Generation Interconnection

Feasibility Study Report

for

Queue Project AF1-258

ROCKAWALKIN 69 KV

3.2 MW Capacity / 0 MW Energy

January, 2020

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1 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a $10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

2 General

The Interconnection Customer (IC), has proposed an uprate to an existing Solar generating facility located in Wicomico County, MD. This projects requests an increase of 3.2 MW of Capacity. The installed facilities will have a total capability of 15 MW with 8.9 MW of this output being recognized by PJM as Capacity.

Queue Number	**AF1-258**
Project Name	ROCKAWALKIN 69 KV
State	Maryland
County	Wicomico
Transmission Owner	DPL
MFO	15
MWE	0
MWC	3.2
Fuel	Solar
Basecase Study Year	2023

2.1 Point of Interconnection

AF1-258 will interconnect with the DPL transmission system as an uprate to an existing facility at the Choptank Electric Cooperative's (CEC) Rockawalkin 69kV substation.

2.2 Cost Summary

The AF1-258 project will be responsible for the following costs associated with the physical interconnection of the project:

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrade	$0
Non Direct Connection Network Upgrades	$0
Total Costs	$0

In addition, the AF1-258 project may be responsible for a contribution to the following costs associated with network upgrades:

Description	Total Cost
System Upgrades	$0

3 Transmission Owner Scope of Work

There is no Delmarva Power & Light attachment facility or direct connection work scope. The Interconnection Customer is responsible for contacting the Choptank Electric Cooperative (CEC) directly for attachment facilities work scope and single line drawing.

4 Attachment Facilities

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

None.

5 Direct Connection Cost Estimate

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

None.

6 Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

None.

7 Schedule

The Interconnection Customer is responsible for contacting Choptank Electric Cooperative (CEC) directly for schedule to construct the physical interconnection for the AF1-258 project.

8 Interconnection Customer Requirements

The Interconnection Customer is responsible for contacting Choptank Electric Cooperative (CEC) for any additional Interconnection Customer requirements.

9 Revenue Metering and SCADA Requirements

9.1 PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

9.1.1 Meteorological Data Reporting Requirement

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

10 Network Impacts

The Queue Project AF1-258 was evaluated as a 3.2 MW (Capacity 3.2 MW) injection as an uprate to an existing facility at the Rockawalkin 69kV substation in the DPL area. Project AF1-258 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-258 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

11 Generation Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

12 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

13 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)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
4135371 0	23229 1	ROCKAWLK N	69. 0	DP&L	23227 1	NSALSBR Y	69. 0	DP& L	1	DPL_P1_2_CKT 6728	singl e	58.0	132.33	135.79	DC	2.01
4135371 1	23229 1	ROCKAWLK N	69. 0	DP&L	23227 1	NSALSBR Y	69. 0	DP& L	1	DPL_P1_3_LORE TO AT1&2	singl e	58.0	130.09	133.61	DC	2.04
4135371 5	23229 1	ROCKAWLK N	69. 0	DP&L	23227 1	NSALSBR Y	69. 0	DP& L	1	Base Case	singl e	58.0	105.33	109.0	DC	2.13

14 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any 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 Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
4135370 4	23229 1	ROCKAWLK N	69. 0	DP&L	23227 1	NSALSBR Y	69. 0	DP& L	1	DPL_P1_2_C KT 6728	operatio n	58.0	188.19	191.65	DC	2.01
4135370 9	23229 1	ROCKAWLK N	69. 0	DP&L	23227 1	NSALSBR Y	69. 0	DP& L	1	Base Case	operatio n	58.0	164.62	168.29	DC	2.13

15 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
41353715,41353710, 41353711	1	ROCKAWLKN 69.0 kV - NSALSBRY 69.0 kV Ckt 1	s0835[1] (8) : To mitigate the ROCKAWLKN to NSALSBRY 69 kV line (from bus 232291 to bus 232271 ckt 1) overloads will require DPL to complete supplemental project (s0835) in place to upgrade this entire circuit 6708 from Vienna to N Salisbury. The portion from Hebron to N Salisbury (which includes Rockawalkin N Salisbury Line#6775) is estimated to cost approximately $8.6M and is scheduled to be completed by 12/31/2020. Total cost of the entire project (Vienna to N Salisbury) is approximately $21.1M. Expected ISD is 12/31/2023. Project Type : CON Cost : $0 Time Estimate : 0.0 Months	$0
			TOTAL COST	$0

[1] Although there is no cost to the interconnection customer, AF1-258 is not deliverable until the s0835 upgrade is in service. For updates, please see the Project Status & Cost Allocation page at https://pjm.com/planning/project-construction.aspx.

16 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

16.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
41353710	232291	ROCKAWLKN	DP&L	232271	NSALSBRY	DP&L	1	DPL_P1_2_CKT 6728	single	58.0	132.33	135.79	DC	2.01

Bus #	Bus	MW Impact
232417	X3-008 C	0.1351
232426	Y1-080 FULL	0.0276
232428	Y3-058 C	0.4988
232919	VN10	0.2423
924831	AB2-136 C	3.6275
925151	AB2-172 C OP	2.4198
925261	AB2-180 C	8.7765
927031	AC1-190 C	4.5731
932161	AC2-023 C	13.9022
936691	AD2-088 C	0.9781
938651	AE1-087 C	2.0378
941971	AE2-209 C	5.0889
945931	AF1-258	2.0060
946041	AF1-269	1.6963
LGEE	LGEE	0.0034
CPLE	CPLE	0.0040
G-007A	G-007A	0.0048
VFT	VFT	0.0129
WEC	WEC	0.0019
CBM-W2	CBM-W2	0.0491
CBM-W1	CBM-W1	0.0751
TVA	TVA	0.0084
CBM-S2	CBM-S2	0.0347
CBM-S1	CBM-S1	0.0511
MEC	MEC	0.0095

17 Contingency Definitions

Contingency Name	Contingency Definition
DPL_P1_2_CKT 6728	CONTINGENCY 'DPL_P1_2_CKT 6728' OPEN LINE FROM BUS 232272 TO BUS 232274 CIRCUIT 1 /MOUNT HERMON - PINEY GROVE 69 DISCONNECT BUS 230912 / PINEY GROVE 69 CAP END
DPL_P1_3_LORETO AT1&2	CONTINGENCY 'DPL_P1_3_LORETO AT1&2' OPEN LINE FROM BUS 232127 TO BUS 232275 CIRCUIT 1 /LORETTO AT1 138/69 OPEN LINE FROM BUS 232127 TO BUS 232275 CIRCUIT 2 /LORETTO AT2 138/69 END
Base Case	

Short Circuit

18 Short Circuit

The following Breakers are overduty:

None.