Generation Interconnection Combined Feasibility/System Impact Study Report

For

PJM Generation Interconnection Request Queue Position Z1-115

Crescentville 13kV

March 2014

Preface

The intent of the Combined Feasibility/System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, 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, if any, is included in the System Impact Study.

The 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 associated with them will be addressed when seeking an Interconnection Agreement as outlined below. . Developer will also be responsible for providing and installing metering equipment in compliance with applicable PJM and Transmission Owner standards.

General

Eastern Regional Medical Center, the Interconnection Customer (IC), has proposed a natural gas generating facility located Philadelphia, Pennsylvania. The installed facilities will have a total capability of 2.0 MW with 1.0 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is December 31, 2014. **This study does not imply a PECO commitment to this in-service date.**

Point of Interconnection

Z1-115 will interconnect with the PECO Energy distribution system at a 13kV circuit from the Crescentville substation.

Cost Summary

The Z1-115 project will be responsible for the following costs:

Description	Total Cost
Transmission Owner facilities	$ 175,000
New System Upgrades	$ 0
Previously Identified Upgrades	$ 0
Total Costs	**$ 175,000**

Transmission Owner Scope of Work

To address the potential for 'islanding', a direct transfer trip [DTT] protection scheme will be required at the customer's expense. The DTT scheme is needed on both services to the customer unless the customer interconnects the generator so it can only operate in parallel with the grid on one of the services.

There are automatic fault isolation devices [circuit breakers [CB] or reclosers] in both circuits supplying the customer. These devices are equipped with automatic reclosing and will reclose at a preset time following a tripping. Based on the circuit loads, if these devices open, there is a possibility that the generator may continue to operate in an 'islanded' mode. After a period of time, the generator will lose synchronization with the grid. If this occurs, there is a possibility of equipment damage, when a fault isolation device recloses.

If the customer configures the generator so that it can only parallel with one of the supplies, the Crescentville 162 circuit will be made the normal supply to the customer and the DTT scheme installed between the Crescentville 162 CB and the customer's generator CB.

If the customer wants to operate the generator in parallel with the grid on either supply, a DTT scheme must also be installed between a pole-mounted recloser in the middle of the Crescentville 138 circuit and the customer's generator CB.

The customer must install approved DTT equipment at their facility and arrange for the lease and installation of two dedicated phone lines for the RLF DTT relay communications between the customer's site and Crescentville Substation and pole-mounted recloser, if applicable. The estimated cost of the PECO work at the substation is **$175,000**. All costs associated with this work at the substation and at the customer's facility, including the relaying, installation and monthly charges for the phone lines, etc. are the responsibility of the customer.

Schedule

A Facility Study is required for this project to provide the full scope of required upgrades including cost and time. The Facilities Study will take approximately 6 months after the customer agrees to fund the study. The estimated time to complete the work described above is 18 to 24 months after all agreements are in place.

Revenue Metering and SCADA 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.

Network Impacts

The Queue Project #Z1-115 was studied as a 2.0 MW (Capacity 1.0 MW) injection at the Crescentville 13.8 kV substation in the PECO area. Project #Z1-115 was evaluated for compliance with reliability criteria for summer peak conditions in 2017. Potential network impacts were as follows:

Generator Deliverability

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

None

Light Load Analysis

Light Load Studies to be conducted during later study phases (applicable to wind, coal, nuclear, and pumped storage projects).

Not applicable

Multiple Facility Contingency

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

None

Short Circuit

(Summary form of Cost allocation for breakers will be inserted here if any)

No short circuit issues found with 2 MW generator. The proposed delta-grounded wye transformer will provide an effectively grounded source to the grid.

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

(Results of the steady-state voltage studies should be inserted here)

None

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

Not applicable

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)

(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

None

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.

None