Generation Interconnection
Revised Feasibility Study Report

For

PJM Generation Interconnection Request
Queue Position W3-152

Morris Park 12kV

February 2011

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 2.5 MW (0.95 MW capacity) solar generating facility. The facility will be located in Phillipsburg, New Jersey.

Point of Interconnection

W3-152 will interconnect with the Jersey Central Power & Light system at the 12kV circuit #27052 from the Morris Park substation.

First Energy Analysis and Results

Local Distribution Circuit Information:

This area is presently served by Distribution circuit 27052, a 3 phase 12.47kV grounded Wye distribution circuit originating from JCP&L's Morris Park substation located about 6.0 miles from the proposed site.

The current rated capacity of the Morris Park 12kV circuit #27052 is 4 MW, with 4 MW of that capacity being used by prior Queue project. No additional interconnections can be accepted on to this circuit. Any new interconnection will be required to connect using a new 12kV circuit from the Morris Park substation.

Circuit protection and co ordination:

Due to the proposed size of this application, and the distance back to the JCP&L owned substation, it is not feasible to connect this DG facility directly to the identified distribution circuit without negatively impacting the reliability of existing customers in the area. The circuit protection modification required would increase the frequency and duration of sustained (and momentary) outages to customers on the distribution circuit.

Main Line:

To accommodate the proposed 2.5 MW capacity, JCP&L will install an express-feed distribution circuit from a JCP&L substation source. The identified 12.5kv source for an express-feed distribution circuit is 6.0 miles away at the Morris Park Substation.

At Substation:

JCP&L will install a Substation distribution cubicle, breaker, and relaying; with new underground egress.

JCP&L will replace three existing (3) electro-mechanical relay panels with SEL-351 electronic relays on 2 distribution circuits and on the transformer bank at Morris Park substation. JCP&L will remove the existing relays and wiring, provide cabling, test switches, auxiliary relays and conduit.

Based on the MW capacity of the customer's system, his generation will backfeed to our 34.5 KV system which will require the installation of a bi-directional LTC control on the bank transformer.

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 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.

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 IC to determine the exact Point Of Interconnection (POI) based on existing infrastructure layout.

- IC will install a pole adjacent to JCP&L's new tap pole, as POI. On this pole, the IC will install cutout fuses with load break capability and primary metering transformers bracket per the FirstEnergy Construction Standards, Page No. 10-347. JC&L will purchase and install the revenue metering CTs and PTs. JCP&L will provide the ratio and accuracy specifications based on the IC load and generation levels

- IC provides all trenching, cables and conduit to connect his PV generation facilities into the Point of Interconnection (POI) pole.

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

- IC's inverter-based generation must be UL listed or certified to comply with the requirements of IEEE 1547. JCP&L will require a witness test of this functionality.

- **IC's main breaker shall have an SEL 351 electronic relay which is required for interconnection protection. The main breaker must be on the high side of the IC's transformer. All equipment, breakers, lightning protection, etc., should meet JCP&L/FE's minimum BIL Ratings.**

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

- JCP&L shall specify a schedule of appropriate power factor settings for the IC inverters.

- IC must meet the 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.

- IC must maintain reactive power capability sufficient to maintain a composite power delivery for the facility at the interconnection point at a power factor between .95 leading and .90 lagging. If this capability cannot be provided by the solar units, a dynamic device such as a STATCOM or SVC must be installed at the project substation at the customer's cost.

Network Impacts

Queue project W3-152 was studied as a(n) 2.5 MW (0.95 MW of which was Capacity) injection into JCPL's system at the Morris Park 34.5 kV substation. Project W3-152 was evaluated for compliance with reliability criteria for summer peak conditions in 2014.

Potential transmission network impacts are as follows:

Generator Deliverability

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

No violations 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 violations identified.

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.)

No violations 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 required.

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 required.

Short Circuit

None 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 violations identified.

