

Generation Interconnection Feasibility Study Report W3-109

The Interconnection Customer (IC) has proposed a 0.625 MWE (0.24 MWC) solar powered generating facility consisting of roof top mounted fixed panel solar photovoltaic arrays. The project is to be located in Bridgeton, Cumberland County, New Jersey. PJM studied W3-109 as a 0.625 MW injection into the Atlantic City Electric (ACE) system at the Carlls Corner 69/12kV substation. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2014. The requested in-service date is December 31, 2011.

Point of Interconnection

W3-109 will interconnect to the Atlantic City Electric system as follows:

0.6 MWs of generation will connect to the existing T3 terminal at the Carlls Corner 69/12kV substation; the remainder of the W3-109 project (.025MWs) will be required to construct a new 69/12kV substation adjacent to the Laurel-Carlls Corner 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. Establish one (1) new 12 kV feeder with PAC overhead conductor from the Carlls Corner Substation to the generating site – approximately 1.1 miles
2. Design and construct a new 69/12 kV substation at the PV site. This substation will be built to the Company's (the "Company" referring to ACE, DPL, or PEPCO) specifications for a distribution substation and be owned and operated by the Company. *Note: There are no plans to serve any load from this substation, however it will be built so that it can serve load in the future. The developer shall supply adequate land for the installation of the substation. The land shall be in close proximity to roads and be on buildable high land.*
3. Create a transmission loop by cutting into the Laurel – Carlls Corner 69 kV line with an approximate total distance of 1.4 miles to the new substation.
4. Establish one new 12 kV feeder with PAC overhead conductor from the new substation to the PV site.
5. A utility operated recloser equipped with the proper relaying and communications will be required for each feeder serving the PV generator.
6. Utility grade primary metering will be required for each feeder.
7. Generation telemetry will be provided to the control center.
8. Perform a detailed time based study.
9. Protection, Planning, and other engineering departments will perform studies, design work, and prepare engineering estimates.
10. Transfer trip may be required.

The estimated cost to perform this work is as follows:

Estimated Costs			
Carlls Corner Substation T3			
New/Replacement Transformer			
PAC Express Feeder	1.1	Miles	\$440,000
Fiber Installation		Miles	\$55,000
New Feeder Terminal			\$505,000
Recloser w/ Relaying and Communications			\$50,000
Utility Grade Metering			\$20,000
SCADA Integration into EMS			\$10,000
Subtotal Cost			\$1,080,000
Subtotal Cost with 18% Overheads			\$1,274,400
Approximate Total Cost with 15% Contingency			\$1,465,560

Estimated Costs			
New Substation			
New Substation			\$4,404,000
PAC Express Feeder	0.1	Miles	\$40,000
Transmission Feed 69 kV	1.4	Miles	\$910,000
Transmission Feed 138 kV	0	Miles	\$0
Fiber Installation (5 miles of fiber assumed)			\$250,000
Recloser w/ Relaying and Communications	1		\$50,000
Utility Grade Metering	1		\$20,000
SCADA Integration into EMS	1		\$10,000
Detailed Time Based Study			\$30,000
Various Departments Work			\$20,000
Subtotal Cost			\$5,734,000
Subtotal Cost with 18% Overheads			\$6,766,120
Approximate Total Cost with 15% Contingency			\$7,781,038

The estimated time to complete this work is **12–18 months** for the express feeder work and **24-36 months** to construct the new substation 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.

Special Operating Requirements

1. The Interconnection Customer will grant its permission to PJM for PJM to send to ACE all telemetry that the Interconnection Customer sends to PJM.
2. 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.

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer (IC) assumes full responsibility for design and construction of all facilities associated with the W3-109 generating station. 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 Atlantic City Electric's Applicable Standards.

Inverter Requirements and Capabilities

The Interconnection Customer's inverter should have the following capabilities:

1. Voltage flicker reduction through set non-unity power factor settings between 0.95 lead and 0.95 lag.

It is the responsibility of the developer to obtain inverters that can operate with these requirements while also meeting all applicable requirements of IEEE and UL standards such as but not limited to IEEE 1547 and UL 1741.

The inverter shall operate in accordance with the IEEE 1547 series of standards that have been approved. While inverters should be capable of voltage stabilization thru dynamic VAR response and capable of low voltage and system disturbance ride through, neither of these capabilities shall be implemented until such time that the IEEE 1547 series of standards are revised and approved to include standards for these capabilities. At such time as these revised standards become available, the PV owner/operator shall cooperate with the Company (the 'Company' referring to ACE, DPL, or PEPCO) to implement these capabilities with settings acceptable to the Company. Until such time, the inverters shall operate with a fixed power factor schedule as supplied by the Company.

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

Stability Analysis

Not required due to project size.

Dynamic Analysis

A time-based dynamic study will commence during the System Impact Study phase of W3-109. Once complete, the results of the study will be reviewed and the proposed project will be evaluated for protection and coordination issues. Other required upgrades may be identified at that time.

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)

None

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