

***Generation Interconnection
Facilities Study Report***

for

***PJM Generation Interconnection Request
X2-067***

“Cartanza 230 kV”

December 2014

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A. Transmission Owner Facilities Study Summary

1. Description of Project

Garrison Energy Center, LLC, the Interconnection Customer (IC), has proposed a 309 MWE (309 MWC, 309 MW MFO) natural gas fueled 1x1 combined cycle generating facility. The project is to be located in the Garrison Oak Technical Park in Dover, Delaware utilizing the same site as the IC's previous queue project W3-032A. The combined generating facility will consist of two (2) trains of one combustion turbine and one steam turbine (1x1 twice). PJM studied X2-067 as a 309 MW injection into the Delmarva Power and Light (DPL) system at the Cartanza 230 kV substation. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2015. The proposed in-service date, as stated in Attachment N, is June 01, 2016.

2. Amendments to the System Impact Study or System Impact Study Results

The scope of the project as stated in the Impact Study Report, dated January 2013, remains relatively unchanged. However, the estimates herein provided were performed in more detail than those provided in the Impact Study Report.

The DPL portion of the project is projected to be completed approximately 60-72 months following an executed Interconnection Service Agreement (ISA) and Interconnection Construction Service Agreement (CSA). The date estimates assume a normal land use and environmental permitting and approval process.

3. Interconnection Customer's Milestone Schedule

The planned in-service date, as stated in Attachment N is June 1, 2016. The in-service date will need to be changed to reflect the estimated construction completion time of 60-72 months after receipt of a fully executed Interconnection Service Agreement (ISA) and Interconnection Construction Service Agreement (CSA).

4. Customer's Scope of Work

The IC proposes the construction of one natural gas fueled combined cycle facility arranged in a one combustion turbine one steam turbine configuration having a maximum generation capacity of 309 MWE.

The IC assumes full responsibility for design, permitting and construction of all facilities associated with the X2-067 generating station on their side of the Point of Interconnection (POI). X2-067 will interconnect to the Delmarva Power and Light transmission system at Cartanza 230 kV substation via the same POI as the previous W3-032A project.

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. Information detailing the interconnection to DPL facilities is outlined in the “Technical Considerations Covering Parallel Operations of Customer Owned Generation of One (1) Megawatt or Greater and Interconnected with the PHI Power Delivery System.” The costs outlined in this study do not include construction of the 230 kV equipment from the generating facility to the tap structure.

The IC is responsible for obtaining all rights necessary for their facilities, up to and including any usage of property in which Pepco Holdings, Inc. may have real property interests. As part of this process, the IC shall provide, for PHI review, surveyed site plans that delineate their intended facilities, and clearly define the facilities relationship to existing rights of way and the electrical facilities contained therein. PHI will provide the IC with the appropriate legal instrument affording the IC the right to use PHI real property, if necessary, upon review, subsequent approval, and associated compensation.

DPL will require the capability to remotely disconnect the generator from the grid by communication from its System Operations facility. Such disconnection may be facilitated by a generator breaker, a line recloser, or other method depending upon the specific circumstances and the evaluation of PHI. The IC is responsible for construction of single mode fiber optic cable from the generating site to the POI.

5. Description of Facilities Included in the Facilities Study (DPL's Scope of Work)

It is assumed that the X2-067 project will utilize the Attachment Facilities and Point of Interconnection created by Interconnection Customer's prior queue project W3-032A. Therefore, no additional work will be required by the Transmission Owner. If the customer desires a second, separate metering point, DPL metering personnel will be involved as discussed in section B.5.

DPL reserves the right to review the electrical protection design and relay settings for interconnecting customer facilities to ensure that the protective relaying equipment will be compatible with that installed at the remote substations. DPL personnel must be present at the time of commissioning to witness proper function of the protection scheme and related coordination.

The project includes network upgrade work that will be completed by the Transmission Owner. The work associated with the network upgrades is listed below.

Non-Direct Connection Network Upgrade Number n3568

This network upgrade was initially caused by PJM queue project X2-066. Because X2-067 also requires this upgrade it will have cost responsibility. See Section 7 for cost allocation.

- Reconductor Claymont to Linwood (DPL tap) 230 kV circuit with some structure replacements. (Transmission)
- Upgrade disconnect switches on line 22084 at Claymont substation. (Substation)

Non-Direct Connection Network Upgrade Number n3569 (Substation)

This network upgrade was initially caused by PJM queue project X2-066. Because X2-067 also requires this upgrade it will have cost responsibility. See Section 7 for cost allocation.

