Generation Interconnection Combined Feasibility/System Impact Study Report

For

PJM Generation Interconnection Request Queue Position AB2-066

Crawfords Corner 12kV

September 2016

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

Cornerstone Power Holmdel, LLC, the Interconnection Customer (IC), has proposed add a battery storage system to an existing solar generating facility located in Monmouth County, New Jersey. This projects requests an increase to the install capability of 0.1 MW with 0.0 MW of this output being recognized by PJM as capacity. The installed facilities will have a total capability of 4.1 MW with 0 MW of this output being recognized by PJM as capacity.

Point of Interconnection

AB2-066 will interconnect with the Jersey Central Power & Light (JCPL) system along a 12kV feed from the Crawfords Corner substation.

Cost Summary

The AB2-066 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$ 25,000
Direct Connection Network Upgrades	$ 0
Non Direct Connection Network Upgrades	$ 0
Transmission System Upgrades	$ 0
Total Costs	**$ 25,000**

Attachment Facilities

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

Description	Total Cost
Engineering Review and Commissioning	$ 2,000
Metering cost is $23,000.00 based on JCP&L installing and owning the equipment	$ 23,000
Total Attachment Facilities cost	**$ 25,000**

Direct Connection Cost Estimate

No Direct Connection Facilities are required to support this request.

Non-Direct Connection Cost Estimate

No Direct Connection Facilities are required to support this request.

Schedule

JCP&L estimates 2 months after execution of construction agreement and construction kick off meeting for design work to be completed.

JCP&L estimates it will require an additional 1 month to schedule and implement the meter replacement.

Interconnection Customer Requirements

PJM 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.

JCPL Requirements:

1. Distributed Generation must not interfere with the proper detection and clearing of faults on the First Energy system.
2. The connected facility shall comply with harmonic voltage and current limits specified in IEEE Standard 519-1992, "IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems".

3. JCP&L will require the installation of a Power Quality Meter (SEL-735) with "Intermediate PQ" option to monitor and capture power quality information to permit ongoing assessment of compliance. Applicant's engineer to submit single line design and SEL-735 ordering specifications. This unit will be installed at the circuit breaker dedicated to the storage system.
4. Anti-Island Protection - The proposed generation facility must be equipped with adequate protection to detect an island condition and disconnect from the FirstEnergy distribution system within two seconds of the formation of an island (per IEEE 1547).
5. IC must meet all applicable JCP&L/FirstEnergy standards and requirements which are included in the current Tariff for Electric Service.
6. All breakers, lightning protection etc. should meet JCP&L/FE's minimum BIL Ratings.
7. IC must meet applicable FE Distributed Generation Technical requirements for the interconnection of generation to the FE Distribution system. For the latest copy of this document, please contact your JCP&L customer support representative, or our general inquires email address at jc_interconnection@firstenergycorp.com
8. FR systems must be analyzed at full potential load change, i.e. not less than twice the aggregate inverter rating.
9. As a result of the frequency & magnitude of load changes, analysis is conducted with the use of an appropriate flicker curve to determine potential impacts on adjacent customers.
10. FR operation may only be permitted while system is configured as originally
11. studied (i.e., not during restoration / maintenance),

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.

The solar portion and battery portions of the facility must be metered separately.

JCPL 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 AB2-066 was evaluated as a 0.1 MW (Capacity 0.0 MW) injection at the W1-112 Holmet 34.5kV substation in the JCPL area. Project AB2-066 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB2-066 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2020 Case

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

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

None

Short Circuit

(Summary of impacted circuit breakers)

None

Affected System Analysis & Mitigation

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

Light Load Analysis

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

None

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

None