# *Generation Interconnection Feasibility Study Report*

# *For*

# *PJM Generation Interconnection Request Queue Position X3-057*

# *Susquehanna Unit 2*

**February 2012**

# 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 50 MW increase in the output of an existing nuclear power plant. The new Maximum Facility Output of the unit will be 1310 MW with 1260 MW of that output being recognized by PJM as capacity. This means that the remaining 50 MW will be curtailable should a system reliability constraint occur. Queue X3-057 had proposed an in-service date of October 31, 2011. This study does not imply a PPL EU commitment to this in-service date.

## Point of Interconnection

X3-057 will interconnect with the PPL Electric Utilities transmission system at the 500kV Susquehanna substation.

# Summary

The analysis performed by PJM and PPL EU have confirmed that there is no work required to support the additional 50 MW.

## Point of Interconnection

X3-057 is connected as shown on the one line diagram below. No additional interconnection facilities or upgrades are required.

# Direct Connection Issues

## X3-057 Generator and GSU modeling

Per the X3-057 supplied data, the following was used in modeling the generators and GSUs:

## X3-057 Generator:

One unit, 1353 MW gross (1354 MVA base), net injected into PPL EU system 1310 MW with a station service load of 43 MW/38 MVAR; saturated sub-transient reactance of 0.29 pu on MVA base (Given).

## GSUs:

Generator Step Up Transformers: Three single phase units, each 23.6/525 kV, 450 MVA (base) with an impedance of 0.002+j0.143 pu (Given).

# Network Impacts

Queue project X3-057 was studied as a(n) 50.0 MW (0.0 MW of which was Capacity) injection into PPL's system at the SUSQ 2 24.0 kV substation. Project X3-057 was evaluated for compliance with reliability criteria for summer peak conditions in 2015.

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

*(Report over-dutied breakers.)*

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.