Generation Interconnection
Combined
Feasibility/System Impact Study Report

For

PJM Generation Interconnection Request
Queue Position X2-101

Upper Pittsgrove 138kV

December 2011

Preface

The intent of the Combined Feasibility/ System Impact Study is to determine a plan, with approximate 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. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

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 Feasibility Study, but the actual allocation will be deferred until the System Impact Study is performed.

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 may be 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

Delsea Energy, LLC, the Interconnection Customer (IC), has proposed an 18 MWE (2.34 MWC: 18 MW MFO) wind powered generating facility consisting of 10 wind turbines. The project will be located in Elmer, New Jersey. PJM studied X2-101 as an 18 MW injection into the Atlantic City Electric system and evaluated it for compliance with reliability criteria for summer peak conditions in 2015. The proposed in-service date, as stated in the Attachment N, is September 1, 2012.

Point(s) of Interconnection

The Interconnection Customer requested a Primary and Secondary Point of Interconnection (POI) be evaluated for the X2-101 project. The Primary POI selected was a transmission level interconnection at a tap of the Upper Pittsgrove - Deepwater 138kV circuit. The Secondary POI selected was also a transmission level interconnection as a direct connection into the Upper Pittsgrove 138kV substation. The results are provided in the Transmission Network Impacts section below.

Primary Option

X2-101 will interconnect with the Atlantic City Electric (ACE) transmission system at a new 138kV three (3) breaker ring bus substation to be built adjacent to the Deepwater-Upper Pittsgrove 138kV circuit (see Attachment 1).

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

The ACE scope of work and estimated costs for the direct connection facilities is as follows:

Substation Engineering Estimate:
Scope: Construct a 138kV three-breaker ring bus substation on the Deepwater to Upper Pittsgrove 138kV line, inclusive of a terminal position for X2-101.
Estimate: $4,500,000
Construction Time: 24 – 36 months

Transmission Engineering Estimate:
Scope: Install a self-supporting 138kV steel pole with a concrete foundation, motor operated disconnects and a short span to new substation.
Estimate: $150,000
Construction Time: 24 months.

Note: If location of generator is greater than 500 feet from substation, circuit breaker will be necessary

Note: the above cost does not include the Contribution in Aid of Construction (CIAC) tax.

Special Operating Requirements

1. PHI will require the capability to remotely trip the generator from its System Operations facility. Such tripping may be facilitated by either a generator breaker, inverter (if so equipped), or a line recloser, depending upon the specific circumstances and the evaluation of PHI.

2. The Interconnection Customer will grant its permission to PJM for PJM to send PHI the following telemetry data that the Interconnection Customer sends to PJM: real time megawatts, megavars, volts, amperes and status, and interval megawatt-hours, and megavar-hours. For generation larger than 10 MW, a direct telemetry connection to PHI System Operations will be required via a radial connection to PHI's telecommunications system or a rented data circuit, at the Interconnection Customer's cost.

3. The Interconnection Customer will be required to make provisions for a voice quality phone line within approximately 3 feet of each Company metering position to facilitate remote interrogation and data collection.

4. A mutually acceptable means of interrupting and disconnecting the generator with a visible break, able to be tagged and locked out, shall be worked out with PHI Engineering.

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer (IC) assumes full responsibility for design and construction of all facilities on their side of the Point of Interconnection. Site preparation including grading and an access road, as necessary, is assumed to be by the IC.

The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The 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. Protective relaying and metering design and installation must comply with PHI's Applicable Standards.

Transmission Network Impacts

Potential transmission network impacts are as follows:

Generator Deliverability

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

None

Multiple Facility Contingency

*(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the **Full** energy output.*

1. The (ACE) X1-016 TAP-Landis 138 kV line (from bus 907120 to bus 228500 ckt 1) loads from 97.77% to 102.31% (AC power flow) of its emergency rating (205 MVA) for the breaker contingency 'AE1'. This project contributes approximately 10.37 MW to the thermal violation.

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)

None

Short Circuit

None

System Protection

X2-101 will be responsible for replacing the line relays at the Deepwater and Upper Pittsgrove substations in conjunction with the new substation. The estimated cost to perform this work is **$600,000.**

Low Voltage Ride Through (LVRT) Analysis

Will be performed during the Facilities Study phase of the project.

