Generation Interconnection Feasibility Study Report Web Version

For

PJM Generation Interconnection Request Queue Position X3-044

Three Mile Island Unit 1 Project

February 2012

Feasibility Study Report

Three Mile Island Unit 1 Generation Project

Introduction

This Feasibility Study report provides the documentation of a system assessment performed by PJM Interconnection, L.L.C. (PJM) and FirstEnergy (FE) in response to a request made by the Interconnection Customer (IC) for an increase in energy and capacity output for the existing Three Mile Island (TMI) Unit #1 of 15 MW as a result of an MUR (Measurement Uncertainty Recovery) project. The existing Three Mile Island Unit #1 is connected to the Met-Ed Transmission network. This assessment was accomplished by: 1. Evaluating the reliability impact of the proposed facilities and connection on the interconnected transmission system by the performance of a power flow study; 2. Ensuring compliance with the NERC, ReliabilityFirst, PJM and FE Reliability Standards by identifying the system reinforcements that will need to be installed for an interconnection of the proposed project; 3. Coordinating and cooperating with the PJM staff and Interconnection Customer by conducting meetings and issuing this report as a part of the PJM study process; 4. Performing a Steady State, Short-Circuit and Dynamics Study as necessary; 5. Conducting all studies in accordance with the PJM Manuals and the "FE Requirements for Transmission Connected Facilities" documents to assure that the assessment performed incorporates study assumptions, follows the documented system performance procedures, considers alternative connection and reinforcement plans, and jointly coordinates the study recommendations.

Connection Facilities

In compliance with the PJM Interconnection Planning protocol, Interconnection Customer has submitted a "Form of Generation Interconnection Feasibility Study Agreement" to PJM that identifies its plan to implement the Three Mile Island 1 (X3-044) Generation Project comprised of an MUR (Measurement Uncertainty Recovery) upgrade to the existing TMI Nuclear Generation plant located just off of Route 441S in Middletown, PA (see Attachment 1). The project upgrade will increase the total capability by 15 MW with all 15 MW of this output being recognized by PJM as capacity. The proposed effective date for this Three Mile Island 1 (X3-044) Generation Project is June 30, 2013.

The primary point of connection (POI) for the Three Mile Island 1 (X3-044) Generation Project currently exists and will remain unchanged. Interconnection Customer will not incur any Direct Connection costs for the Three Mile Island 1 (X3-044) Project. Attachment 2 is a one-line diagram showing the existing point of interconnection of the Three Mile Island substation.

PJM Interconnection Study Results

The following is the report describing the results of the analysis performed by PJM engineers with respect to the transmission system impacts.

Network Impacts
Queue project X3-044 was studied as a 15.0 MW (15.0 MW of which is Capacity) injection into ME's system at the TMI 230.0 kV substation. Project X3-044 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

Short Circuit
(Report over-dutied breakers.)

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 violations identified.

Transmission Owner's Analysis Results

The following is the report generated by the Transmission Owner (TO) based upon its analysis of the project's impacts on the lower voltage system, if any, and the costs and schedules for any transmission and distribution system upgrades.

Power Flow Analysis

A Power Flow study was conducted to determine the reliability impact of the proposed Three Mile Island 1 (X3-044) Project on the FE Transmission System. This study was completed using a 2015 summer peak load power flow that contains a detailed representation of the Met-Ed transmission networks in the area of the proposed Three Mile Island 1 (X3-044) Project. The findings and the recommendations from this analysis are based on a contingency review that was performed to identify the facility loadings and/or voltage conditions that violate the ReliabilityFirst, PJM or FE Planning Criteria and are attributable to this project. Note that in accordance with PJM study procedures, this Three Mile Island 1 (X3-044) queue project under study and earlier active queue projects are considered to be in service. All active queue projects after (X3-044) are considered not in service.

The Three Mile Island 1 (X3-044) Project request for an incremental increase of 15 MW (15 MW capacity) to the existing TMI Unit 1 generator was studied. The results of the FE analysis show that there are no network upgrades required for the deliverability of the Three Mile Island 1 (X3-044) Project generation to the Met-Ed transmission system. The results from the study Power Flow Analysis showing a comparison of the FE and PJM contingency study results is detailed on Attachment 3. As shown, there also are no reinforcements defined for previous projects for which this project will have an impact, and there are no new upgrades required for the Three Mile Island 1 (X3-044) Project.

Short Circuit and Dynamics Analysis

A short circuit analysis was not necessary because no electrical characteristics were being modified as part of the Three Mile Island 1 (X3-044) Project. (It should be noted that during the kick off meeting there was mention of a separate project to rewind the TMI generator. Such a project will require a short circuit analysis to be completed. In accordance with PJM protocol, such a change will need to be submitted to PJM as a baseline upgrade as an RTEP queue project. The Interconnection Customer will have a cost responsibility for any facility upgrades attributable to the rewinding. This may include an upgrade of the TMI 230 kV breakers due to increased fault duty.)

System Protection Analysis

Since the Three Mile Island 1 (X3-044) Project only consisted of an MUR (Measurement Uncertainty Recovery) upgrade no system protection analysis was required. (It should be noted that during the kick off meeting there was mention of a separate project to rewind the TMI generator. This project will require a system protection analysis to be completed.)

Metering

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

Based on a review of the information provided by Interconnection Customer, no metering changes/ upgrades will be required.

Compliance Issues

Interconnection Customer will be responsible for meeting all FE criteria as defined in the FE Requirements for Transmission Connected Facilities document referenced above. This includes the provision of a reactive power capability sufficient to maintain a composite power delivery for the facility at the interconnection point at a power factor from .95 leading (absorbing MVARs) to .90 lagging (producing MVARs).

Interconnection Customer will also be required to meet all PJM, ReliabilityFirst and NERC reliability criteria and operating procedures for standards compliance. This includes the need to properly locate and report the over and under-voltage and over and under-frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and ReliabilityFirst audits. Failure to comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the FE system.

FE Facility Upgrades and Costs

The results of the FE analysis shows that no planning criteria violations are attributable to the addition of the Three Mile Island 1 (X3-044) Project for the conditions studied. Therefore the conclusion is that no Transmission or Subtransmission system reinforcements will be required to provide the requested service.

Interconnection Customer Requirements

In addition to the FE facilities, Interconnection Customer will be responsible for meeting all criteria as specified in the applicable sections of the "FE Requirements for Transmission Connected Facilities" document.

Summary

The connection of the Three Mile Island 1 (X3-044) Project to the FE transmission system will require no network upgrades. Since the point of interconnection will remain unchanged, Interconnection Customer will not incur any Direct Connection costs for the Three Mile Island 1 (X3-044) Project.

Note that the FE findings were made from a conceptual review of this project. A more detailed review of this project upgrade will be identified in the System Impact Study.