Generation Interconnection Feasibility Study Report Queue Position V4-042

General

The Interconnection Customer (IC) has proposed a 20 MWE (7.6 MWC) solar powered generating facility consisting of ground mounted fixed panel solar arrays to be located in Upper Pittsgrove Township, Salem County, New Jersey. PJM studied V4-042 as a 20 MW injection into the Atlantic City Electric's transmission system at the Upper Pittsgrove 138 kV substation and evaluated the project for compliance with reliability criteria for summer peak conditions in 2014. The planned in-service date, as identified in the Attachment N, is the fourth quarter of 2010.

Point of Interconnection

V4-042 will interconnect with the Atlantic City Electric distribution system at the Clayton and Lamb 69/12kV substations via two (2) dedicated 10MW 12kV feeders.

10 MWs of generation will connect to the Clayton substation's new transformer T2; 10 MWs of generation will connect to the Lamb substation's transformer T1.

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

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

1. Replace the existing Clayton substation T2 transformer with a new 37 MVA transformer and a new feeder breaker. Construct a new 12.6 mile 12 kV feeder (NJ095x) with PAC overhead conductor from the Clayton substation to the IC's generating site. It is anticipated that some poles will require replacement. The estimated cost to perform this work is **$7,140,000.**

2. Construct a new feeder breaker and a new 13.7 mile 12 kV feeder (NJ121x) with PAC overhead conductor from the Lamb substation to the IC's generating site. It is anticipated that some poles will require replacement. The estimated cost to perform this work is **$5,580,000.**

3. Install a utility operated recloser, with relaying and communication equipment, on each feeder. The estimated cost to perform this work is **$100,000.**

4. Install utility grade primary metering on each feeder. The estimated cost to perform this work is **$40,000.**

5. Install a SCADA point addition to the Control Center for each feeder. The estimated cost to perform this work is **$20,000.**

6. Perform system protection planning, transfer trip work, and dynamic study. Transfer trip to be installed in locations where a generator installation could be islandized with a minimum load that is less than 3 times the size of generator capacity. The estimated cost to perform this work is **$50,000.**

   The total estimated cost to perform the above work is **$12,930,000.** The estimated time to complete the work is **6 to 12 months** following receipt of a fully executed Interconnection Services Agreement and Interconnection Construction Service Agreement.

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

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer assumes full responsibility for design and construction of all facilities associated with the V4-042 generating station on their side of the POI. Site preparation including grading and an access road, if necessary, is assumed to be by 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 Atlantic City Electric Applicable Standards.

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)

1. The Deepwater 138/69 kV transformer (ACE) loads from 115.77% to 126.29% (DC power flow) of its rating (190 MVA) for the tower line contingency ('AE12TOWER'). This project contributes approximately 19.98 MW to cause the thermal violation.

Short Circuit

Not required.

Dynamic Analysis

A time based dynamic study will be completed during the System Impact Study phase of V4-042.

AC injection into the grid must follow a ramp up rate that does not negatively affect the distribution system. An inverter capable of dynamic VAR output with Droop and Time Delay settings will be required. Further study will be required to review the impact to the grid under all output scenarios and grid load profiles. The proposed project will be reviewed for protection and coordination issues and any other required upgrades will be identified in future studies.

New System Reinforcements

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

1. To mitigate the Deepwater 138/69kV transformer overload would require the replacement of the existing unit with a new transformer rated at 224 MVA nominal. The cost of this upgrade is approximately **$4,200,000.** The estimated time to complete this work is **24 to 36 months** following receipt of a fully executed Interconnection Services Agreement and Interconnection Construction Services Agreement.

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

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:

None