Generation Interconnection Combined Feasibility/System Impact Study Report

For

PJM Generation Interconnection Request Queue Position AC2-009

Mount Rose 13kV

September 2017

Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

Public Service Electric and Gas Company, the Interconnection Customer (IC), has proposed a Solar generating facility located in Mercer County, New Jersey. The installed facilities will have a total capability of 0.59MW with 0.1MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is September 30, 2017. **This study does not imply a PSE&G commitment to this in-service date.**

Point of Interconnection

AC2-009 will interconnect with the PSE&G distribution system by tapping the Mount Rose 13kV (MRO8011) circuit.

Cost Summary

The cost estimate for the Attachment Facilities will be provided in a separate two party Interconnection Agreement (IA) between PSE&G and the Interconnection Customer. The cost summary table below concludes that the AC2-009 project has no allocation for transmission upgrades due to network impacts on the system (see Network Impacts section for details):

Description	Total Cost
Attachment Facilities (to be provided in the IC)	$ TBD
Allocation for Transmission Upgrades	$ 0
Total Costs	**$ TBD**

Transmission Owner Scope of Work

Detailed scope, cost, and schedule will be provided in a separate two party Interconnection Agreement (IA) between PSE&G and the Interconnection Customer.

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

General Scope and Assumptions:

- Install a 13kV line tap and required revenue metering/telemetering/SCADA.
- The SCADA equipment (Distribution and ESOC RTU) will be procured and installed by the customer
- Customer will abide by PSE&G Information and Requirements for electric service hand book
- Customer is responsible to provide trench, conduit and manholes were applicable
- Customer is responsible to provide access and easements
- Customer is responsible to provide permits and associated costs.
- Material procurement will be six months from project approval/authorization

Interconnection Customer Requirements

1. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.
2. The power factor requirement is as follows: Due to the high voltage in the PSEG 13kV distribution zone during certain times, The Interconnection Customer shall design its Customer Facility with the ability to maintain a power factor of at least 0.95 leading to 0.95 lagging measured at the Point of Interconnection.
3. Install smart inverters with Voltage VAR Control (VVC) capabilities, where the customer will ensure that the voltage at the utility interconnection point will not exceed 1.04 p.u.
4. PEPP Manual Requirements:
   https://www.pseg.com/business/builders/new_service/before/index.jsp
   a. Chapter 3 (Customer Equipment Requirements – Primary Service)
   b. Chapter 5 (General Specifications for a Customer-Owned 26.4 kV Metal-Clad Substation) (if applicable)
   c. Chapter 11 (General Specifications for Inverter-Based Generation)
   d. PSE&G's Information & Requirements for Electric Service Handbook

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

Public Service Electric and Gas (PSE&G) Requirements

The Interconnection Customer will be required to comply with all PSE&G Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Information and Requirements for Electric Service" document located at the following links:

http://www.pseg.com/business/builders/new_service/before/
http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx

Network Impacts

The Queue Project AC2-009 was evaluated as a 0.9 MW (Capacity 0.1 MW) injection at the Mount Rose 69 kV substation in the PSEG area. Project AC2-009 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-009 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2020

Generator Deliverability

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

None.

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.

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

None.

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

None.

Short Circuit

(Summary of impacted circuit breakers)

None.

Potential Congestion due to Local Energy Deliverability

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.

Note: Only the most severely overloaded conditions are listed below. 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 shall study all overload conditions associated with the overloaded element(s) identified.

None.

New System Reinforcements

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

None.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

None.

Attachment 1. System Configuration