- Upgrade 2-954 ACSR strand bus to 2-1590 ACSR stranded bus at Mickleton substation.

Non-Direct Connection Network Upgrade Number n3570 (Transmission)

This network upgrade was initially caused by PJM queue project X2-066. Because X2-067 also requires this upgrade it will have cost responsibility. See Section 7 for cost allocation.

- Reconductor Edgemoor to Linwood (DPL tap) 230kV circuit with some structure replacements.

Non-Direct Connection Network Upgrade Number n3571

This network upgrade was initially caused by PJM queue project X2-066. Because X2-067 also requires this upgrade it will have cost responsibility. See Section 7 for cost allocation.

- Reconductor Edgemoor to Claymont 230kV circuit with some structure replacements. (Transmission)
- Upgrade disconnect switches on line 23015 at Claymont substation. (Substation)

6. Total Cost of Transmission Owner Facilities Included in the Facilities Study

Note: the costs below represent the total amount for the network upgrade, not the X2-067 portion. See Section 7 below for X2-067 cost allocation.

<i>Item</i>	<i>Total Cost</i>
Attachment Facilities	\$11,000 if second meter position required
Attachment Facilities with Contingency 15%	\$12,650
Network Upgrades	\$19,442,333
Network Upgrades with 15% Contingency	\$22,358,683

7. Summary of the Schedule for Completion of Work for the Facilities Study

The overall estimated timeline for this project, including upgrades, is approximately 60-72 months from the date the ISA and CSA are fully executed by the parties. This timeline may be able to be improved with preferred system outages. Since the IC will be performing the land use and environmental permitting for the generator and substation site, the timeline may also be able to be improved with favorable permitting timelines.

<i>Attachment Facility</i>	<i>Timeframe</i>
Substation Design, Procurement and Construction	36-42 months
Transmission Engineering, Procurement and Construction	60-72 months
Environmental Permitting	48-64 months
Outside Plant Comm. Design, Procurement and Construction	60-72 months
Metering	6 months
Real Estate	36 months

B. Transmission Owner Facilities Study Results

This section describes facilities identified to be installed (attachment facilities), replaced, and/or upgraded (upgrade facilities) by DPL to accommodate the project. During detailed design and analysis other components may be identified for installation or replacement due to this interconnection.

1. Transmission Lines – New

No new transmission lines are required.

2. Transmission Line – Upgrades

PJM Upgrade Number n3568

The re-conductor of the Claymont to Linwood (DPL tap) 230kV-22084 circuit includes the following work:

- Replace 0.35 miles of single 1590 ACSR conductor with a bundled (2) 1590 ACSR conductors or an equivalent.
- Replace 0.35 miles of the existing static with 0.638” OPGW or an equivalent optical ground wire.
- Any pole replacements for this circuit will be included under Upgrade N3570 (Edgemoor to Linwood) given that these lines are physically co-located on the same structures.

PJM Upgrade Number n3570

The re-conductor of the Edgemoor to Linwood (DPL tap) 230 kV-22085 circuit includes the following work:

- Replace 8.11 miles of single 1590 ACSR conductor with a bundled (2) 1590 ACSR conductors or an equivalent.
- Replace 8.11 miles of the existing static with 0.638” OPGW or an equivalent optical ground wire.
- Replace approximately 19 structures (this line is co-located with the Edgemoor to Claymont 230kV; the estimate for Upgrade N3571 includes the replacement of the structures in this line except for the stretch between Claymont and Linwood).

PJM Upgrade Number n3571

The re-conductor of the Edgemoor to Claymont 230 kV-23015 circuit includes the following work:

- Replace 7.1 miles of single 1590 ACSR conductor with a bundled (2) 1590 ACSR conductors or an equivalent.
- Replace 7.1 miles of the existing static with 0.638” OPGW or an equivalent optical ground wire.
- Replace approximately 123 structures (exact quantity to be determined upon the completion of a detailed structural analysis; the total structures count is 123).

3. Substation/Switchyard Facilities (Attachment Facilities)

It is assumed that all required substation work was performed by the W3-032A project.

4. Upgrades to Substation/Switchyard Facilities

PJM Network Upgrade Number n3568

The upgrade of the disconnect switch at Claymont substation will include the following work:

- Replace/upgrade five (5) disconnect switches to 2000 amps capacity at Claymont substation. The switches identifications are: 22084-L1 (G1), 232-D1, 232-D2, 233-D1, and 233-D2.

