Generation Interconnection
Combined
Feasibility/System Impact Study Report

For

PJM Generation Interconnection Request
Queue Position X2-100

Woodstown-Laurel 69kV

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 a 14.4 MWE (1.87 MWC: 14.4 MW MFO) wind powered generating facility consisting of 8 wind turbines. The project will be located in Elmer, New Jersey. PJM studied X2-100 as a 14.4 MW injection into the Atlantic City Electric system at a 50% tap between the Woodstown and Laurel 69kV circuit 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 of Interconnection

X2-100 will interconnect with the Atlantic City Electric (ACE) transmission system at a new 69kV three (3) breaker ring bus substation to be built adjacent to the Deepwater-Laurel 69kV circuit (see Attachment 1).

Direct Connection Requirements

Transmission Owner (ACE) 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 69kV three-breaker ring bus substation on the Deepwater to Laurel 69kV line, inclusive of a terminal position for X2-100.
Estimate: $3,600,000

Construction Time: 24 – 36 months

Transmission Engineering Estimate:
Scope: Install a self-supporting 69kV steel pole with a concrete foundation, motor operated disconnects and a short span to new substation.
Estimate: $125,000
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 by 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 projects 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 the design and construction of all facilities on their IC 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.*

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)

None

Short Circuit

None

System Protection

X2-100 will be responsible for replacing the line relays at the Deepwater and Laurel 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.

New System Reinforcements

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

None

Contribution to Previously Identified System Reinforcements

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

None

Other Charges

ACE reserves the right to charge the Interconnection Customer Operation and Maintenance (O&M) expenses to maintain the Interconnection Customer's Attachment Facilities, including metering and telecommunications facilities, owned by ACE.

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.

1. The (AE) Us Silica Tap-V4-036 TAP 69 kV line (from bus 228222 to bus 900280 ckt 1) loads from 102.82% to 106.14% (AC power flow) of its emergency rating (90 MVA) for the operational contingency 'CARLL-SHERM'. This project contributes approximately 3.06 MW to the thermal violation.

2. The (AE) Laurel-W2-035 TAP 69 kV line (from bus 228259 to bus 902330 ckt 1) loads from 112.71% to 118.59% (AC power flow) of its emergency rating (58 MVA) for the operational contingency 'WOOD-LAUR_X2-100B'. This project contributes approximately 3.54 MW to the thermal violation.

3. The (AE) V4-036 TAP-W1-085 TAP 69 kV line (from bus 900280 to bus 901400 ckt 1) loads from 118.91% to 122.23% (AC power flow) of its emergency rating (90 MVA) for the operational contingency 'CARLL-SHERM'. This project contributes approximately 3.06 MW to the thermal violation.

4. The (AE) Roadstown Tap-W1-068 TAP 69 kV line (from bus 228223 to bus 901320 ckt 1) loads from 125.72% to 131.83% (AC power flow) of its emergency rating (56 MVA) for the operational contingency 'WOOD-LAUR_X2-100B'. This project contributes approximately 3.54 MW to the thermal violation.

5. The (AE) Quinton-Churchtown 69 kV line (from bus 228329 to bus 228319 ckt 1) loads from 120.02% to 124.78% (AC power flow) of its emergency rating (72 MVA) for the operational contingency 'WOOD-LAUR_X2-100B'. This project contributes approximately 3.54 MW to the thermal violation.

6. The (AE) W3-163 TAP-Clayton 69 kV line (from bus 904450 to bus 228405 ckt 1) loads from 119.52% to 123.13% (AC power flow) of its emergency rating (54 MVA) for the operational contingency 'MICK-BRIDG'. This project contributes approximately 2.12 MW to the thermal violation.

7. The (AE) W3-163 TAP-Clayton 69 kV line (from bus 904450 to bus 228405 ckt 1) loads from 98.62% to 103.05% (AC power flow) of its normal rating (44 MVA) for non contingency condition. This project contributes approximately 2.05 MW to the thermal violation.

8. The (AE) W2-035 TAP-W4-083 TAP 69 kV line (from bus 902330 to bus 905670 ckt 1) loads from 124.10% to 129.98% (AC power flow) of its emergency rating (58 MVA) for the operational contingency 'WOOD-LAUR_X2-100B'. This project contributes approximately 3.54 MW to the thermal violation.

9. The (AE) Carlls Corner-Sherman 69 kV line (from bus 228252 to bus 228226 ckt 1) loads from 163.06% to 175.02% (AC power flow) of its emergency rating (56 MVA) for the operational contingency 'WOOD-LAUR_X2-100B'. This project contributes approximately 7.28 MW to the thermal violation.

10. The (AE) Carlls Corner-Sherman 69 kV line (from bus 228252 to bus 228226 ckt 1) loads from 148.88% to 155.96% (AC power flow) of its normal rating (44 MVA) for non contingency condition. This project contributes approximately 3.47 MW to the thermal violation.

11. The (AE) X2-100 TAP-Woodstown 69 kV line (from bus 909770 to bus 228360 ckt 1) loads from 109.23% to 115.18% (AC power flow) of its emergency rating (108 MVA) for the operational contingency 'USLC-SM_V4-036_W1-085B'. This project contributes approximately 8.44 MW to the thermal violation.