Infrastructure Upgrade Estimated Costs (By JCP&L):

Total Estimated Costs (by JCP&L) is $3,941,000.00

- Conceptual cost to build a express-feed distribution circuit , which does not include Right of Way, Town, County and State permits and any other legal issues involved with land rights is $3,200,000.00

- Substation upgrade cost is $ 718,000.00 non-refundable

- Metering costs is $23,000.00 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

- **This price is based on 2012 and 2013 labor costs and material costs. If project has work performed in 2014 additional escalation costs could occur.**

- **Due to the size and complexity of this project, if customer wishes to proceed, JCP&L will need to perform a Facilities Study.**

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. 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

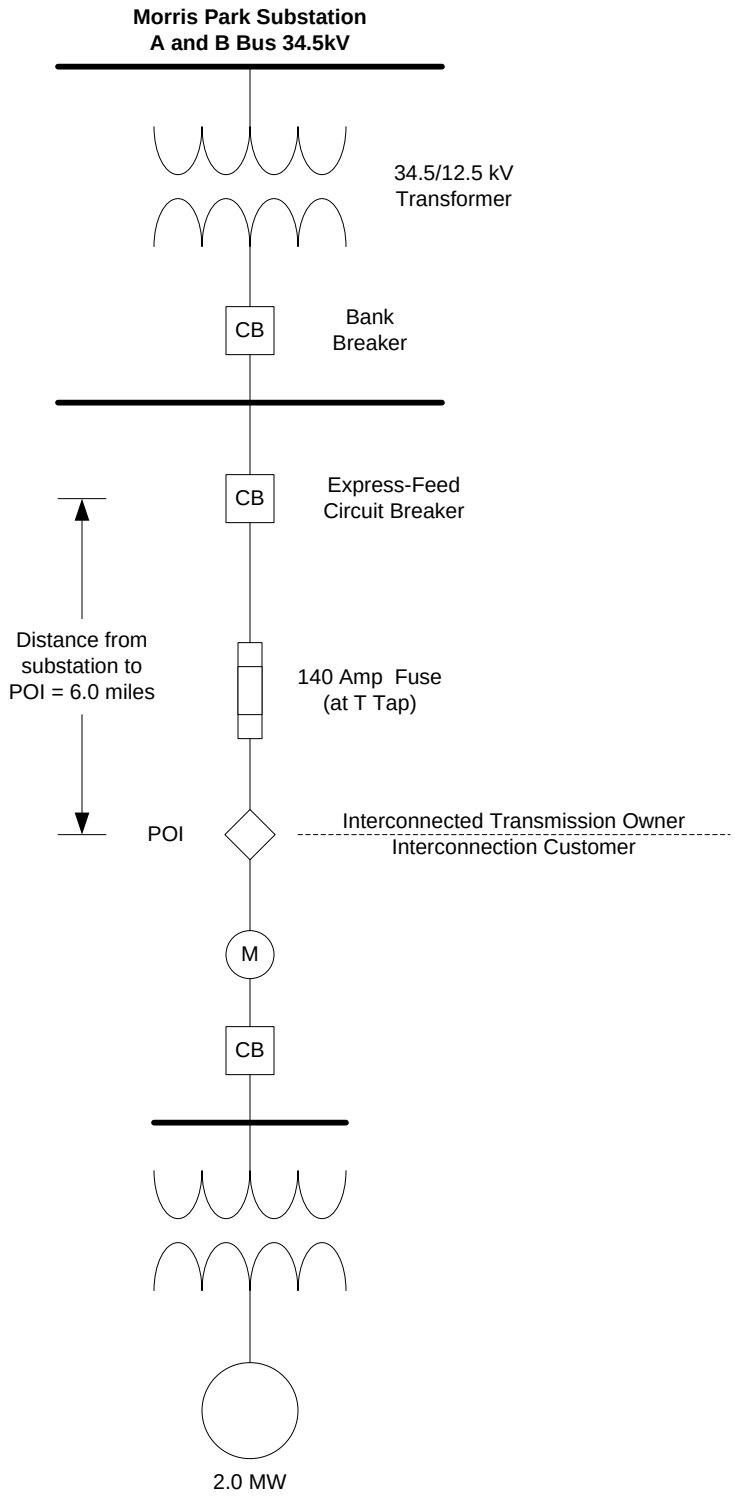
Timetable for Construction:

Total time to complete this project is 24 months from receipt of "Interconnect Agreement", "Construction Agreement" and receipt of "Estimated Project Costs".

JCP&L estimates 12 months after receipt of above for design work to be completed.

JCP&L estimates it will require an additional 12 months to complete the identified infrastructure upgrades.

Attachment 1
Single Line Diagram



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