Generation Interconnection Combined Feasibility/System Impact Study Report

For

PJM Generation Interconnection Request Queue Position W1-132

Pittstown

July 2010

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

Garden Solar, LLC, the Interconnection Customer (IC), has proposed a 2 MW (0 MW capacity) solar generating facility. The facility will be located at 43 Senator Stout Road in Pittstown, New Jersey.

Point of Interconnection

W1-132 will interconnect with the Jersey Central Power & Light distribution system to the #80149 12kV circuit fed from the Baptistown substation at or near pole #37..

Network Impacts

The queue W1-132 project was studied as a 2.0MW (0.0MW of which was capacity) injection into JCPL's system at the Baptistown 34.5kV substation. The project was studied on a combined feasibility-impact basis which utilizes an AC analysis, and incorporates all contingency types. Project W1-132 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

Results of First Energy Feasibility Study

Feasibility Study
W1-132
Garden Solar, LLC
2.0 MW Solar Facility at
43 Senator Stout Rd
Pittstown, NJ

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973-401-8712 (3-200-8712)
July 19, 2010

Feasibility Study W1-132

Scope:

Generation Interconnection Feasibility Study W1-132 for Garden Solar, LLC examines the capability of Jersey Central Power and Light Co, a FirstEnergy Company's, electric distribution system to accept the output of the proposed 2.0 MW solar panel generation located at 43 Senator Stout Rd, Pittstown, New Jersey which is West of Oak Summit Road with a scheduled in service date of April 1, 2011.

Local Distribution Circuit Information

This area is presently served by Distribution Circuit 27720, a 3 phase 12.47 kV grounded wye distribution circuit originating from JCP&L's Baptistown Substation located 5.0 miles from the proposed site.

Circuit protection and co ordination:

Main Line: To accommodate the proposed 2 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 for 2 MW of power export. This fuse will coordinate with other protective devices along the main line from the IC back to the Baptistown substation.

At Substation: Replace 3 existing electro-mechanical relays with SEL-351 electronic relays on 2 distribution circuits and on one Transformer Bank at Baptistown 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 Morristown, NJ .

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.

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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.

- 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.

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Infrastructure Upgrade Costs (By JCP&L):

Total Estimated Costs (by JCP&L) is $205,000.00

- Approximate cost to extend one (1) span three phase 1/0 ACSR conductor , three 100K fuses, manually operable disconnect switch at the interconnection point is $ 25,000.00 non-refundable.
- Substation upgrade cost is $ 160,000.00.
- Metering costs is $20,000.00 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 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.

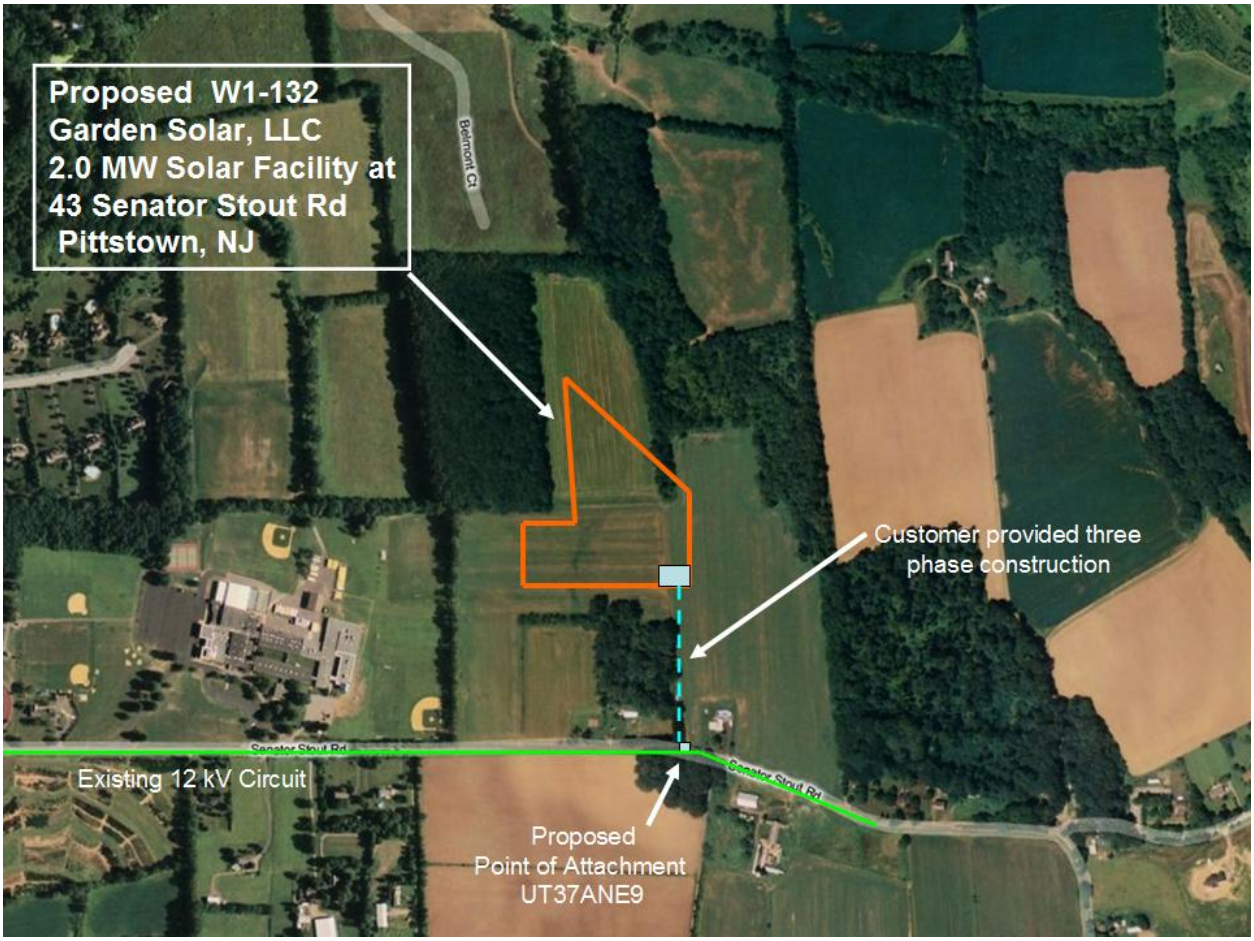
Timetable for Construction:

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.

Feasibility Study W1-132



BAPTISTOWN SUBSTATION

A Bus 34.5 KV TRANSMISSION LINE