

# Generation Interconnection Feasibility Study Report Queue Position Z1-103

The Interconnection Customer (IC) has proposed a 4.16 MWC (0 MWE) Capacity only upgrade to prior queue project W1-006. The combined W1-006 and Z1-103 project is now a 20 MWE (11.76 MWC) resource. W1-006/Z1-103 is a solar powered generating facility located in New Church, Accomack County, Virginia. PJM studied Z1-103 as a 4.16 MW injection into the Delmarva Power and Light's (DPL) system at the Oak Hall 138 kV substation and evaluated it for compliance with reliability criteria for summer peak conditions in 2017.

## **Point of Interconnection**

Z1-103 will utilize the same Point of Interconnection as prior queue project W1-006 at the Oak Hall 138 kV substation.

## **Transmission Owner Scope of Work**

No additional Transmission Owner work is required for Z1-103.

## **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 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.

The Interconnection Customer will purchase and install all metering instrument transformers as well as construct a metering structure per PHI's specifications. The secondary wiring connections at the instrument transformers will be completed by the interconnection customer's contractors and inspected by PHI, while the secondary wiring work at the metering enclosure will be completed by PHI's Meter technicians. The metering control cable and meter cabinets will be supplied by PHI and installed by the interconnection customer's contractors. PHI'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 output. The ownership of metering equipment purchased or installed by the IC shall be transferred to the Transmission Owner at 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 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.*

1. (DP&L - DP&L) The PINEY138-LORETTO 138 kV line (from bus 232128 to bus 232127 ckt 1) loads from 99.78% to 100.59% (**DC power flow**) of its emergency rating (159 MVA) for the line fault with failed breaker contingency outage of 'DP58'. This project contributes approximately 1.29 MW to the thermal violation.

```

CONTINGENCY 'DP58'                               /*OAK HALL BUS BREAKER
DISCONNECT BRANCH FROM BUS 232132 TO BUS 232130 CKT 1      /*OAK
HALL POCOMOKE 138 138
DISCONNECT BRANCH FROM BUS 232132 TO BUS 232131 CKT 1      /*OAK
HALL NEW CHURCH 138 138
END

```

Please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.

**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)*

None

**Short Circuit**

No overstressed breakers were identified.

**Stability and Low Voltage Ride Through Analysis**

Will be performed during the System Impact study phase of the project (if required).

**Light Load Analysis**

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

Not required.

**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 (DP&L - DP&L) PINEY-LORETTO 138 kV line (from bus 232128 to bus 232127 ckt 1) overload will require upgrading the line 13777 conductor. The estimated cost to perform this work is **\$10,936,500** and will take **48 months** to complete.

**Contribution to Previously Identified System Reinforcements**

*(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. Cost allocation for these overloads will be provided in the System Impact Study Report.*

None

**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.

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.

These are *not* required reliability upgrades.

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 1

(DP&L - DP&L) The PINEY138-LORETTO 138 kV line (from bus 232128 to bus 232127 ckt 1) loads from 99.78% to 100.59% (**DC power flow**) of its emergency rating (159 MVA) for the line fault with failed breaker contingency outage of 'DP58'. This project contributes approximately 1.29 MW to the thermal violation.

```

CONTINGENCY 'DP58'                                /*OAK HALL BUS BREAKER
DISCONNECT BRANCH FROM BUS 232132 TO BUS 232130 CKT 1    /*OAK
HALL POCOMOKE 138 138
DISCONNECT BRANCH FROM BUS 232132 TO BUS 232131 CKT 1    /*OAK
HALL NEW CHURCH 138 138
END
    
```

Bus Number	Bus Name	Full Contribution
232905	BAYVIEW1	0.14
232906	IR3	8.48
232912	OH NUG1	0.51
232913	OH NUG2	0.51
232914	OH NUG3	0.51
232915	OH NUG4	0.51
232916	OH NUG5	0.51
232917	OH NUG6	0.51
232918	OH NUG7	0.51
232921	TASLEY2G	0.37
904210	V4-022 C	0.02

904212	V4-022 E	0.95
904631	V4-064 C	2.34
904632	V4-064 E	3.81
900001	W1-003 C	2.35
900002	W1-003 E	3.83
900011	W1-004 C	2.35
900012	W1-004 E	3.83
900021	W1-005 C	2.35
900022	W1-005 E	3.83
900031	W1-006 C	2.35
900032	W1-006 E	3.83
907072	X1-032 E	-1.8
909191	X2-066	12.18
910662	X3-040 E	5.53
914461	Y2-109	< 0.01
916301	Z1-076 C	1.8
916302	Z1-076 E	2.94
916311	Z1-077 C	1.09
916312	Z1-077 E	1.78
916511	Z1-100	1.29
916521	Z1-101	1.29
916531	Z1-102	1.29
916541	Z1-103	1.29