Generation Interconnection Feasibility Study Report Queue Position AD2-110

"Interconnection Customer" has proposed an uprate to its existing natural gas generating facility located 225 Alleman Road, Chambersburg, Franklin County, Pennsylvania. This project requests an increase to the install capability of 12 MW Energy and 12 MW Capacity Interconnection Rights ("CIR"). The installed facilities will have a total capability of 100 MW with 100 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is 5/31/2022. **This study does not imply a Mid-Atlantic Interstate Transmission, LLC ("Transmission Owner" or "MAIT") commitment to this in-service date.**

Point of Interconnection ("POI")

The AD2-110 uprate project will use the same existing Guildford units POI, assigned Queue No. E04_W20. The existing POI will remain unchanged. The AD2-110 is interconnecting with the West Penn Power transmission system by direct injection of power into Guildford switching station.

Network Impacts

Summer Peak Analysis - 2021

The Queue Project AD2-110 was evaluated as a 12.0 MW (Capacity 12.0 MW) injection at the Guilford 138kV substation in the APS area. Project AD2-110 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-110 was studied with a commercial probability of 53%. Potential network impacts were 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)

1. (PENELEC - PENELEC) The 26ROXBURY 138/115 kV transformer (from bus 200532 to bus 200520 ckt 2) loads from 114.09% to 115.35% (**DC power flow**) of its emergency rating (150 MVA) for the line fault with failed breaker contingency outage of 'ME_P4-500-002H'. This project contributes approximately 1.89 MW to the thermal violation.

```
CONTINGENCY 'ME_P4-500-002H'                          /* HUNTERSTOWN 500 KV STUCK CB - CBB11392
 DISCONNECT BRANCH FROM BUS 200026 TO BUS 200004 CKT 1 /* HUNTERTN 500 CNASTONE 500
 DISCONNECT BRANCH FROM BUS 200026 TO BUS 204501 CKT 1 /* HUNTERTN 500 27HUNTRSTN 230
 END
```

Please refer to Appendix 3 for a table containing the generators having contribution to this flowgate.

Steady-State Voltage Requirements

To be determined during the system impact phase.

Short Circuit

None.

Affected System Analysis & Mitigation

NYISO Impacts:

NYISO Impacts to be determined during later study phases (as applicable).

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.

Not Applicable

Light Load Analysis - 2021

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

Short Circuit

None

Stability and Reactive Power Requirement

To be determined during the system impact study phase.

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

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

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

1. (PENELEC - PENELEC) The 26ROXBURY 138/115 kV transformer (from bus 200532 to bus 200520 ckt 2) loads from 114.09% to 115.35% (**DC power flow**) of its emergency rating (150 MVA) for the line fault with failed breaker contingency outage of 'ME_P4-500-002H'. This project contributes approximately 1.89 MW to the thermal violation.

PENELEC:
Replace the existing Roxbury 100 MVA 138/115 kV transformer with a 224 MVA unit. Convert Roxbury 115 kV substation into a four (4) breaker ring bus. (Upgrade Id: s1643) The scheduled in-service date is 12/31/2019.

Light Load Load Flow Analysis Reinforcements

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

None

Contribution to Previously Identified System Reinforcements
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

None

Appendix 3

Flowgate Contingency -
PJM Queue Position: AD2-110

This appendix contains additional information about the flowgate presented in the body of the report. The intent of this 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.

PENELEC - PENELEC) The 26ROXBURY 138/115 kV transformer (from bus 200532 to bus 200520 ckt 2) loads from 114.09% to 115.35% (**DC power flow**) of its emergency rating (150 MVA) for the line fault with failed breaker contingency outage of 'ME_P4-500-002H'. This project contributes approximately 1.89 MW to the thermal violation.

CONTINGENCY 'ME_P4-500-002H' /* HUNTERSTOWN 500 KV
STUCK CB - CBB11392
DISCONNECT BRANCH FROM BUS 200026 TO BUS 200004 CKT 1 /* HUNTERTN 500 CNASTONE 500
DISCONNECT BRANCH FROM BUS 200026 TO BUS 204501 CKT 1 /* HUNTERTN 500 27HUNTRSTN 230
END

Bus Number	*Bus Name*	*Full Contribution*
LTF	*CARR*	*0.4*
LTF	*CBM-S1*	*1.59*
LTF	*CBM-S2*	*1.7*
LTF	*CBM-W1*	*5.1*
LTF	*CBM-W2*	*9.15*
LTF	*CIN*	*1.16*
LTF	*CPLE*	*0.45*
LTF	*G-007*	*1.23*
LTF	*IPL*	*0.75*
LTF	*LGEE*	*0.25*
LTF	*MEC*	*2.24*
LTF	*MECS*	*1.4*
LTF	*O-066*	*8.06*
LTF	*RENSSELAER*	*0.32*
LTF	*ROSETON*	*2.31*
LTF	*WEC*	*0.31*
235723	*01GUILF1*	*1.29*
235724	*01GUILF2*	*1.29*
237329	*01CHBRG_I12*	*1.19*
905554	*W4-102 E*	*0.68*
918661	*AA1-080 C*	*0.12*
918662	*AA1-080 E*	*0.06*
918731	*AA1-092 C*	*0.55*
918732	*AA1-092 E*	*0.28*
918761	*AA1-095 C*	*0.33*
918762	*AA1-095 E*	*0.17*

Bus Number	*Bus Name*	*Full Contribution*
918771	*AA1-096 C*	*0.12*
918772	*AA1-096 E*	*0.06*
923871	*AB2-027 C*	*0.18*
923872	*AB2-027 E*	*0.3*
924482	*AB2-097 E*	*0.64*
930781	*AB1-123 C*	*0.41*
930782	*AB1-123 E*	*0.43*
930821	*AB1-127 C*	*1.04*
930822	*AB1-127 E*	*1.7*
930831	*AB1-128 C*	*1.04*
930832	*AB1-128 E*	*1.7*
933251	*AC2-136 C*	*0.34*
933252	*AC2-136 E*	*0.39*
933974	*AD1-020 BAT*	*1.24*
934361	*AD1-060 C*	*0.54*
934362	*AD1-060 E*	*0.88*
934371	*AD1-061 C*	*0.87*
934372	*AD1-061 E*	*1.41*
936061	*AD2-009 C*	*5.92*
936062	*AD2-009 E*	*2.7*
936221	*AD2-028 C1*	*9.35*
936222	*AD2-028 E1*	*4.4*
936223	*AD2-028 C2*	*1.15*
936224	*AD2-028 E2*	*5.73*
936311	*AD2-040*	*0.23*
936471	*AD2-062 C O1*	*20.92*
936871	***AD2-110***	***1.89***