Generation Interconnection Feasibility Study Report

PJM Generation Interconnection Request Queue Position #U2-027 Mehoopany 115kV

50MW

(6.5MW capacity)

October 2008

Preface

The intent of the Generation Interconnection Feasibility Study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

The proposed interconnection facilities must be designed in accordance with the FirstEnergy "Requirements for Transmission Connected Facilities" document. Procedures for gaining access to these standards can be found at the link below.

http://www.pjm.com/planning/trans-standard.html

In some instances an Interconnection Customer may not be responsible for 100% of the identified Network Upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, 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 Generation Interconnection Feasibility Study, but the actual allocation will be deferred until the System Impact Study is performed.

The Generation Interconnection Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities unless noted in the report. The project developer is responsible for acquiring any necessary right of way and real estate, as well as applying for and obtaining any and all permits unless prior agreement by interested parties allows for other arrangements. For properties currently owned by Transmission Owners, some permitting and real estate costs may be included in the study.

Cost and Timing Estimates

The estimates in this report do not include tax gross-up.

While the information in this transmittal is reasonable for the scope of work defined, it should, however, be noted that the cost figures and time estimates are conceptual in nature at this stage, as an engineering team has not been assigned to the project. Any change to the scope of work will require that the estimates be revisited. The costs are a best estimate, but the developer will be charged for actual costs. Any under-runs or over-runs will be reconciled at the conclusion of the project.

General
The #U2-027 project was studied as a 50 MW (6.5 MW of capacity) injection into the Penelec system at the Mehoopany 115kV substation. Project #U2-027 was evaluated for compliance with reliability criteria for summer peak conditions in 2012.

Metering
The Interconnection Customer will be required to install and maintain metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM and the Transmission Owner. The PJM requirements for this equipment are listed in Appendix 2, section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. The PJM and Transmission Owner requirements for Metering Equipment will be discussed in more detail in subsequent studies.

Design Requirements
The generation owner is responsible for specifying appropriate equipment and facilities such that the parallel generation is compatible with the FirstEnergy Transmission System. The generation owner is also responsible for meeting any applicable federal, state, and local codes. It is also the developer's responsibility to obtain any needed right-of-way between the plant site and FirstEnergy's facilities.

FirstEnergy may complete detailed relay coordination studies to identify off-site relay setting changes required due to this generation interconnection during the Facilities Study phase of this project. This may result in additional individual relay replacements being required. These relay replacements will be done at the cost of the developer.

Reactive Power

Requirements to be provided during the System Impact Study or Facilities Study phase of the project studies.

Cost and Timing Estimates
While the information in this transmittal is reasonable for the scope of work defined, it should, however, be noted that the cost figures and time estimates are conceptual in nature at this stage, as an engineering team has not been assigned to the project. Any change to the scope of work will require that the estimates be revisited. The costs are a best estimate, but the Interconnection Customer will be charged for actual costs. Any under-runs or over-runs will be reconciled at the conclusion of the project.

Direct Connection Facilities

Connection to the Mehoopany substation would be through an expansion of the substation, requiring the addition of three breakers, bus work, relaying and SCADA (see Figure 1). The developer is responsible for constructing all of the facilities on its side of the Point of Interconnection.

The proposed Interconnection Facilities must be designed in accordance with the FirstEnergy "Requirements for Transmission Connected Facilities" document. Procedures for gaining access to these standards can be found at the link below.

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Below are conceptual estimates for the engineering/construction associated with Direct Connection requirements based upon similar projects that have been designed and/or constructed.

Item	Description	Conceptual Cost Estimate
1	Addition of three 115 kV circuit breakers adjacent to the existing Mehoopany 115kV substation in order to expand the substation. This includes disconnect switches and bus structures.	$2,763,000
2	New tap structure in Mehoopany 115kV substation.	$250,000
3	115 kV transmission line extending from the new tap structure in the Mehoopany 115 kV substation to the generation plant interconnection substation.	Developer cost. Line built, owned and maintained by the developer.
4	Relay and control work at Mehoopany 115kV substation	$360,000
5	Relay and control work at North Meshoppen 115 kV Substation.	$360,000
6	Install 6.56 miles of fiber optic cable between Mehoopany and North Meshoppen 115 kV substations.	$656,000

Conceptual Estimate: $4,389,000
Estimated Lead Time: 2.0 years from signed CSA

Notes:

- The above estimates do not include 1) tax gross-up, 2) property costs and site development up to rough grade which is to be provided by the developer, 3) interconnection metering and

generation SCADA to be provided by the developer, and 4) engineering and field activities for design review and commissioning of the developer's facilities

Network Impacts
Potential network impacts were as follows:

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

No problems were identified.

