Generation Interconnection
Feasibility Study Report
Queue Position Y1-065

The Interconnection Customer (IC) has proposed a 852 MWE (805 MWC, 852 MW MFO) natural gas fueled 2x1 combined cycle generating facility upgrade to their existing generating facility located in Rock Springs, Maryland. PJM studied Y1-065 as an 852 MW injection into the NAEA Rock Springs 500kV substation and evaluated it for compliance with reliability criteria for summer peak conditions in 2015. The proposed in-service date, as requested during the project kick-off call, is May 01, 2017.

Point of Interconnection

Y1-065 will interconnect with the NAEA (Essential Power) transmission system at the Rock Springs 500kV substation via a new bus position.

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:

Attachment Facilities:

The following work is required in the Rock Springs 500kV substation:

- relocate one H-frame structure and re-position another H-frame structure and the future generator disconnect
- upgrade bus differential protection relays.

The estimated cost to perform this work is **$870,000** and will take **12 months** to complete.

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer (IC) is responsible for all design and construction related activities 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. Route selection, line design, and right-of-way acquisition of the direct connect facilities is not included in this report, and is the responsibility of the IC. The Interconnection Customer will be responsible for contributing to future O & M costs associated with the direct connect facilities.

Protective relaying and metering design and installation must comply with PHI's applicable standards. The IC is also required to provide revenue metering and real-time telemetering data to PJM in conformance with the requirements contained in PJM Manuals M-01 and M-14 and the PJM Tariff.

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)*

1. The PEACHBTM-CNASTONE 500 kV line (from bus 200013 to bus 200004 ckt 1) loads from 89.51% to 105.78% (DC power flow) of its emergency rating (2815 MVA) for the single line contingency ('PJM39_X4-030B'). This project contributes approximately 457.8 MW to the thermal violation.

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)

1. The ROCKSPGS-KEENEY 500 kV line (from bus 200051 to bus 200010 ckt 1) loads from 110.62% to 116.21% (DC power flow) of its emergency rating (3014 MVA) for the single line contingency ('PJM40'). This project contributes approximately 181.62 MW to the thermal violation.

2. The PEACHBTM-LIMERICK 500 kV line (from bus 200013 to bus 200024 ckt 1) loads from 125.11% to 130.28% (DC power flow) of its emergency rating (2598 MVA) for the single line contingency ('PJM27'). This project contributes approximately 134.32 MW to the thermal violation.

Short Circuit

The following breakers were identified as being newly overduty as a result of the Y1-065 generation addition:

BUS_NO	BUS	BREAKER	Rating Type	Duty Percent With Y1-065_BGE_25	Duty Percent Without Y1-065_BGE_25	Duty Percent Difference	Note
4	CNASTONE 500.kV	A" 2-500"	T	100.30%	99.10%	1.20%	New Overduty
4	CNASTONE 500.kV	C" 5012/3-5"	T	100.30%	99.10%	1.20%	New Overduty
4	CNASTONE 500.kV	H" 5011/2-5"	T	100.30%	99.10%	1.20%	New Overduty
4	CNASTONE 500.kV	K" 500-2 TR"	T	100.30%	99.10%	1.20%	New Overduty

4	CNASTONE 500.kV	M" 5013/3-5"	T	100.30%	99.10%	1.20%	New Overduty
4	CNASTONE 500.kV	N" BREAKER"	T	100.30%	99.10%	1.20%	New Overduty

To mitigate the six overloaded breakers at Conastone will require replacement with ones rated at 63kA. The estimated cost to perform this work is **$9,906,336** and will take **24-36 months** to complete.

Stability Analysis

The Stability Analysis will commence during the System Impact 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)

1. To mitigate the (PECO & BGE) PEACHBTM-CNASTONE 500 kV line (from bus 200013 to bus 200004 ckt 1) overload will require the following:

   BGE portion
   Rebuild bay with breakers A B C to 4000 A for a new rating of 2939/3733. The estimated cost to rebuild the bay is **$6,600,000** and will take **24-36 months** to complete. PJM network upgrade number (n2138).

   PECO portion
   Replace the existing Peach Bottom - Conastone 500kV Line (5012) terminal equipment at Peach Bottom substation to match the conductor summer normal and emergency rating of 2920 / 3707 MVA. The estimated cost to perform this work is **$5,000,000** and will take **36 months** to complete. PJM network upgrade number (n2139).

Contribution to Previously Identified System Reinforcements

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

1. To mitigate the (NAEA&PECO) ROCKSPGS-KEENEY 500 kV line (from bus 200051 to bus 200010 ckt 1) overload will require the following:

   Kenney Substation (PECO)
   Replace line traps and 500kV circuit breakers on the 5014 and 5025 lines. The estimated cost to perform this work is **$2,160,000** and will take **24 months** to complete.

   Rock Springs Substation (NAEA)

Replace the 5025 line disconnects as well as the 52-4 and 52-5 breaker disconnects with ones rated at 4000A. The estimated cost to perform this work is **$1,370,000** and will take **12 months** to complete.

2. To mitigate the (PECO) PEACHBTM-LIMERICK 500 kV line (from bus 200013 to bus 200024 ckt 1) overload will require replacing terminal equipment at the Limerick and Peach Bottom substations. The estimated cost to perform this work is **$7,250,000** and will take **24 months** to complete.