

***Generation Interconnection
Feasibility Impact
Study Report***

For

***PJM Generation Interconnection Request
Queue Position W1-065***

Millstone

July 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 1.99 MW (.756 MW capacity) solar generating facility. The facility will be located in Millstone, New Jersey. The project has a proposed in service date of March 31, 2011.

The total cost estimate for this connection is:

Attachment Facilities	\$245,000
Direct Connection Local Upgrades	0
Non Direct Connection Local Upgrades	0
Total Costs	\$245,000

Point of Interconnection

W1-065 will interconnect with the Jersey Central Power & Light distribution system to a 12.47kV circuit fed the Smithbridge substation.

Scope of Work

Local Distribution Circuit Information:

This area is presently served by a 12.47kV grounded wye distribution circuit originating from JCP&L's Great Adventure Substation.

Circuit protection and co ordination:

Main Line: To accommodate the proposed 1.99 MW capacity, JCP&L will install 100 K protective fuses on the three phase primary line to the facility allowing a nominal current of 100 amps of primary current 1.99 MW of power export. This fuse will coordinate with other protective devices along the main line from the IC back to the Great Adventure Substation.

At Substation: Replace 3 existing electro-mechanical relays with SEL-351 electronic relays on 2 distribution circuits and on one Transformer Bank at Great Adventure Substation. 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, leased phone line, or radio communications. The SCADA control system must communicate with our RDO dispatch center located in Red Bank, NJ.

The customer must install and maintain the SCADA control system equipment. Equipment needed inside JCP&L facilities will 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 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.
- 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 Estimated Costs (By JCP&L):

Total Estimated Costs (by JCP&L) is \$425,000

Breakdown is as follows:

- Conceptual estimate to rearrange the existing over head facilities to Great Adventure circuit by closing the disconnects switch at pole# JC 589 ME and reconductoring about 2,000 feet of three phase line to provide the line capacity to connect the PV facility, install three 100E fuses at the interconnection point is \$ 245,000
- Substation upgrade cost is \$ 160,000
- Metering Cost is \$ 20,000 based on us installing and owning the equipment.
- Note: The above costs do not include taxes. If appropriate, this could add approximately an additional 34% to the Project cost.
- 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.

Network Impacts

Queue project W1-065 was studied as a(n) 2.0MW (0.8MW of which was Capacity) injection into JCPL's system at the Smithbridge 34.5kV substation. Project W1-065 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.

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.

Short Circuit

Not required.

Stability Analysis

Not required.

Attachment 1
Aerial View

Attachment 2 Single Line Diagram