Multiple Facility Contingency
(Double Circuit Tower Line for the full energy output. Stuck breaker and bus fault contingencies will be performed for the System Impact Study)

No problems were 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)

1. The Oxbow-Lackawanna 230kV line loading increases 5%(DC power flow) of its emergency rating (617MVA) for the Tower line contingency outage (2PPL). This project contributes approximately 26.8MW to the thermal congestion. To alleviate this would require the rebuild of approximately 16.33 miles of transmission line (estimated to cost approximately $19,596,000). This overload also requires the following terminal upgrades at Oxbow substation: replace substation conductor (estimated cost approximately $125,000) and replace a disconnect switch (estimated cost approximately $85,000). Additionally, terminal upgrades and substation work would be required at the Lackawanna substation (estimated to cost approximately $500,000).

Short Circuit

PJM has completed the short circuit analysis of the Queue Position #U2-027 on the 230kV voltage and above system. PJM analysis found no new breakers to be over-duty in the Penelec transmission area. Additional short circuit study will be performed during the System Impact Study phase of this project.

Steady-State Voltage Requirements
(Results of the steady-state voltage studies should be inserted here)

To be determined during the System Impact Study phase of the study of this project.

Stability and Reactive Power Requirement
(Results of the dynamic studies should be inserted here)

To be determined during the System Impact Study phase of this project.

Delivery of Energy Portion of Interconnection Request
PJM and FirstEnergy studied the delivery of the energy portion of this Interconnection Request. The following analysis has been performed to inform the Interconnection Customer (Queue Position #U2-027) of potential congestion issues (operational restrictions) that may occur and affect the Queue Position #U2-027 project's ability to operate at full output for certain system conditions. **The upgrades listed below are not required reliability upgrades for the Queue Position #U2-027 interconnection.** Please note that the number of facilities identified below as requiring upgrades may be quite extensive – with a number of these facilities requiring reconductoring/rebuilding of transmission lines. Some of the reconductoring/rebuilding projects can be done in a "short" time frame while others are quite extensive and will require a "long" time to complete. In general, the time necessary to design and rebuild an extensive facility upgrade will take approximately 2-3 years to complete. 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 below. 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 shall study 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:

1. The Laurel Lake-Goudy 115kV line loads from 134.3% to 141.0% (DC power flow) of its normal rating (108MVA) for non-contingency condition.

2. The Tiffany-Laurel Lake 115kV line loads from 128.9% to 135.1% (DC power flow) of its normal rating (116MVA) for non-contingency condition.

3. The Laurel Lake-Goudy 115kV line loads from 191.2% to 197.8% (DC power flow) of its emergency rating (129MVA) for the single line contingency outage (PN20).

4. The Mehoopany-North Meshoppen 115kV line loads from 64.4% to 100.0% (DC power flow) of its normal rating (71MVA) for non-contingency condition.

5. The Lenox-Tiffany 115kV line loads from 111.9% to 117.3% (DC power flow) of its emergency rating (151MVA) for the single line contingency outage (PN20).

6. The North Meshoppen-Oxbow 230kV line loads from 109.2% to 114.5% (DC power flow) of its normal rating (499MVA) for non-contingency condition.

