Generation Interconnection
Feasibility Study Report
Queue Position AE2-112

The Interconnection Customer (IC) has proposed a 20.0 MW Energy (7.6 MW Capacity) upgrade to prior queue project AD2-076 a solar generating facility to be located at Latitude: 39.0445330, Longitude: -76.0085710 in Queen Anne's County, Maryland. PJM studied the AE2-112 project as an injection into the Delmarva Power & Light Company (DPL) transmission system at the Carville Substation (PSSE # 232105) and evaluated it for compliance with reliability criteria for summer peak conditions in 2022. The project was studied at a commercial probability of 53%. The planned in-service date, as requested by the IC, is November 30, 2021. This date may not be attainable due to required PJM studies (System Impact and Facilities) and the Transmission Owner's construction schedule.

Point of Interconnection

The Interconnection Customer requested a transmission level Point of Interconnection (POI) be evaluated for the AE2-112 project at the same POI as prior queue project AD2-076. As a result, the AE2-112 project will connect with the DPL transmission system at the Carville 138 kV Substation.

Transmission Owner Scope of Work

There is no additional Transmission Owner work scope beyond what was already identified in the AD2-076 report. In the event that the AD2-076 project does not move forward, the AE2-112 project will be responsible for those costs.

Required Relaying and Communications

As required by prior queue project AD2-076.

Metering

As required by prior queue project AD2-076.

Interconnection Customer Scope of Direct Connection Work

The IC is responsible for all design and construction related to 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. Protective relaying and metering design and installation must comply with DPL'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.

DPL Interconnection Customer Scope of Direct Connection Work Requirements:

- DPL requires that an IC circuit breaker is located within 500 feet of the DPL substation to facilitate the relay protection scheme between DPL and the IC at the Point of Interconnection (POI).

Special Operating Requirements

1. 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, or other method depending upon the specific circumstances and the evaluation by DPL.

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

Summer Peak Analysis - 2022

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, Fault with a Stuck 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)

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
1819011	232100	CHURCH	DP&L	232107	TOWNSEND	DP&L	1	DPL_P7_1_DBL_1NCB-A	tower	348.0	101.75	104.28	DC	8.82

Summer Peak Load Flow Analysis Reinforcements

System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

ID	Index	Facility	Upgrade Description	Cost

ID	Index	Facility	Upgrade Description	Cost
1819011	1	CHURCH 138.0 kV - TOWNSEND 138.0 kV Ckt 1	ds13833r0001 (39) : To mitigate the (DP&L) CHURCH to TOWNSEND 138 kV line (from bus 232100 to bus 232107 ckt 1) overload will require substation reinforcements at Church Substation. Project Type : FAC Cost : $500,000 Time Estimate : 24-36 Months	$500,000
			TOTAL COST	$500,000

Short Circuit

No issues identified.

Stability and Reactive Power Requirement

To be performed during later study phases as required.

Light Load Analysis - 2022

To be performed during later study phases (as required by PJM Manual 14B).

Delivery of Energy Portion of Interconnection Request
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. Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

None

Delmarva Power and Light Costs
Cost estimates will further be refined as a part of the Impact Study and Facilities Study for this project. The Interconnection Customer will be responsible for all costs incurred by DPL in connection with the AE2-112 project.

Flow Gate Details

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, 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.

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1819011	232100	CHURCH	DP&L	232107	TOWNSEND	DP&L	1	DPL_P7_1_DBL_1NCB-A	tower	348.0	101.75	104.28	DC	8.82

Bus #	Bus	MW Impact
232813	VAUGHN	0.08
232902	EASTMUNI	2.61
232907	VN8	4.17
232910	NRG_G1	1.29
232911	NRG_G2	1.29
232916	OH NUG5	0.68
232919	VN10	0.24
232922	MR3	10.61
232926	CRISFLD1	0.25
293670	O-025 C	0.15
901003	W1-003 C	0.38
901004	W1-003 E	0.91
901013	W1-004 C	0.38
901014	W1-004 E	0.91
901023	W1-005 C	0.38
901024	W1-005 E	0.91
901033	W1-006 C	0.38
901034	W1-006 E	0.91
907052	X1-032 E	0.81
910571	X3-008 C	0.23
910572	X3-008 E	3.07
910821	X3-066 C	0.12
910822	X3-066 E	1.58
913361	Y1-079 C	0.17
913362	Y1-079 E	2.3
913411	Y1-080 C	0.04
913412	Y1-080 E	0.49
915541	Y3-058 C	0.15
915542	Y3-058 E	1.94
917082	Z2-012 E	2.48
917432	Z2-076 E	0.38
917442	Z2-077 E	0.38
918831	AA1-102	0.93
919831	AA2-069	46.93
920321	AA2-130	0.05