12. The (AE) Woodstown-Woodstown #1 69 kV line (from bus 228360 to bus 228332 ckt 1) loads from 119.33% to 124.36% (AC power flow) of its emergency rating (74 MVA) for the operational contingency 'USLC-SM_V4-036_W1-085B'. This project contributes approximately 4.96 MW to the thermal violation.

13. The (AE) W1-068 TAP-Quinton 69 kV line (from bus 901320 to bus 228329 ckt 1) loads from 144.36% to 150.45% (AC power flow) of its emergency rating (56 MVA) for the operational contingency 'WOOD-LAUR_X2-100B'. This project contributes approximately 3.54 MW to the thermal violation.

14. The (AE) W4-083 TAP-Roadstown Tap 69 kV line (from bus 905670 to bus 228223 ckt 1) loads from 131.22% to 137.11% (AC power flow) of its emergency rating (58 MVA) for the

operational contingency 'WOOD-LAUR_X2-100B'. This project contributes approximately 3.54 MW to the thermal violation.

15. The (AE) Fairton-Newport 69 kV line (from bus 228214 to bus 228219 ckt 1) loads from 152.93% to 159.25% (AC power flow) of its emergency rating (48 MVA) for the operational contingency 'CARLL-SHERM'. This project contributes approximately 3.06 MW to the thermal violation.

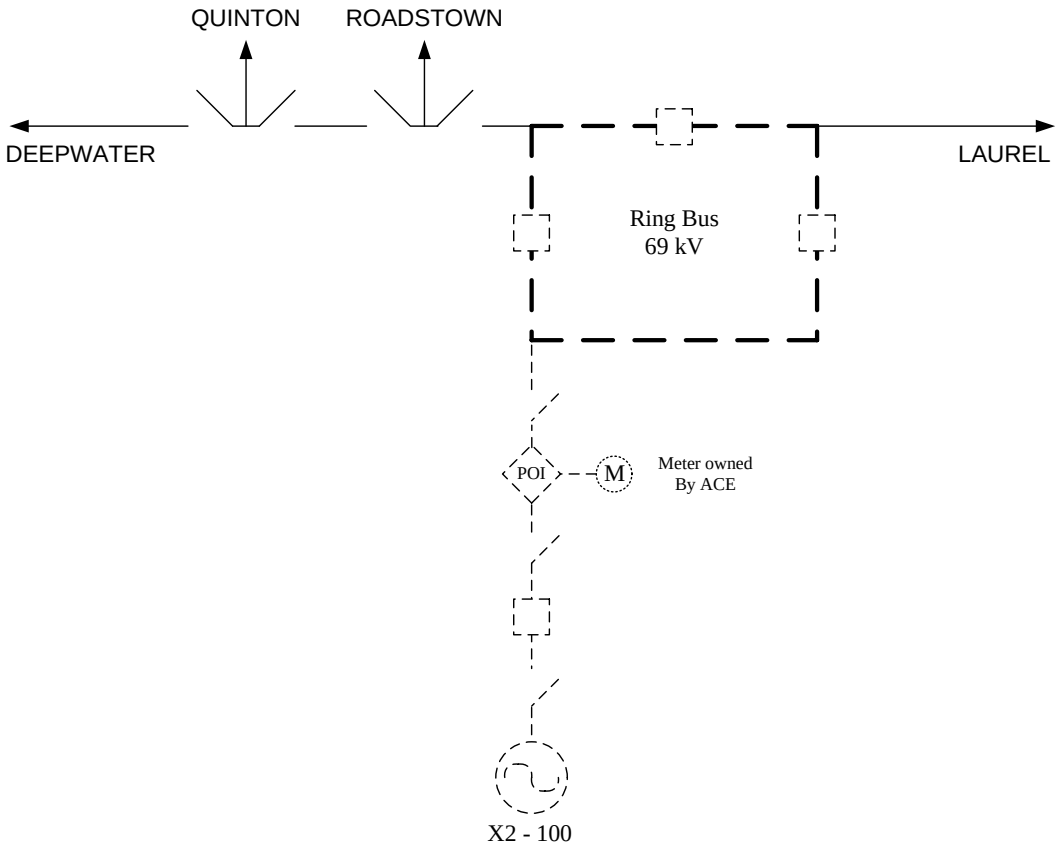
16. The (AE) Woodstown #1-W3-163 TAP 69 kV line (from bus 228332 to bus 904450 ckt 1) loads from 119.61% to 123.22% (AC power flow) of its emergency rating (54 MVA) for the operational contingency 'MICK-BRIDG'. This project contributes approximately 2.12 MW to the thermal violation.

17. The (AE) Woodstown #1-W3-163 TAP 69 kV line (from bus 228332 to bus 904450 ckt 1) loads from 98.63% to 103.05% (AC power flow) of its normal rating (44 MVA) for non contingency condition. This project contributes approximately 2.05 MW to the thermal violation.

18. The (AE) Newport-Us Silica Tap 69 kV line (from bus 228219 to bus 228222 ckt 1) loads from 110.86% to 115.66% (AC power flow) of its emergency rating (55 MVA) for the operational contingency 'CARLL-SHERM'. This project contributes approximately 3.06 MW to the thermal violation.

Attachment 1

X2-100
Deepwater – Laurel 0723
New 69kV Ring Bus



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