Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position Y1-047

North Meshoppen 34.5 kV

July 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 natural gas generating facility located in Auburn Township, Susquehanna County, Pennsylvania. The installed facilities will have a total capability of 15.4 MW with 15.4 MW of this output being recognized by PJM as capacity. This means that the remaining 0 MW will be curtailable should a system reliability constraint occur. The proposed in-service date for this project is June 1, 2013. **This study does not imply a First Energy commitment to this in-service date.**

Point of Interconnection

Y1-047 will interconnect with the Penelec transmission system at one of two points of interconnection:

Option 1 will interconnect at 34.5 kV in the North Meshoppen substation on the #2 bus.

Option 2 will interconnect at 115 kV in the North Meshoppen substation.

Cost Summary

The Y1-047 project will be responsible for the following costs:

Description	Total Cost	
Attachment Facilities	$	18,200
Direct Connection Network Upgrades	$	516,700
Non Direct Connection Network Upgrades	$	0
Total Costs	**$**	**534,900**

In addition, the Y1-047 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	$ 0
Previously Identified Upgrades	$ 31,162,615
Total Costs	**$ 31,162,615**

Cost allocations for these upgrades will be provided in the System Impact Study Report.

Attachment Facilities

These costs do not include CIAC Tax Gross-up. The single line is shown below in Attachment 1.

Description	Total Cost
Revenue metering	$ 18,200
Express 0.1 mile 34.5kV line from North Meshoppen Sub interconnection disconnect switch to Y1-047, plus Y1-047 line breaker located at PV generator site	Customer Owned
Total	**$ 18,200**

Direct Connection Cost Estimate

The total preliminary cost estimate for Direct Connection work is given in the table below:

Description	Total Cost
North Meshoppen sub. new 34.5kV breaker position, breaker, relaying and associated equipment	$ 506,700
RTU programming for connection to the First Energy SCADA and relay support for the generation installation.	$ 10,000
Total	**$ 516,700**

Conceptual Estimate: $534,900
Estimated Lead Time: 1.0 year from signed IA

It was proposed that the project be studied as an interconnection into the First Energy distribution system at North Meshoppen Substation #2 34.5kV bus via a new breaker position.

The Interconnection Customer is responsible for constructing all of the facilities on its side of the point of interconnection, on the line to the generating plant. The Interconnection Customer will also be responsible for the modifications at North Meshoppen substation that are required due to connecting the facility.

The proposed interconnection facilities must be designed in accordance with the FirstEnergy "Requirements for Transmission Connected Facilities" document and "Technical Requirements for the Interconnection of Customer-Owned generation to the FirstEnergy Distribution System" document.

The 34.5kV interconnection point will require the installation of a Penelec installed/owned main line breaker in the #2 North Meshoppen 34.5kV bus (which will act as the disconnect point between First Energy and the generator interconnection) and a new disconnect switch situated just outside of the North Meshoppen substation fence line (POI).

Interconnection metering is also required for this generation connection. The 34.5 kV revenue quality metering equipment shall be designed, furnished and installed by FirstEnergy. The Interconnection Customer will be responsible for designing, furnishing and installing a SCADA RTU in their generation substation and obtaining the telecommunication circuits from the RTU to the Penelec Data Center. The connection to the Penelec Data Center will be to provide MW, MVAR and 34.5kV voltage at the Interconnection Customer's generation substation. Please reference the FirstEnergy Metering Requirements for Interconnection Customers, for more details on the metering requirements for FirstEnergy. This document can be found on the FE website at:

https://www.firstenergycorp.com/feconnect/penelec/wholesale.html

Notes:

- Detailed Engineering & Construction Estimates TBD via Facility Study
- 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) Generation SCADA to be provided by the developer
    4) Engineering and field activities for design review and commissioning of the developer's facilities.

Attachment 1 provides a conceptual one-line of the direct connection facilities needed.

