Generation Interconnection
Feasibility Study Report
W4-027

The Interconnection Customer (IC) has proposed a 10 MWE (3.8 MWC) solar powered generating facility consisting of ground mounted fixed panel solar arrays to be located in Vineland, New Jersey. PJM studied W4-027 as a 10 MW injection into the Atlantic City Electric (ACE) system at the Minotola 69/12kV substation and evaluated the project for compliance with reliability criteria for summer peak conditions in 2014. The planned in-service date, as stated in the Attachment N, is June 30, 2011.

Point(s) of Interconnection

W4-027 will interconnect with the Atlantic City Electric system as follows:

7.9 MWs will connect to the existing T2 transformer at the Minotola 69/12kV substation; 2.1 MWs will connect to a new 3 breaker ring bus substation to be constructed adjacent to the Landis-Minotola 138kV 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 Minotola Substation to the generating facility – approximately 1.5 miles
2. Design and construct a new 138/12 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 Landis – Minotola 138 kV line with an approximate total distance of 0.8 miles to the new substation.
4. Establish one new 12 kV feeder with PAC overhead conductor from the new substation to the generating facility.
5. A utility operated recloser will be required on the customer tap that will have proper relaying and communication.
6. Utility grade primary metering will be required.
7. Generation telemetry and remote trip capabilities 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:

Estimated Costs			
Minotola Substation T2			
New/Replacement Transformer			
PAC Express Feeder		Miles	$600,000
Fiber Installation	1.5	Miles	$75,000
New Feeder Terminal			$444,000
Recloser w/ Relaying and Communications			$50,000
Utility Grade Metering			$20,000
SCADA Integration into EMS			$10,000
Detailed Time Based Study			$30,000
Various Departments Work			$20,000
Subtotal Cost			$1,249,000
Subtotal Cost with 18% Overheads			$1,473,820
Approximate Total Cost with 15% Contingency			$1,694,893

Estimated Costs			
New Substation			
New Substation			$5,314,000
PAC Express Feeder	0.1	Miles	$40,000
Transmission Feed 69 kV	0	Miles	$0
Transmission Feed 138 kV	0.8	Miles	$640,000
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			$6,374,000
Subtotal Cost with 18% Overheads			$7,521,320
Approximate Total Cost with 15% Contingency			$8,649,518

The total approximate cost for both feeders is **$10,344,411**.

The estimated time to complete this work is **12 - 18 months** for the express feeder to the Minotola substation and **24 - 36 months** for 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. ACE 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 ACE.
2. The Interconnection Customer will grant its permission to PJM for PJM to send ACE all telemetry that the Interconnection Customer sends to PJM.
3. The Interconnection Customer will be required to make provisions for a voice quality phone line within approximately 3 feet of each ACE 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 W4-027 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 dynamic VAR response
2. Ramp rate control
3. SCADA communications
4. Curtailment or other mitigation ability if high voltage were to occur
5. Low voltage and system disturbance ride through
6. Ability to receive and respond to a transfer trip or SCADA signal

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 ACE to implement these capabilities with settings acceptable to Pepco Holdings, Inc. (ACE, DPL, and Pepco). Until such time, the inverters shall operate with a fixed power factor schedule as supplied by PHI.

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 the project. 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