Generation Interconnection
Feasibility Study Report
Queue Position AE2-334

The Interconnection Customer (IC) has proposed a 44.0 MW Energy (28.7 MW Capacity) solar generating facility to be located at Latitude: 39.6418630, Longitude: -75.0637120 in Gloucester County, New Jersey. PJM studied the AE2-334 project as an injection into the Atlantic City Electric Company (ACE) transmission system at a tap of the Clayton (PSSE bus #228405) to Williamstown (PSSE bus # 228417) 69 kV circuit and evaluated it for compliance with reliability criteria for summer peak conditions in 2022. The project was studied at a commercial probability of 53%. The planned in-service date, as requested by the IC during the project kick-off call, is June 30, 2022. This date is dependent on completion of PJM studies (System Impact and Facilities) and the Transmission Owner's construction schedule for network upgrades.

Point of Interconnection

The Interconnection Customer requested a transmission level Point of Interconnection (POI) be evaluated for the AE2-334 project. As a result, the AE2-334 project will connect with the ACE transmission system at a new 69 kV three breaker ring bus substation to be constructed adjacent to the Clayton-Monroe 69 kV circuit.

Transmission Owner Scope of Attachment Facilities and Direct Connection Work

Substation Interconnection Estimate

Scope: Build a new 69 kV substation with a 3-position ring bus. Two of the positions on the ring bus will be transmission line terminals for the tie-in of existing ACE Line 0716. The other position will be a terminal configured for the interconnection of the AE2-334 facility.

Estimate: $4,700,000
Construction Time: 32-48 months

Major Equipment Included in Estimate:

- Control Enclosure Qty. 1
- Power Circuit Breaker, 69 kV, 2000A, 40kA, Qty. 3
- Line Switch, 69 kV, 2000A, Manual, Arcing horns Qty. 2
- Disconnect Switch, 69 kV, 2000A, Manual Wormgear, Arcing Horns Qty. 6
- CT/VT Combination Units, 69 kV Qty. 3
- CVT, 69 kV Qty. 9
- Disconnect Switch Stand, High, 69 kV, Steel Qty. 8
- CT/VT Stand, Single Phase, High, 69 kV, Steel Qty. 3
- CVT Stand, Single Phase, High, 69 kV, Steel Qty. 9
- SSVT, 69 kV/240-120 V Qty. 2
- Relay Panel, Transmission Line, FL/BU Qty. 3

- Relay Panel, Bus, FL/BU Qty. 3
- Control Panel, 69 kV Circuit Breaker Qty. 3
- Take-off structure, 69 kV Qty. 1
- Bus Support Structure, 3 phase, 69 kV, Steel Qty. 8
- 69 kV Al tub bus Lot

Estimate Assumptions:

- Developer to purchase required land and is available for use.
- Land purchase for the substation is not included.
- Site clearing and grading performed by Developer.
- Grounding, environmental and soil studies not included.
- Communication fiber optic available to new substation.

Required Relaying and Communications

New protection relays are required for the new terminals.

Front line and back-up line protection will be required. A relay panel for the generator terminal will be required for front line and back-up protection.

New protection relays are required for the new line terminals. Frontline and Backup line protection will be required. A relay panel will be required for each transmission line (2 total).

A breaker control relay on a breaker control panel will be required for the control and operation of each new 69 kV circuit breaker (3 total).

The project will require re-wiring and adjustment of existing relay schemes at Clayton, Williamstown Tap, and Monroe to accommodate the new 69 kV substation.

Metering

A three phase 69 kV revenue metering point will need to be established within the IC facility at the POI.

The IC will purchase and install all metering instrument transformers, as well as construct a metering structure per ACE's specifications. The secondary wiring connections at the instrument transformers will be completed by the IC's contractors and inspected by ACE, while the secondary wiring work at the metering enclosure will be completed by ACE's meter technicians. The metering control cable and meter cabinets will be supplied by ACE and installed by the IC's contractors. ACE's meter technicians will program and install two solid state multi-function meters (Primary & Backup) for each new metering position. Each meter will be equipped with load profile, telemetry, and DNP outputs. The IC will be provided with one (1) meter DNP output.

The IC will be required to make provisions for a POTS (plain old telephone service) line within approximately three (3) feet of each ACE metering position to facilitate remote interrogation and data collection.