PJM Network Upgrade Number n3569

The upgrade of the 2-954 ACSR strand bus to 2-1590 ACSR stranded bus at Mickleton substation will include the following work:

- Upgrade of the existing 2-954 AL 230 kV transmission line down conductors connections at the DELCOTAP 230 kV line terminal position.
- Upgrade of the existing 2-954 AL metering and instrument transformer connections at the DELCOTAP 230 kV line terminal position.
- Upgrade of the existing 2-954 AL strain bus down conductors and Bus 1 connections.

The identified 230 kV connections will require upgrading to 2-1590 AL to alleviate the overloads.

PJM Network Upgrade Number n3571

The upgrade of the disconnect switch at Claymont substation will include the following work:

- Replace/upgrade five (5) disconnect switches to 2000 amps capacity at Claymont substation. The switches identifications are: 23015-L2 (G2), 231-D1, 231-D2, 235-D1, and 235-D2.

5. Metering & Communications

Metering

Since the X2-067 project will utilize the Attachment Facilities and Point of Interconnection created by Interconnection Customer's prior queue project W3-032A (including the metering point and settings). Therefore, no additional work will be required by the Transmission Owner-Metering Department.

The option does exist for the customer to request a second metering point behind the POI. If the customer requests this second, separate metering point, the following will apply and the cost will be \$11,000.

The metering instrument transformers will be specified by DPL but all equipment and labor will be supplied by the IC. The DPL scope would include the programming and installation of the meters, both primary and backup, and all required wiring work needed to connect the secondary wiring conductors at the metering enclosure. The materials that the Meter Department provides

would be the meter enclosures, control cable, the meters, the output devices, and miscellaneous material at the cabinet.

The IC will purchase and install all metering instrument transformers as well as construct a metering structure per DPL's specifications. The secondary wiring connections at the instrument transformers will be completed by the interconnection customer's contractors and inspected by DPL, while the secondary wiring work at the metering enclosure will be completed by DPL's Meter technicians. The metering control cable and meter cabinets will be supplied by DPL and installed by the interconnection customer's contractors. DPL's meter technicians will program and install two solid state multi-function meters (Primary & Backup) for the new metering position. Each meter will be equipped with load profile, telemetry, and DNP outputs. The IC will be provided with one meter DNP output.

The IC 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.

Telemetry

It is the Interconnection Customer's responsibility to send the data that PJM and the Company requires directly to PJM. The Interconnection Customer will grant permission for PJM to send the Company the following telemetry that the Interconnection Customer sends to PJM: real time MW, MVAR, volts, amperes, generator status, and interval MWH and MVARH.

6. Environmental, Real Estate and Permitting Issues

Environmental

This estimate assumes that the IC will procure all necessary permits for their facilities on their side of the POI. DPL will secure the necessary permits for all Network Upgrade Projects.

DPL's Environmental Planning Department has reviewed the available public sector data for all of the upgrade project areas and the work involved in permitting the projects is as follows:

PJM Network Upgrade Numbers n3568, n3570, and n3571

Edgemoor to Claymont to Linwood 230kV Transmission Line Reconductor

· All wetlands would need to be field surveyed. This portion of the project is proposed to be reconducted and about half of the structures replaced, so permanent fill/impacts may occur in wetlands, which would require a USACE Nationwide permit (dependent on amount of fill) and a DNREC (Tidal) Wetlands permit (if tidal wetlands are filled). Regardless of impacts, wetland delineation and mapping should be developed for constructability and access planning.

· All stream crossings would need to be field surveyed. These areas would need to be reviewed by DNREC Wetlands and Subaqueous Lands Section (WSLS) to determine whether or not they are jurisdictional (defined bed/bank, supports aquatic vegetation, etc.). If they are determined to be

within the jurisdiction of the WSLS, a Subaqueous Lands permit would be required in order to temporarily install matting in or over the subaqueous lands for construction access (i.e. streams).

- Soil Disturbance: It is highly likely that a sediment and soil erosion control plan would be required from the City of Wilmington for soil disturbance because half of the structures along this portion of the project are planned to be replaced. A storm water permit for construction may also be necessary.

- Rare, Threatened and Endangered (RTE) Species: Dependent on agency consultation.

