

***Generation Interconnection
Feasibility Study Report***

For

***PJM Generation Interconnection Request
Queue Position Y2-078***

Lakewood #1 230kV

February 2013

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

The Interconnection Customer (IC), has proposed an uprate to an existing natural gas generating facility located in Lakewood, New Jersey. This projects requests an increase to the install capability of 20 MW with 20 MW of this output being recognized by PJM as capacity. The installed facilities will have a total capability of 280 MW with 242 MW of this output being recognized by PJM as capacity. This means that the remaining 38 MW will be curtailable should a system reliability constraint occur. The proposed in-service date for this project is November 8, 2014. **This study does not imply a FirstEnergy commitment to this in-service date.**

Point of Interconnection

Y2-078 will interconnect with the Jersey Central Power & Light transmission system at the Lakewood 230kV substation.

Cost Summary

The Y2-078 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$ 0
Direct Connection Network Upgrades	\$ 0
Non Direct Connection Network Upgrades	\$ 0
Total Costs	\$ 0

In addition, the Y2-078 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	\$ 0
Previously Identified Upgrades	\$ 0
Total Costs	\$ 0

Cost allocations for these upgrades will be provided in the System Impact Study Report.

Attachment Facilities

In summary, Attachment 1 shows a conceptual one-line diagram of the Direct Connection facilities that exist for the Y2-078 Project. As indicated, it will be studied as a 280 MW injection to the Jersey Central 230 kV system at the Lakewood Cogen Substation seven (7) breaker 230 kV ring bus. Since the plant is an existing facility, the Y2-078 Project has a cost estimate for direct connection of zero (\$0) dollars.

Description	Total Cost
Attachment Facilities	\$ 0
Direct Connection Network Upgrades	\$ 0
Non Direct Connection Network Upgrades	\$ 0
Total Costs	\$ 0

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.

FirstEnergy Requirements

The Interconnection Customer will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "FirstEnergy Requirements for Transmission Connected Facilities" document located at the following links:

<http://www.firstenergycorp.com/feconnect>

<http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx>

Network Impacts

The Queue Project #Y2-078 was studied as a 20.0MW (Capacity 20.0MW) injection at the Lakewood 230 kV substation in the JCPL area. Project #Y2-078 was evaluated for compliance with reliability criteria for summer peak conditions in 2016. 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).

Will be confirmed during the System Impact Study phase.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

None

Short Circuit

(Summary of impacted circuit breakers)

An analysis was conducted to assess the impact of the Y2-078 Project on the system protection requirements in the area. The results of this review have identified the following:

For a 20 MW increase in generation output there are no additional system protection upgrades.

Fault currents at 230kV Lakewood Cogen substation are listed below.

	Three Phase	Line-Ground
X/R Ratio	15.9	12.0
Fault Current (Amps)	27,899	29,174

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)

Will be confirmed during the System Impact Study phase.

Stability and Reactive Power Requirement for Low Voltage Ride Through

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

Will be confirmed during the System Impact Study phase.

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. Single Line Diagram