Interconnection Customer Scope of Direct Connection Work

The IC is responsible for all design and construction related to activities on their side of the Point of Interconnection. Site preparation, including grading and an access road, as necessary, is assumed to be by the IC. Route selection, line design, and right-of-way acquisition of the direct connect facilities is not included in this report, and is the responsibility of the IC. Protective relaying and metering design and installation must comply with ACE's applicable standards. The IC is also required to provide revenue metering and real-time telemetering data to PJM in conformance with the requirements contained in PJM Manuals M-01 and M-14 and the PJM Tariff.

ACE Interconnection Customer Scope of Direct Connection Work Requirements:

- ACE requires that an IC circuit breaker is located within 500 feet of the ACE substation to facilitate the relay protection scheme between ACE and the IC at the Point of Interconnection (POI).

Special Operating Requirements

1. ACE will require the capability to remotely disconnect the generator from the grid by communication from its System Operations facility. Such disconnection may be facilitated by a generator breaker, or other method depending upon the specific circumstances and the evaluation by ACE.

2. ACE reserves the right to charge the Interconnection Customer operation and maintenance expenses to maintain the Interconnection Customer attachment facilities, including metering and telecommunications facilities, owned by ACE.

Summer Peak Analysis - 2022

Transmission Network Impacts

Potential transmission network impacts are as follows:

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
8557458	228406	GLASBORO	AE	228479	ROWAN	AE	1	AE_P1-2 MON-WASH	single	77.0	98.55	100.99	DC	1.88

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

Contribution to Previously Identified Overloads
(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Summer Peak Load Flow Analysis Reinforcements

System Reinforcements
(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

ID	Index	Facility	Upgrade Description	Cost
8557458	1	GLASBORO 69.0 kV - ROWAN 69.0 kV Ckt 1	AEC at0729r0001 (53) : To mitigate the (ACE) Glassboro - Rowan 69 kV line (from bus 228406 to bus 228479 ckt 1) overload, it will require increasing the emergency rating of the Glassboro to Rowan 69 kV line by rebuilding the circuit. The rebuild will include the installation of new poles, foundations, insulators, and conductor. Project Type : FAC Cost : $6,400,000 Time Estimate : 24-48 Months	$6,400,000
			TOTAL COST	$6,400,000

Steady-State Voltage Requirements

To be performed during later study phases as required.

Short Circuit

No issues identified.

Stability and Reactive Power Requirement

To be performed during later study phase.

Light Load Analysis - 2022

To be performed during later study phases (as required by PJM Manual 14B).

Delivery of Energy Portion of Interconnection Request
PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request. Only the most severely

overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
8557443	213922	RICHMOND	PECO	214012	WANEETA3	PECO	1	Base Case	operation	760.0	103.65	104.2	DC	9.17
8557459	228406	GLASBORO	AE	228479	ROWAN	AE	1	AE_P1-2 MON-WASH	operation	77.0	98.95	100.63	DC	2.88

Atlantic City Electric Costs

Cost estimates will further be refined as a part of the Impact Study and Facilities Study for this project. The Interconnection Customer will be responsible for all costs incurred by ACE in connection with the AE2-334 project.

Flow Gate Details

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
8557458	228406	GLASBORO	AE	228479	ROWAN	AE	1	AE_P1-2 MON-WASH	single	77.0	98.55	100.99	DC	1.88

Bus #	Bus	MW Impact
939821	AE1-218 C O1	0.11
939831	AE1-219 C O1	0.25
943071	AE2-334 C	1.88
CBM-N	CBM-N	0.0

Bus #	Bus	MW Impact
CBM-S1	CBM-S1	0.01
CBM-S2	CBM-S2	0.0
CBM-W1	CBM-W1	0.01
CBM-W2	CBM-W2	0.05
CIN	CIN	0.0
CPLE	CPLE	0.0
G-007A	G-007A	0.06
IPL	IPL	0.0
LGEE	LGEE	0.0
MEC	MEC	0.01
MECS	MECS	0.01
NYISO	NYISO	0.01
VFT	VFT	0.05
WEC	WEC	0.0

Contingency Name	Contingency Definition
AE_P1-2 MON-WASH	CONTINGENCY 'AE_P1-2 MON-WASH' OPEN LINE FROM BUS 228465 TO BUS 228474 CIRCUIT 1 / END