Bus #	Bus	MW Impact
923921	AB2-032 C	6.29
923922	AB2-032 E	2.96
923951	AB2-036 C	12.67
923952	AB2-036 E	20.72
923961	AB2-037 C	19.91
923962	AB2-037 E	32.52
924191	AB2-063 C	3.22
924192	AB2-063 E	5.26
924681	AB2-120 C	7.58
924682	AB2-120 E	12.37
924781	AB2-130 C O1	6.47
924782	AB2-130 E O1	10.56
924801	AB2-133 C O1	11.61
924802	AB2-133 E O1	14.73
924821	AB2-135 C	12.37
924822	AB2-135 E	14.11
924831	AB2-136 C	5.89
924832	AB2-136 E	6.25
924971	AB2-153 C	3.52
924972	AB2-153 E	5.74
925151	AB2-172 C	4.7
925152	AB2-172 E	7.67
925261	AB2-180 C	2.93
925262	AB2-180 E	1.25
925271	AB2-185 C	5.2
925272	AB2-185 E	2.23
926911	AC1-177	0.82
927031	AC1-190 C	8.58
927032	AC1-190 E	3.68
927191	AC1-213 C	0.65
927192	AC1-213 E	0.43
930202	AB1-056 E O1	33.09
930881	AB1-137 C	0.77
930882	AB1-137 E	0.33
930921	AB1-141 C	6.24
930922	AB1-141 E	2.91
930931	AB1-142 C	6.24
930932	AB1-142 E	2.91
931111	AB1-162 C	2.69
931112	AB1-162 E	4.39
931261	AB1-176 C	1.44
931262	AB1-176 E	2.37
932161	AC2-023 C	5.63
932162	AC2-023 E	4.1
933641	AC2-186 C	3.69
933642	AC2-186 E	6.01
936611	AD2-076 C O1	8.21
936612	AD2-076 E O1	13.4
936691	AD2-088 C O1	3.61
936692	AD2-088 E O1	2.41
938251	AE1-038 C O1	0.87
938252	AE1-038 E O1	1.21

Bus #	Bus	MW Impact
938651	AE1-087 C	3.96
938652	AE1-087 E	0.99
938891	AE1-117 C O1	8.81
938892	AE1-117 E O1	23.49
938901	AE1-118 C O1	8.81
938902	AE1-118 E O1	23.51
939151	AE1-145 C1	2.39
939152	AE1-145 C2	1.6
939153	AE1-145 E	0.04
939361	AE1-167 C O1	1.2
939362	AE1-167 E O1	1.0
939621	AE1-192 C O1	9.39
939622	AE1-192 E O1	4.6
941021	AE2-093 C	5.93
941022	AE2-093 E	9.42
941181	AE2-112 C	3.35
941182	AE2-112 E	5.47
941971	AE2-209 C	7.65
941972	AE2-209 E	5.33
942441	AE2-257 C O1	6.04
942442	AE2-257 E O1	15.93
942701	AE2-286 C	1.83
942702	AE2-286 E	2.65
942821	AE2-301 C	0.82
942822	AE2-301 E	1.24
BLUEG	BLUEG	0.96
CALDERWOOD	CALDERWOOD	0.1
CANNELTON	CANNELTON	0.06
CARR	CARR	0.05
CATAWBA	CATAWBA	0.07
CHEOAH	CHEOAH	0.1
CHILHOWEE	CHILHOWEE	0.03
COFFEEN	COFFEEN	0.1
COTTONWOOD	COTTONWOOD	0.4
DUCKCREEK	DUCKCREEK	0.22
EDWARDS	EDWARDS	0.1
ELMERSMITH	ELMERSMITH	0.1
FARMERCITY	FARMERCITY	0.07
G-007	G-007	0.07
GIBSON	GIBSON	0.04
HAMLET	HAMLET	0.11
NEWTON	NEWTON	0.26
O-066	O-066	0.65
PRAIRIE	PRAIRIE	0.49
RENSSELAER	RENSSELAER	0.04
SANTEETLA	SANTEETLA	0.03
SMITHLAND	SMITHLAND	0.04
TATANKA	TATANKA	0.12
TILTON	TILTON	0.12
TRIMBLE	TRIMBLE	0.11
TVA	TVA	0.34
UNIONPOWER	UNIONPOWER	0.15

Contingency Name	Contingency Definition
DPL_P7_1_DBL_1NCB-A	CONTINGENCY 'DPL_P7_1_DBL_1NCB-A' /* #1 & #2 KEENEY-STEELE 230 OPEN LINE FROM BUS 231003 TO BUS 232000 CKT 1 OPEN LINE FROM BUS 231003 TO BUS 923960 CKT 2 END