Generation Interconnection Feasibility Study Report Queue Position W1-088

The Interconnection Customer (IC) has proposed a 20 MWE (7.6 MWC) solar powered generating facility consisting of ground mounted fixed panel solar arrays to be located in Millville, Cumberland County, New Jersey. PJM studied W1-088 as a 20 MW injection into the Atlantic City Electric (ACE) system at a tap along the South Millville-US Silica Tap 69kV circuit. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2014.

Point of Interconnection

W1-088 will connect to the Atlantic City Electric transmission system via a tap of the US Silica Tap – South Millville 69kV circuit.

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

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

1. Construct a tap structure and install three (3) 69kV switches on the US Silica Tap-South Millville 69kV circuit on property provided by the Interconnection Customer at no expense to Atlantic City Electric.

The estimated cost to perform this work is **$500,000** and will take an estimated **24 – 36 months** to complete after receipt of a fully executed Interconnection Service Agreement (ISA) and Interconnection Construction Service Agreement (CSA).

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

Interconnection Customer Scope of Direct Connection Work

The IC is responsible for all design and construction related activities on their side of the Point of Interconnection. IC will interconnect W1-088 with the ACE system by constructing a customer owned 69kV circuit from their facility to the tap structure of the US Silica Tap-South Millville 69kV circuit. The above cost estimates do not include construction of that line or bus work. Route selection, line design, right-of-way acquisition, and construction of such lines will be entirely the responsibility of the Interconnection Customer.

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 Atlantic City Electric'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 contingencies at **Full** energy output. Stuck Breaker and Bus Fault contingencies will be applied during the System Impact Study.*

1. The W1-085TAP1-SO MVLLE 69 kV line (from bus 901640 to bus 228228 ckt 1) loads from 94.38% to 111.54% (DC power flow) of its emergency rating (89 MVA) for the tower line contingency ('AE11TOWER'). This project contributes approximately 15.27 MW to cause 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

Not required.

Stability Analysis

Not required due to project size.

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 W1-085TAP1-SO MVLLE 69 kV line (from bus 901640 to bus 228228 ckt 1) overload will require the reconductor of approximately 2.9 miles of circuit with 795 ACSR conductor. The estimated cost to perform this work is **$1,500,000** and will take **24-36 months** to complete following receipt of a fully executed Interconnection Services Agreement (ISA) and

Interconnection Construction Services Agreement (CSA). See PJM Tariff Section 217.3a for cost allocation requirements.

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.

1. The BALFSTNT-WHTN A T 69 kV line (from bus 228215 to bus 228233 ckt 1) loads from 50.78% to 62.17% (DC power flow) of its normal rating (77 MVA) for non-contingency condition. This project contributes approximately 8.77 MW to cause the thermal violation.

2. The LAUREL#2-LAUREL 69 kV line (from bus 228259 to bus 228218 ckt 1) loads from 70.03% to 77.95% (DC power flow) of its emergency rating (149 MVA) for the single line contingency ('USLC-SM_V4-036B_WITH_W1-085B'). This project contributes approximately 16.23 MW to cause the thermal violation.

3. The WHTN A T-2ND ST#1 69 kV line (from bus 228233 to bus 228225 ckt 1) loads from 59.25% to 72.53% (DC power flow) of its normal rating (66 MVA) for non-contingency condition. This project contributes approximately 8.77 MW to cause the thermal violation.

4. The SO MVLLE-BUTLER 69 kV line (from bus 228228 to bus 228703 ckt 1) loads from 65.95% to 77.99% (DC power flow) of its emergency rating (89 MVA) for the single line contingency ('SS-SMLVIL'). This project contributes approximately 13.71 MW to cause the thermal violation.

5. The SO MVLLE-BALFSTNT 69 kV line (from bus 228228 to bus 228215 ckt 1) loads from 61.1% to 74.8% (DC power flow) of its normal rating (64 MVA) for non-contingency condition. This project contributes approximately 8.77 MW to cause the thermal violation.

6. The BALFSTNT-WHTN A T 69 kV line (from bus 228215 to bus 228233 ckt 1) loads from 72.76% to 83.08% (DC power flow) of its emergency rating (94 MVA) for the single line contingency ('LAUR-FAIR'). This project contributes approximately 11.55 MW to cause the thermal violation.

7. The W1-085TAP1-V4-036TAP1 69 kV line (from bus 901640 to bus 900350 ckt 1) loads from 99.99% to 133.32% (DC power flow) of its emergency rating (60 MVA) for the single line contingency ('USLC-SM_V4-036B_WITH_W1-085B'). This project contributes approximately 20 MW to cause the thermal violation.

8. The WHTN A T-2ND ST#1 69 kV line (from bus 228233 to bus 228225 ckt 1) loads from 92.43% to 105.53% (DC power flow) of its emergency rating (74 MVA) for the single line contingency ('LAUR-FAIR'). This project contributes approximately 11.55 MW to cause the thermal violation.

9. The SO MVLLE-BALFSTNT 69 kV line (from bus 228228 to bus 228215 ckt 1) loads from 94.99% to 108.47% (DC power flow) of its emergency rating (72 MVA) for the single line contingency ('LAUR-FAIR'). This project contributes approximately 11.55 MW to cause the thermal violation.

10. The V4-036TAP1-US SLC T 69 kV line (from bus 900350 to bus 228222 ckt 1) loads from 133.17% to 166.5% (DC power flow) of its emergency rating (60 MVA) for the single line contingency ('USLC-SM_V4-036B_WITH_W1-085B'). This project contributes approximately 20 MW to cause the thermal violation.

11. The FAIRTON-LAUREL#2 69 kV line (from bus 228214 to bus 228259 ckt 1) loads from 127.44% to 145.76% (DC power flow) of its emergency rating (93 MVA) for the single line contingency ('USLC-SM_V4-036B_WITH_W1-085B'). This project contributes approximately 20 MW to cause the thermal violation.

12. The CRLS CR2-SHRMAN#2 69 kV line (from bus 228252 to bus 228226 ckt 1) loads from 151.55% to 167.69% (DC power flow) of its emergency rating (56 MVA) for the single line contingency ('USLC-SM_V4-036B_WITH_W1-085B'). This project contributes approximately 9.04 MW to cause the thermal violation.

13. The W1-085TAP1-SO MVLLE 69 kV line (from bus 901640 to bus 228228 ckt 1) loads from 117.06% to 140.28% (DC power flow) of its normal rating (65.7 MVA) for non-contingency condition. This project contributes approximately 15.25 MW to cause the thermal violation.

14. The US SLC T-NEWPORT 69 kV line (from bus 228222 to bus 228219 ckt 1) loads from 127.78% to 164.15% (DC power flow) of its emergency rating (55 MVA) for the single line contingency ('USLC-SM_V4-036B_WITH_W1-085B'). This project contributes approximately 20 MW to cause the thermal violation.

15. The NEWPORT-FAIRTON 69 kV line (from bus 228219 to bus 228214 ckt 1) loads from 126.1% to 166.61% (DC power flow) of its emergency rating (48 MVA) for the single line

contingency ('USLC-SM_V4-036B_WITH_W1-085B'). This project contributes approximately 20 MW to cause the thermal violation.