PJM Generator Interconnection Request
Queue X2-013
Thorofare (Freq. Reg.) 26kV
Feasibility/Impact Report

October 2011
#671119

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.

X2-013 Thorofare (Freq. Reg.) 26kV Feasibility/Impact Study

General

Energy Storage Holdings has proposed installing a 2.0 MW (300 kilowatt hours of storage) battery for frequency regulation, under the PJM new technolgy pilot program, on the same property as the Paradise Solar project near the intersection of Paradise Road and Crown Point Road in West Deptford Township, Gloucester County, New Jersey. The scheduled in-service date for the project is 11/01/11.

Direct Connection

It was decided that the project will be connected to the utility system at 26kV by expanding the switchgear for the Paradise Solar project and by separately metering the battery connection.

The battery project is independent from the solar project located at the same site.

The battery will regulate based upon a signal from PJM. The signal is updated every 4 seconds. The battery can absorb or discharge up to 2.0MW. Generally will be 200 to 500 KW.

The installation should not affect underfrequency relaying on the distribution feeders. The equipment is IEEE 1547 compliant and includes its own under/over voltage and under/over frequency protection. Frequency trip points can be set to match the protection on the distribution feeders.

The battery installation will be separately metered. The project will be paid the PJM Tariff rate for regulation. The installation must validate per test its ability to regulate. The project will pay PSE&G for charging the battery. The battery is approximately 85% efficient. The metering will be bi-directional. The price of energy will be based upon PJM settlement accounting.

The following are estimates (including risk and contingencies) for the interconnection of the 2.0 MW battery storage project in West Deptford, New Jersey. The interconnection will consist of a single line service from the Thorofare Q-121 26kVcircuit. The total interconnection cost will be as shown below:

Project Item		26-kV Single Line Q-121
Inside Plant		
Line Position/Feeder Row		-
Relay Protection		-
Manholes/Conduit		-
Other/Misc.		-
	Sub Total	$0
Outside Plant		
Overhead Line		$83,799
Underground Line		-
Manholes/Conduit		-
Other/Misc.		-
	Sub Total	$83,799
Metering/Monitoring		
Revenue Metering/Telemetering/SCADA		$86,000
Feeder Metering		$0
Other/Misc.		-
	Sub Total	$86,000
Total Cost		**$169,799**
Acceptable Generation Level		**Up to 2.0 MW**

This cost is exclusive of work required to be performed by the developer as specified in PSE&G's Information & Requirements for Electric Service Handbook. This work includes, but may not be limited to, the following:

- Developer is responsible for purchase and installation of all high voltage (13-kV, 26-kV, and 69-kV) service equipment as required
- Developer will adhere to specifications detailed in the PSE&G Information and Requirements for electric service handbook
- Developer is responsible for all trenching and the installation of conduits and manholes as normally required and specified by PSE&G
- Developer must obtain all permits and easements required to install the interconnection facilities
- Developer must provide access for the installation, maintenance and operation of all service equipment

It is anticipated that material procurement and construction will require 5-6 months from the date of project approval and authorization.

Project Schedule

October 31, 2011

ISA and CSA are fully executed and authorization is received to proceed with construction

Long lead time construction material is placed on order

November 5, 2011

Developer submits preliminary site plan, 26-kV switchgear one-line diagram and equipment specifications for approval

November 10, 2011

PSE&G provides comments on project lay-out and design

November 15, 2011

Developer submits final site plan, 26-kV switchgear one-line diagram and equipment specifications for approval

November 30, 2011

PSE&G commences line construction

December 10, 2011

PSE&G provides final comments and approval of 26-kV switchgear lay-out and design. Developer begins construction based on approved design

December 15, 2011

Switchgear inspection and approval by PSE&G

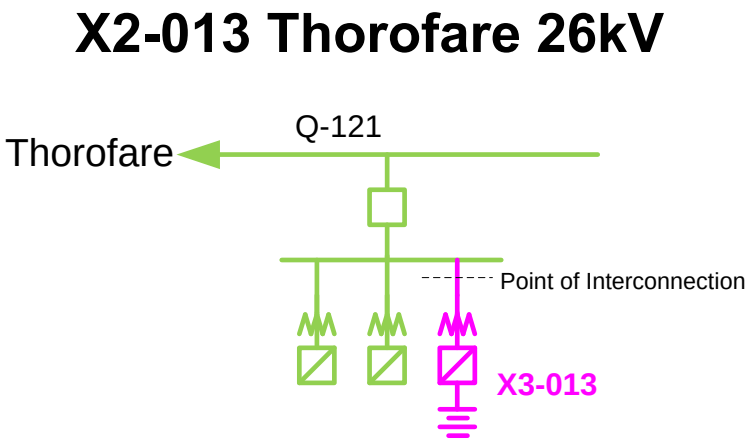
January 1, 2012

Completion of interconnection work and service cut-in

Notes:

1) Customer will abide by PSE&G Information and Requirements for electric service hand book
2) Customer is responsible to provide trench, conduit and manholes were applicable
3) Customer is responsible to provide access and easements
4) Customer is responsible to provide permits and associated costs.
5) Electric service route was based on most efficient route
6) Material procurement will be six months from project approval/authorization

Figure #1



Network Impacts

The Queue Project #X2-013 was studied as a(n) 2.0 MW(Capacity 0.0MW) injection at Thorofare 26kV station in the PSEG area. Project #X2-013 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. 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, Line with Failed Breaker and Bus Fault contingencies for the full energy output)

No problems identified.

Short Circuit

(Summary form of Cost allocation for breakers will be inserted here if any)

No problems identified

Stability

Not required because the project is less than 30 MW.

Power Factor

The facility must maintain a power factor between 0.95 lead and 0.95 lag at the point of interconnection.

System Reinforcements

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.