Generation Interconnection
Feasibility Study Report
Queue Position Y3-110

The Interconnection Customer (IC) has proposed a 15.7 MW Maximum Facility Output (MFO); 15.7 MW Capacity biomass fueled generating facility consisting of a steam boiler and turbine to be located in Salisbury, Maryland. PJM studied the Y3-110 project as a 15.7 MW injection into the Delmarva Power and Light Company's (DPL) system as a tap of the North Salisbury-Walston Switch 69 kV circuit and evaluated it for compliance with reliability criteria for summer peak conditions in 2017. The proposed in-service date, as stated in the Attachment N, is December 31, 2016.

Point of Interconnection

Y3-110 will interconnect with the Delmarva Power and Light transmission system at a new 69 kV three (3) breaker ring bus substation to be constructed adjacent to the North Salisbury – Walston Switch 69 kV circuit. The Point of Interconnection (POI) will be located at a disconnect switch just beyond the fence line of the new substation.

Direct Connection Requirements

Transmission Owner Scope of Work

Substation Engineering Estimate:
Scope: Construct a new 69 kV three-breaker ring bus substation, inclusive of a terminal position for queue project Y3-110, adjacent to the North Salisbury – Walston Switch 69 kV circuit.
Estimate: $2,000,000
Construction Time: 15 – 18 months

Note that it is assumed that the Developer would be responsible for land acquisition for all the new facilities, including the substation. The Developer would also be responsible for the necessary permits to construct these facilities (zoning, storm water management, environmental, etc.) as well as site clearing/grading and entrance road construction. These costs are not included in the $2.0M estimate.

Transmission Engineering Estimate:
Scope: Cut the North Salisbury-Walston Switch 69 kV circuit #6741 and loop it into and out of the new substation. Install two (2) self-supporting steel poles with anchor bolt foundations, two (2) post construction tangent structures, and a short span to the new DPL substation. Environmental and forestry work is assumed to be minimal.
Estimate: $335,000
Construction Time: 12 months

Note: A breaker is required within 500 feet of the POI.

Interconnection Customer Scope of Work

The Interconnection Customer (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.

The Interconnection Customer 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 form-c pulse outputs. The ownership of metering equipment purchased or installed by the IC shall be transferred to the Interconnected Transmission Owner at time of commercial operation, unless the IC asserts its right to install, own and operate the metering system.

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, a line recloser, or other method depending upon the specific circumstances and the evaluation by DPL.

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

3. The Interconnection Customer 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.

4. 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.

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)

1. The MILF_230-STEELE (DPL - DPL) 230 kV line (from bus 232004 to bus 232000 ckt 1) loads from 112.36% to 112.58% (DC power flow) of its emergency rating (551 MVA) for the tower line contingency outage of 'DBL_4NC'. This project contributes approximately 7.72 MW to the thermal violation.

   Please refer to Appendix 5 for a table containing the generators having contribution to this flowgate.

Short Circuit

No issues identified.

Stability Analysis

To be performed during the Facilities Study phase, it deemed necessary.

Light Load Analysis

Light Load Studies to be conducted during later study phases (applicable to wind, coal, nuclear, and pumped storage projects).

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. The costs identified below represent the total to complete the reinforcement, not necessarily this project's cost. Actual cost allocations will be deferred until the System Impact Study is performed.

1. To mitigate the MILF_230-STEELE (DPL - DPL) 230 kV line (from bus 232004 to bus 232000 ckt 1) overload will require reconductoring the Milford-Steele 230 kV circuit. The estimated cost to perform this work is **$23,000,000** and will take **24-30 months** to complete.

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

Appendices

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.

Appendix 5

(DP&L - DP&L) The MILF_230-STEELE 230 kV line (from bus 232004 to bus 232000 ckt 1) loads from 112.36% to 112.58% (DC power flow) of its emergency rating (551 MVA) for the tower line contingency outage of 'DBL_4NC'. This project contributes approximately 7.72 MW to the thermal violation.

CONTINGENCY 'DBL_4NC' /* RED LION-CEDAR CREEK 230;RED LION-CARTANZA 230
OPEN LINE FROM BUS 231004 TO BUS 232002 CKT 1
OPEN LINE FROM BUS 231004 TO BUS 232003 CKT 1
END

Bus Number	Bus Name	Full Contribution
232900	DEMECSMY	1.37
232616	GEN FOOD	0.52
232920	IR10	0.47
232906	IR3	110.12
232904	IR4	12.63
232923	MR1	0.56
232924	MR2	0.56
232922	MR3	3.37
232901	NORTHST	1.29
886231	T-144 C	4.7
886232	T-144 E	4.6
297076	V2-028 C	0.79
297077	V2-028 E	1.28
904210	V4-022C	0.92
904212	V4-022E	1.5
904631	V4-064 C	3.67
904632	V4-064 E	5.99
900001	W1-003 C	3.67
900002	W1-003 E	5.98
900011	W1-004 C	3.67
900012	W1-004 E	5.98
900021	W1-005 C	3.67
900022	W1-005 E	5.98
900031	W1-006 C	3.67
900032	W1-006 E	5.98
901411	W1-062	1.52
901491	W1-070 C	3.48
901492	W1-070 E	5.68
903341	W3-032A 1	5.08
903351	W3-032A 2	5.08
904791	W3-160 C	2.3
904792	W3-160 E	3.76
907072	X1-032 E	1.88
907321	X1-096 C	8.97
907322	X1-096 E	60.05
909191	X2-066	352.97
909201	X2-067	227.92
910571	X3-008 C	2.04
910572	X3-008 E	3.33

910591	X3-015 C	2.33
910592	X3-015 E	3.81
910662	X3-040 E	8.7
910671	X3-041 C	0.17
910672	X3-041 E	5.99
910792	X3-071 E	3.9
910822	X3-077 E	3.4
912111	X4-017 C	3.52
912112	X4-017 E	5.74
912202	X4-040 E	1.
913371	Y1-080 C	0.41
913372	Y1-080 E	0.68
914451	Y2-108	0.92
914461	Y2-109	0.24
915302	Y3-054 E	8.32
915321	Y3-058 C	2.52
915322	Y3-058 E	4.11
915701	Y3-110	7.72