Other Charges

It is anticipated that the Interconnection Customer will be charged for ongoing operation and maintenance of the attachment facilities. The methodology of calculating this charge is still under development.

New System Reinforcements

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

1. To mitigate the (ACE) X1-016 TAP-Landis 138 kV circuit (from bus 907120 to bus 228500 ckt 1) overload will require reconductoring the Upper Pittsgrove-Landis 138kV circuit, a distance of approximately 9.62 miles. The estimated cost to perform this work is $3.0M and will take **18-24 months** to complete.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.

None

Potential Congestion due to Local Energy Deliverability

(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 below. There is no guarantee of full deliverability 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 identified overloaded element(s). As a result of the aggregate energy resources in the area, the following violations were identified:

These are ***not*** required reliability upgrades.

None

Secondary Option

X2-101 was studied as an 18 MW injection at the Upper Pittsgrove 138kV substation.

Transmission Network Impacts

Potential transmission network impacts are as follows:

Generator Deliverability

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

None

Multiple Facility Contingency

*(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the **Full** energy output.*

1. The (ACE) X1-016 TAP-Landis 138 kV line (from bus 907120 to bus 228500 ckt 1) loads from 97.77% to 102.31% (AC power flow) of its emergency rating (205 MVA) for the breaker contingency 'AE1'. This project contributes approximately 10.37 MW to the thermal violation.

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None

Short Circuit

None

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Will be performed during the Facilities Study phase of the project.

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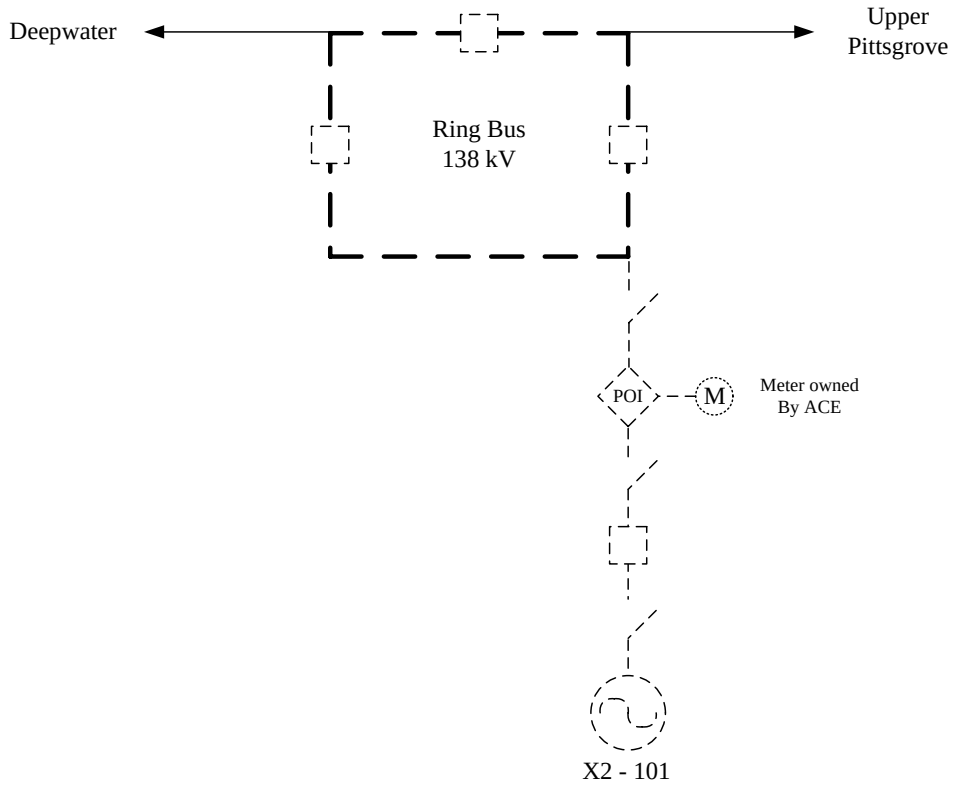
None

Attachment 1

X2-101
Deepwater – Upper Pittsgrove 1405
New 138kV Ring Bus



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