

Generation Interconnection Feasibility Study Report Queue Position X3-009

The Interconnection Customer (IC) has proposed a 20 MWE (7.6 MWC; 20 MW MFO) solar powered generating facility to be located in Dorchester County, Maryland. PJM studied X3-009 as a 20 MW injection into the Delmarva Power and Light (DPL) system and evaluated the project for compliance with reliability criteria for summer peak conditions in 2015. The planned in-service date, as stated in the Attachment N, is June 01, 2017.

Point(s) of Interconnection

The Interconnection Customer requested a Primary and Secondary Point of Interconnection (POI) be evaluated for the X3-009 project. The Primary POI selected was a 69kV transmission level interconnection at the East New Market 69kV substation. The Secondary POI selected was a 12kV distribution level interconnection at the East New Market substation. The study results are provided in the Transmission Network Impacts section below.

Direct Connection Requirements

Primary POI Option

X3-009 will interconnect with the Delmarva Power and Light system at the East New Market 69kV substation.

Transmission Owner Scope of Work

The scope of work and estimated costs for the direct connection facilities is as follows:

Substation Engineering Estimate:

Scope: Convert the East New Market 69kV substation into a ring bus configuration inclusive of a terminal position for the X3-009 queue project. The Developer will be responsible for either all of the cost or a portion of the cost.

Estimate: \$3,000,000

Construction Time: 18 – 24 months

Transmission Engineering Estimate:

Scope: Install a self-supporting 69kV steel pole with a concrete foundation, motor operated disconnects, and a short span to PHI substation.

Estimate: \$125,000

Construction Time: 24 months

Note: If location of generator is greater than 500 feet from substation, circuit breaker will be necessary

Note: the above cost does not include the Contribution in Aid of Construction (CIAC) tax.

Special Operating Requirements

1. PHI will require the capability to remotely trip the generator from its System Operations facility. Such tripping may be facilitated by either a generator breaker, inverter (if so equipped), or a line recloser, depending upon the specific circumstances and the evaluation by PHI.
2. It is the Interconnection Customer's responsibility to send the data that PJM and the Company requires directly to PJM. The Interconnection Customer will grant permission for PJM to send the Company the following telemetry that the Interconnection Customer sends to PJM: real time MW, MVAR, volts, amperes, generator/status, and interval MWH and MVARH.
3. The Interconnection Customer will be required to make provisions for a voice quality phone line within approximately 3 feet of each Company metering position to facilitate remote interrogation and data collection.
4. A mutually acceptable means of interrupting and disconnecting the generator with a visible break, able to be tagged and locked out, shall be worked out with PHI Engineering.

Interconnection Customer Scope of Work

The Interconnection Customer (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.

The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with PHI's Applicable Standards.

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

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)*

None

Multiple Facility Contingency

(Double Circuit Tower Line, Line with Failed 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

Short Circuit

No issues identified.

Stability Analysis

Not required due to project size.

System Protection

Protective relaying and metering design and installation must comply with PHI’s applicable standards. Any other costs determined by system protection as a result of the short circuit studies will be supplied in the near future.

Other Charges

PHI reserves the right to charge the Interconnection Customer Operation and Maintenance expenses to maintain the Interconnection Customer’s Attachment Facilities, including metering and telecommunications facilities which are owned by PHI.

New System Reinforcements

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

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.

None

Potential Congestion due to Local Energy Deliverability

(PJM also studied the delivery of the energy portion of the surrounding generation. Any potential 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 Transmission Interconnection Request. Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full deliverability for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the identified overloaded element(s). As a result of the aggregate energy resources in the area, the following violations were identified:

These are *not* required reliability upgrades.

None

Secondary POI Option

PJM studied X3-009 as a 20 MW injection at the East New Market 12kV substation.

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)*

None

Multiple Facility Contingency

*(Double Circuit Tower Line, Line with Failed 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

Short Circuit

No issues identified.

Potential Congestion due to Local Energy Deliverability

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These are *not* required reliability upgrades.

None