Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position W2-006

Newburgh 12kV

October 2010

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 a 1.00 MW (0.38 MW capacity) solar generating facility. The facility will be located in Long Valley, New Jersey.

Point of Interconnection

W2-006 will interconnect with the Jersey Central Power & Light system on a 12kV circuit fed from the Newburgh Substation.

PJM Analysis and Network Impacts

Queue project W2-006 was studied as a(n) 1.0MW (0.4MW of which was Capacity) injection into JCPL's system at the Newburgh 34.5kV substation. Project W2-006 was evaluated for compliance with reliability criteria for summer peak conditions in 2014. Potential network impacts were as follows:

Generator Deliverability

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

No problems identified.

Multiple Facility Contingency

(Double Circuit Tower Line Contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No problems identified.

Contribution to Previously Identified Overloads

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

No problems identified.

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.

Short Circuit

(Report Overdutied breakers here)

Not required.

Energy Portion of Interconnection Request

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. 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 analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.

No problems identified.

First Energy Analysis and Impacts

Local Distribution Circuit Information

This area is presently served by a 3-phase 12.47KV grounded Wye distribution circuit originating from JCP&L's Newburgh Substation located 2.0 miles from the proposed site.

Circuit protection and coordination:

Main Line: To accommodate the proposed 1.0 MW capacity on the 12.5 kV distribution system, JCP&L will install 100 k protective fuses off main line. JCP&L will also install 65 k protective fuses on the three phase primary line to the facility allowing a nominal current of 65 amps of primary current for 1.0 MW of power export. This fuse will coordinate with other protective devices along the main line from the Interconnection Customer (IC) back to the Newburgh substation.

At Substation: JCP&L to replace 3 existing electro-mechanical relays with SEL-351 electronic relays on a distribution circuit and on one Transformer Bank at Newburgh Substation. Interconnection Customer (IC) to provide wiring, conduit and RTU configuration to tie into our substation entry point.

At PV Facility: SCADA control system for the breaker will be designed by the customer, and must be approved by JCP&L/FirstEnergy prior to purchase. Typically, these systems utilize fiber optic or leased phone line. The SCADA control system must communicate with our RDO dispatch center.

The customer must install and maintain the SCADA control system equipment. Equipment needed inside JCP&L facilities may be installed by JCP&L personnel. Periodic testing of the system will be required and the system must be configured to fail in a 'trip' condition- i.e. upon loss of communications, the system must trip the generator off line.

Distributed Generation must not interfere with the proper detection and clearing of faults on the First Energy system.

Additional requirements:

- JCP&L will work with the customer to determine the exact interconnection point, based on existing infrastructure layout.

- Interconnect Customer (IC) will install a pole adjacent to JCP&L's pole as point of interconnection. On this pole the IC will install cutout fuses with load break capability, primary metering transformer bracket per the FE Construction Standards of page# 10-347. JCP&L will install and purchase the revenue metering CTs and PTs., which is based on the ratio and accuracy specifications of the customer load and generation levels.

- IC provides all trenching, cables and conduit from JCP&L's point of interconnection pole to connect his PV generation facilities.

- IC must meet all applicable JCP&L/FirstEnergy standards and requirements which are included in the current Tariff for Service.

- IC's inverter-based generation must be UL listed or certified to comply with the requirements of IEEE 1547.

- IC's main breaker shall have a SEL 351 Multi-function relay (or equivalent) which is required for interconnection protection. The main breaker must be on the high side of the customer's transformer. All breakers, lightning protection etc. should meet JCP&L/FE's minimum BIL Ratings. **(Customer's single line does not show this breaker and must be corrected)**

- The IC's transformer must be grounded Wye to grounded Wye.

- IC must meet requirements of N.J.A.C. 14:4-9 ("In front of meter" all power sold to PJM and interconnection standards for Class I Renewable Energy Systems), as well as IEEE 1547, and IEEE 1547.1

- IC must meet applicable FE Distributed Generation Technical requirements for the interconnection of generation to the FE Distribution system.

Infrastructure Upgrade Costs (By JCP&L)

Total Estimated Costs (by JCP&L) is $330,000

- Approximate cost to reconductor 2000 feet of three phase #2 ACSR conductor, replace 1 set of fuses, install 1 set of fuses and install a manually operable disconnect switch at the interconnection point is $ 150,000 non-refundable.

- Substation upgrade cost is $ 160,000 non-refundable.

- Metering costs is $20,000 non-refundable based on us installing and owning the equipment.

- **Note: The above costs do not include taxes. This tax is approximately an additional 36% to the Project cost.**

- All JCPL costs are not subject to refundable provisions of the NJ-BPU Tariff for Electric service

- All Right of Ways (ROW) are the responsibility of the IC to obtain.

Note - this is an estimate based on similar work orders previously worked by JCP&L for the types of work described in the analysis above. It is accurate to within plus or minus 50 percent.

Should the customer want to proceed with the connection of this facility a contract with JCPL will be developed based on these costs and a true-up of actual charges will be made at the completion of the project.

Timetable for Construction:

Total time to complete this project is 8-9 months from receipt of "Interconnect Agreement", "Construction Agreement" and receipt of "Estimated Project Costs".

JCP&L estimates 3 months after receipt of above for design work to be completed.

JCP&L estimates it will require an additional 5-6 months to complete the identified infrastructure upgrades.

Attachment 1
Aerial View

Attachment 2
Single Line Diagram