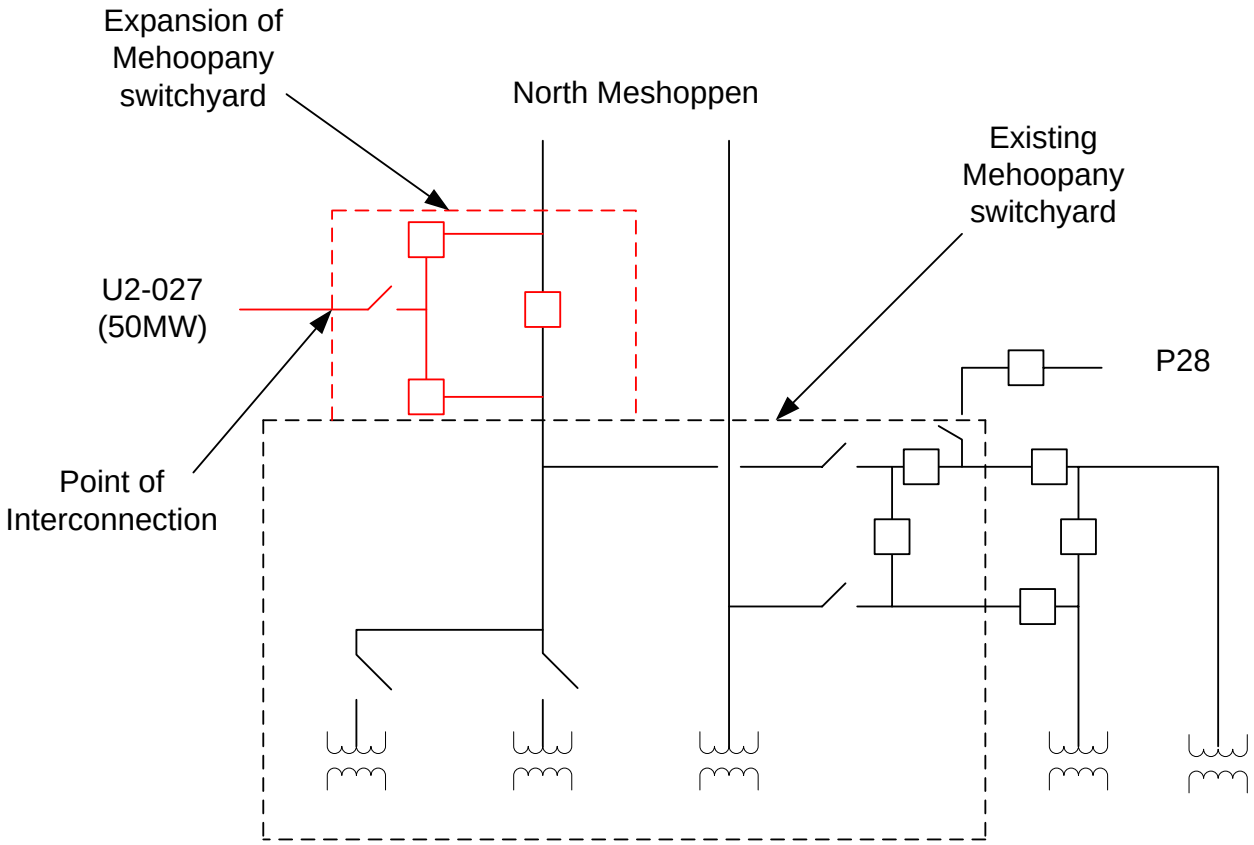
7. The Oxbow-Lackawanna 230kV line loads from 109.3% to 114.8% (DC power flow) of its normal rating (499MVA) for non-contingency condition.

8. The CNASTONE-N-NWEST 500kV line loads from 182.6% to 182.8% (DC power flow) of its emergency rating (2901MVA) for the single line contingency outage (PJM13B_NNWEST_A).

9. The CNASTONE-N-NWEST 500kV line loads from 182.6% to 182.8% (DC power flow) of its emergency rating (2901MVA) for the single line contingency outage (U_queue_reinforcement_60).

10. The North Meshoppen-Lenox 115kV line is overloaded to approximately 102.7% (DC power flow) of its emergency rating (179MVA) for the single line contingency outage (PN20).

Figure #1



Existing facilities

Proposed facilities

Note:
The Interconnection Customer (IC) must own and install a fully rated fault interrupting 115 kV circuit breaker on the IC side of the POI (high voltage side of the generator step-up transformer)