- Cultural Resources: Formal agency consultation should occur in regards to cultural resources.

Resource Studies (preliminary list):

- Delineation of the wetland and waters of the U.S.
- Habitat Suitability Assessment (based on agency consultation)
- Potential Targeted RTE Species Surveys (based on agency consultation)
- Visual Architectural Assessment
- NEPA review (potential – dependent on funding source/Federal stakeholders, etc.)

Summary of Potential Permits/Approvals:

Based on the information reviewed, the following is a list of environmental permits that may be required for the project:

- USACE Nationwide Permit or Individual Permit
- DNREC Subaqueous Lands Permit
- DNREC Wetlands Permit – fill in tidal wetlands unlikely.
- Kent County Sediment and Soil Erosion Plan.
- Kent County Storm water Permits for Construction.
- NEPA - potential)

Real Estate

DPL will research the existing property rights for the existing transmission circuits ROW and the specific pole locations and obtain any required road crossing permits and associated work.

The IC is to provide easements into the facility for DPL facilities at no expense to DPL prior to construction.

7. Summary of Results of Study

<i>Project Name: X2-067 Cartanza 230kV</i>	<i>Indirect</i>		<i>Direct</i>		TOTAL (\$)
Non-Direct Connection Network Upgrade n3568 - Reconductor the Claymont to Linwood & Upgrade Line 22084 disconnect switches at Claymont	Material	Labor	Material	Labor	
System Planning		14		200	214
Project Management & Special Billing		140		2,000	2,140
Outside Plant Communications	560	2100	8,000	30,000	40,660
System Protection		56		800	856
Interconnection Arrangements		14		200	214
System Operations		56		800	856
Real Estate		105		1,500	1,605
Environmental Permitting		350		5,000	5,350
Transmission Engineering & Construction	15,955	28,382	75,977	405,459	525,773
Substation Engineering & Construction	18,000	12,000	170,000	284,500	484,500
TOTAL COST	34,515	43,217	253,977	730,459	1,062,168
15% Contingency	5,177	6,483	38,097	109,569	159,325
GRAND TOTAL	39,692	49,700	292,073	840,028	1,221,494
X2-067 Allocation (48.99%)					520,356

<i>Project Name: X2-067 Cartanza 230kV</i>	<i>Indirect</i>		<i>Direct</i>		TOTAL (\$)
Non-Direct Connection Network Upgrade n3569 - Upgrade the 2-954 ACSR strand bus to 2-1590 ACSR bus at Mickleton	Material	Labor	Material	Labor	
System Planning		14		200	214
Project Management & Special Billing		140		2,000	2,140
System Protection		56		800	856
Interconnection Arrangements		7		100	107
System Operations		42		600	642
Environmental Permitting		14		200	214
Substation Engineering & Construction	2100	8330	30,000	119,000	159,430
TOTAL COST	2,100	8,603	30,000	122,900	163,603
15% Contingency	315	1,290	4,500	18,435	24,540
GRAND TOTAL	2,415	9,893	34,500	141,335	188,143
X2-067 Allocation (48.72%)					79,707

<i>Project Name: X2-067 Cartanza 230kV</i>	<i>Indirect</i>		<i>Direct</i>		<i>TOTAL (\$)</i>
Non-Direct Connection Network Upgrade n3570 - Reconductor the Edgemoor to Linwood (DPL/PECO Tap) 230kV	Material	Labor	Material	Labor	
System Planning		14		200	214
Project Management & Special Billing		1050		15,000	16,050
Outside Plant Communications	560	2100	8,000	30,000	40,660
System Protection		56		800	856
Interconnection Arrangements		14		200	214
System Operations		105		1,500	1,605
Real Estate		560		8,000	8,560
Environmental Permitting		4690		67,000	71,690
Transmission Engineering & Construction	278,517	350,946	1,710,797	5,013,511	7,353,771
Substation Engineering & Construction				500	500
TOTAL COST	279,077	359,535	1,718,797	5,136,711	7,494,120
15% Contingency	41,862	53,930	257,820	770,507	1,124,118
GRAND TOTAL	320,939	413,465	1,976,617	5,907,218	8,618,238
X2-067 Allocation (58.42%)					4,378,064