Summary

Conceptual estimates are provided for the assumption that the point of interconnection would be on the #2 34.5kV bus at North Meshoppen substation and that the customer interconnection substation would be at a site approximately 3.2 miles north of Meshoppen, PA. Power flows from the Y1-047 Project will require facility upgrades in the FirstEnergy territory. As shown, the total estimated cost of these reinforcements is $31,162,615. Please note that PJM is responsible for determining the cost responsibility for the network upgrades required to mitigate these violations.

Based on the scope of the FE direct connection, it is expected to take approximately one (1) year from the signing of a Connection Service Agreement to complete the installation required for the North Meshoppen (Y1-047) Project. Additional time may be required to construct any system reinforcements.

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.

First Energy Requirements

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

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

Network Impacts

Option 1

The Queue Project #Y1-047 was studied as a 15.4MW (Capacity 15.4MW) injection at the North Meshoppen 34.5 kV substation in the PENELEC area. Project #Y1-047 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. Potential network impacts were as follows:

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
B_PN230-SX-#11_X1_109A	CONTINGENCY 'B_PN230-SX-#11_X1_109A' /* EAST TOWANDA - N MESHOPPEN (ETP) 230 KV & N MESHOPPEN BK 4 DISCONNECT BRANCH FROM BUS 200675 TO BUS 907910 CKT 1 END
PL100841	CONTINGENCY 'PL100841' /*230KV BRANCH FROM SUSQUEHANNA BUS TO SUSQ G1 OUT DISCONNECT BRANCH FROM BUS 208113 TO BUS 208114 CKT 1 END
PL100903	CONTINGENCY 'PL100903' /* SUSQUEHANNA-SUSQ GEN 1 230KV DISCONNECT BUS 208114 END

Generator Deliverability

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

None.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

None.

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None.

Contributions to previously identified circuit breakers found to be over-duty:

None.

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)

	Contingency		Affected		Bus			Power	Loading %		Rating		MW
#	Type	Name	Area	Facility Description	From	To	Circuit	Flow	Initial	Final	Type	MVA	Contribution
1	N-1	PL100841	PJM	OXBOW-LACK 230 kV line	200708	208009	1	DC	109.74	111.03	ER	617	7.93
2	N-1	PL100903	PJM	OXBOW-LACK 230 kV line	200708	208009	1	DC	109.74	111.03	ER	617	7.93
3	N-1	B_PN230-SX-#11_X1_109A	PJM	N.MESHPN-OXBOW 230 kV line	200706	200708	1	DC	112.5	113.79	ER	608	7.88
4	Non	Non	PJM	OXBOW-LACK 230 kV line	200708	208009	1	DC	120.65	122.27	NR	488	7.93

#	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution
5	Non	Non	PJM	N.MESHPN-OXBOW 230 kV line	200706	200708	1	DC	121.46	123.05	NR	478	7.6

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined.

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined.

New System Reinforcements

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

None.

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)

Overload #'s	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
#1, 2, 4	OXBOW-LACK 230 kV line	To alleviate the overload on the Lackawanna – Oxbow 230kV line, a rebuild of approximately 16.33 miles of transmission line would be required (estimated to cost approximately $19,596,000).	Pending	**$ 19,596,000**

Overload #'s	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
#3, 5	N.MESHPN-OXBOW 230 kV line	To alleviate the overload on the Oxbow – North Meshoppen 230kV line, a rebuild of approximately 10.16 miles of transmission line would be required to support bundled conductor and upgrade terminal equipment at North Meshoppen and Oxbow substations. Estimated to cost approximately $11,566,615 (excluding tax) and to take 4-5 years to complete after signed ISA	Pending	**$ 11,566,615**
			Total New Network Upgrades	**$ 31,162,615**

Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any 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 Merchant 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.

None.

Network Impacts

Option 2

The Queue Project #Y1-047 was studied as a 15.4MW (Capacity15.4MW) injection at the North Meshoppen 115 kV substation in the PENELEC area. Project #Y1-047 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. Potential network impacts were as follows:

Contingency Descriptions

The following contingencies resulted in overloads:

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Attachment 1

System Configuration