Substation Platform (OSP) at Hudson South 1 (“HS1”) 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 Hudson South 1 offshore Wind Energy Area to the onshore POI at Deans 500 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	Hudson South 1 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 WEA Hudson South A1 OWF lease 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. 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 well 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	$860,472,256.00
Component cost (in-service year)	$1,101,477,236.00

Greenfield Substation Component

Component title	Offshore Substation Platform (OSP) at Hudson South 1 (“HS1”) 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 Hudson South 1 offshore Wind Energy Area to the onshore POI at Deans 500 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	Hudson South 1 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 WEA Hudson South A1 OWF lease 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. 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 Hudson South 1 (“HS1”) 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 Hudson South 1 offshore Wind Energy Area to the onshore POI at Deans 500 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	Hudson South 1 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 WEA Hudson South A1 OWF lease 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	1470 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 foot print, high reliability, good scalability, and low harmonic distortion. Further details are provided in the project analysis attachments.

	Normal ratings	Emergency ratings
Summer (MVA)	1470.000000	1470.000000
Winter (MVA)	1470.000000	1470.000000
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	New Onshore Converter Station - Onshore Converter Station at Deans

Project description	The project consists of building a new onshore converter station close to the Deans 500 kV substation to convert the offshore wind power from ±400 kV HVDC to 500 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 Deans
Substation description	The new onshore converter station converts the offshore wind power from ±400 kV HVDC to 500 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	500 kV AC

Transformer Information

	Name	**Capacity (MVA)**	
Transformer	Onshore Converter Station	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 Deans substation may impact physical resources (air quality, geological resources, water quality, wetlands and waterbodies), 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 acquired private land and has purchase options for land immediately adjacent to the Deans 500kV substation for the onshore HVDC converter substation totaling approximately 19 acres. Specific land acquired and obtained purchase option agreements are listed below: South Brunswick Tax Map Parcels Block 24, Lots 7 and 12 have been purchased and owned by Anbaric. South Brunswick Tax Map Parcels Block 24 Lots 8, 9, 10, and 11, have executed Option Agreements to Purchase with the owners. There may be additional parcels and negotiations with owners are underway. Further details are provided in the corresponding attachment section. "
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	$393,618,648.00
Component cost (in-service year)	$503,865,147.00

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 Deans 500 kV substation to convert the offshore wind power from ±400 kV HVDC to 500 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 Deans
Substation description	The new onshore converter station converts the offshore wind power from ±400 kV HVDC to 500 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	500 kV AC

Transformer Information

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

	High Side	Low Side	Tertiary
Voltage (kV)	500 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 500 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 Deans substation may impact physical resources (air quality, geological resources, water quality, wetlands and waterbodies), 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 acquired private land and has purchase options for land immediately adjacent to the Deans 500kV substation for the onshore HVDC converter substation totaling approximately 19 acres. Specific land acquired and obtained purchase option agreements are listed below: South Brunswick Tax Map Parcels Block 24, Lots 7 and 12 have been purchased and owned by Anbaric. South Brunswick Tax Map Parcels Block 24 Lots 8, 9, 10, and 11, have executed Option Agreements to Purchase with the owners. There may be additional parcels and negotiations with owners are underway. Further details are provided in the corresponding attachment section.
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	12/2025
Project Duration (In Months)	108

Cost Containment Commitment

Cost cap (in current year)	$2,174,422,292.00
Cost cap (in-service year)	$2,783,444,368.00

Components covered by cost containment

1. Upgrade/Expansion of 500 kV Deans Substation - External
2. 400 kV HVDC Submarine Cable - Proposer
3. 400 kV HVDC Underground Cable - Proposer
4. 500 kV HVAC Underground Cable - Proposer
5. Offshore Substation Platform (OSP) at Hudson South 1 (“HS1”) offshore wi... - Proposer
6. Offshore Substation Platform (OSP) at Hudson South 1 (“HS1”) offshore wi... - Proposer
7. Offshore Substation Platform (OSP) at Hudson South 1 (“HS1”) offshore wi... - Proposer
8. New Onshore Converter Station - Onshore Converter Station at Deans - 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