<i>Project Name: X2-067 Cartanza 230kV</i>	<i>Indirect</i>		<i>Direct</i>		<i>TOTAL (\$)</i>
Non-Direct Connection Network Upgrade n3571 - Reconductor the Edgemoor to Claymont & Upgrade Line 23015 disconnect switches at Claymont	Material	Labor	Material	Labor	
System Planning		14		200	214
Project Management & Special Billing		1050		15,000	16,050
Outside Plant Communications	560	2100	8,000	30,000	40,660
System Protection		56		800	856
Interconnection Arrangements		14		200	214
System Operations		105		1,500	1,605
Real Estate		560		8,000	8,560
Environmental Permitting		4690		67,000	71,690
Transmission Engineering & Construction	284,744	376,152	4,067,770	5,373,599	10,102,266
Substation Engineering & Construction	18,000	12,000	170,000	284,500	484,500
TOTAL COST	303,304	396,741	4,245,770	5,780,799	10,726,615
15% Contingency	45,496	59,511	636,866	867,120	1,608,992
GRAND TOTAL	348,800	456,252	4,882,636	6,647,919	12,335,607
X2-067 Allocation (48.99%)					5,254,968

Generation projects meeting IRS "Safe Harbor" provisions generally do not incur "CIAC"(Contribution in Aid to Construction), a tax collected by the utility for the state or federal government. DPL does not expect to collect CIAC for this project. If for any reason, "CIAC" would be required for this project, it would be the responsibility of the party owning the generator to pay this cost.

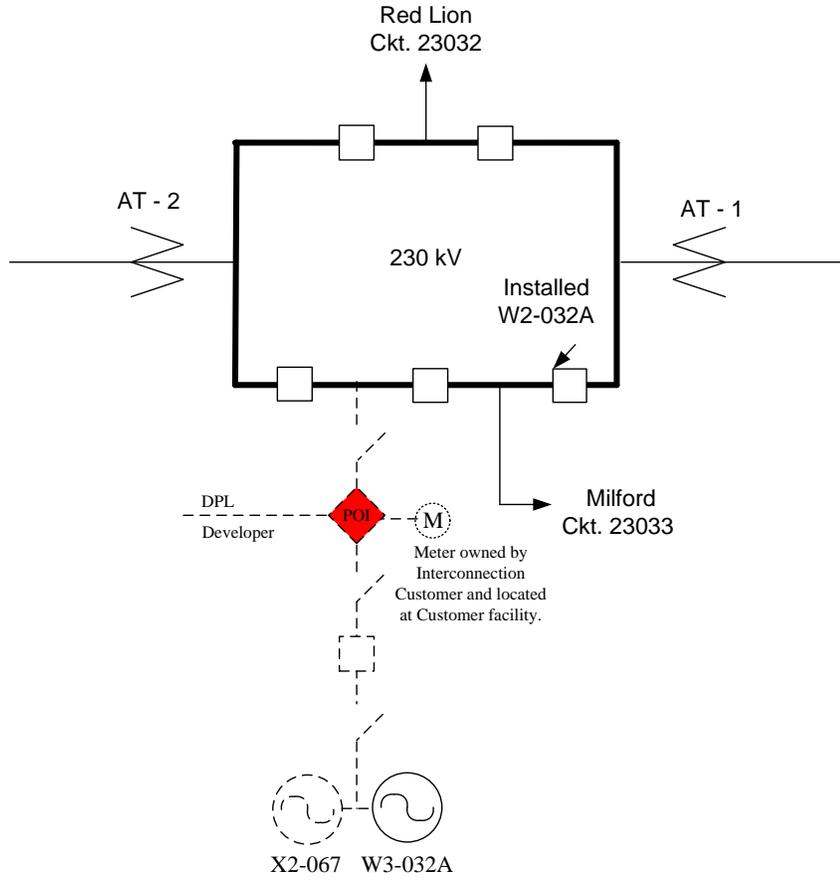
DPL reserves the right to charge the Interconnection Customer operation and maintenance expenses to maintain the IC's attachment facilities, including metering facilities, owned by DPL.

8. Schedules and Assumptions

The DPL schedule is based on a 60-72 months lead-time from start of engineering to in-service date, including the assumption that it would not be impacted by storm damage and restoration, time of year limitations, permitting issues, outage scheduling, system emergencies, and contractor and equipment availability.

It is important to note that this project will be incorporated into the existing project work load at DPL at the time of contract execution. If the workload of existing projects is extensive, resource constraints may cause this project to be delayed beyond the projected in-service date.

Cartanza 230kV



 Point of Interconnection

X2-067/W3-032A