Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position X1-068

Red Oak 230kV

November 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 30 MW increase to a natural gas generating facility located in Sayerville, NJ. The installed facilities will have a total capability of 796 MW with 796 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is April 19, 2011.

Point of Interconnection

X1-068 will interconnect with the Jersey Central Power & Light transmission system at the Red Oak 230kV substation.

Attachment Facilities

There are no overloads to the existing Attachment Facilities, so there are no additions or modifications to the existing Attachment Facilities.

The single line is shown below in Figure 1.

Direct Connection Cost Estimate

There are no overloads to the existing Direct Connection Facilities, so there are no additions or modifications to the existing Direct Connection Facilities.

Non-Direct Connection Cost Estimate

There are no overloads to the existing Non-Direct Connection Facilities, so there are no additions or modifications to the existing Non-Direct Connection Facilities.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

FirstEnergy Requirements

The Interconnection Customer will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. The FirstEnergy Revenue Metering Requirements may be found in the FirstEnergy Requirements for Transmission Connected Facilities document located at the following link:

www.firstenergycorp.com/feconnect
http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx

Network Impacts

Queue project X1-068 was studied as a(n) 30.0 MW (30.0 MW of which was Capacity) injection into JCPL's system at the RDOAKCT1 18.0 kV substation. Project X1-068 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)

1. (PJM) The Red Oak B Bus-Raritan River 230 kV line (from bus 206315 to bus 206305 ckt 1) loads from 97.32% to 99.04% (DC power flow) of its normal rating (869 MVA) for non contingency condition. This project contributes approximately 14.95 MW to the thermal violation.

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.

Short Circuit

(Summary of impacted circuit breakers)

Not required.

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.)

2. (PJM) The Red Oak A Bus-Raritan River 230 kV line (from bus 206314 to bus 206305 ckt 1) loads from 118.58% to 120.35% (DC power flow) of its emergency rating (1068 MVA) for the single contingency 'B_CNJ2-SX-#36'. This project contributes approximately 18.86 MW to the thermal violation.

3. (PJM/PSEG) The Raritan River-Kilmer I 230 kV line (from bus 206305 to bus 218331 ckt 1) loads from 100.42% to 100.77% (DC power flow) of its emergency rating (739 MVA) for the single contingency 'PS56D'. This project contributes approximately 16.14 MW to the thermal violation.

4. (PJM) The Red Oak B Bus-Raritan River 230 kV line (from bus 206315 to bus 206305 ckt 1) loads from 123.86% to 125.73% (DC power flow) of its emergency rating (1068 MVA) for the single contingency 'B_CNJ2-SX-#37'. This project contributes approximately 19.98 MW to the thermal violation.

5. (PJM) The R11 B-Red Oak A Bus 230 kV line (from bus 295951 to bus 206314 ckt 1) loads from 113.76% to 116.11% (DC power flow) of its emergency rating (805 MVA) for the single contingency 'B_CNJ2-SX-#36'. This project contributes approximately 18.92 MW to the thermal violation.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation.)

1,4. To mitigate the overload on the Red Oak B Bus-Raritan River 230 kV line (Item #1 under the "Generator Deliverability" section above and Item #4 in the "Contribution to Previously Identified Overloads" section above), FirstEnergy has proposed to reconductor the 2.6 miles double circuit tower line with 1590 Kcmil 54/19 ACSS/AW – Bundled (existing conductor is 1590 Kcmil 45/7 ACSR). The new summer ratings of the line will be 1642 (normal) and 1850 (emergency). FirstEnergy will also replace the bundled drop look conductors at the Raritan River and Red Oak B substations. The upgrade is estimated to cost $8,331,000.

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.)

2. To mitigate the overload on the Red Oak A Bus-Raritan River 230 kV line (Item #2 in the "Contribution to Previously Identified Overloads" section above), FirstEnergy has proposed to reconductor the 2.6 miles double circuit tower line with 1590 Kcmil 54/19 ACSS/AW – Bundled (existing conductor is 1590 Kcmil 45/7 ACSR). The new summer ratings of the line will be 1642 (normal) and 1850 (emergency). FirstEnergy will also replace the bundled drop look conductors at the Raritan River and Red Oak A substations. The upgrade is estimated to cost $8,331,000. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

3. To mitigate the overload on the Raritan River-Kilmer I 230 kV line (Item #3 in the "Contribution to Previously Identified Overloads" section above), PSEG has proposed to replace a 2000 amp wave trap at the Raritan River substation with a 3000 amp wave trap. The upgrade is estimated to cost $117,000. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

5. To mitigate the overload on the R11 B-Red Oak A Bus 230 kV line (Item #5 in the "Contribution to Previously Identified Overloads" section above), FirstEnergy has proposed to reconductor the 1.7 miles line with 1590 Kcmil 54/19 ACSS/AW – Bundled (existing conductor is 1590 Kcmil 45/7 ACSR). The new summer ratings of the line will be 869 (normal) and 1068 (emergency). The upgrade is estimated to cost $640,000. This

overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

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.