

Generation Interconnection Feasibility Study Report Queue Position AD1-069

Iron Bridge – Donegal 138 kV

General

“Interconnection Customer” has proposed a new wind generation facility in the Fayette County, Pennsylvania. The installed facilities will have capability of 80 MW with 11.76 MW of this output being recognized by PJM as capacity. The proposed in-service date is December 15, 2020. This study does not imply a **West Penn Power (“Transmission Owner”) commitment to this in-service date.**

Point of Interconnection (POI)

This project will interconnect with the West Penn Power transmission system by direct tapping the Iron Bridge – Donegal 138 kV line at a point located approximately 5.2 miles from Iron Bridge sub. This transmission tap will be facilitated by building a new three breaker ring bus switching station and a one span loop of the Iron Bridge – Donegal transmission line. Please refer to Appendix 2 for one-line diagram of system configuration.

Network Impacts

The Queue Project AD1-069 was evaluated as a 80.0 MW (Capacity 11.8 MW) injection tapping Iron Bridge to Donegal 138kV line in the APS area. Project AD1-069 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-069 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Analysis - 2021

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. (AP - AP) The 01ALLENP-01CHARLR 138 kV line (from bus 235135 to bus 235161 ckt 1) loads from 112.09% to 119.78% (**DC power flow**) of its emergency rating (179 MVA) for the tower line contingency outage of 'AP-P7-1-WPP-138-80'. This project contributes approximately 13.77 MW to the thermal violation.

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CONTINGENCY 'AP-P7-1-WPP-138-80'                /* 58
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235277 CKT 1    /* 01CHARLR 138 01YUKON 138
DISCONNECT BRANCH FROM BUS 235270 TO BUS 235277 CKT 1    /* 01WESTRV 138 01YUKON 138
END
```

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

2. (AP - AP) The 01ALLENP-01CHARLR 138 kV line (from bus 235135 to bus 235161 ckt 1) loads from 111.14% to 118.83% (**DC power flow**) of its emergency rating (179 MVA) for the tower line contingency outage of 'AP-P7-1-WPP-138-78'. This project contributes approximately 13.77 MW to the thermal violation.

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CONTINGENCY 'AP-P7-1-WPP-138-78'                /* 57
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235270 CKT 1    /* 01CHARLR 138 01WESTRV 138
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235277 CKT 1    /* 01CHARLR 138 01YUKON 138
END
```

3. (AP - AP) The 01YUKON-01SMTH62 138 kV line (from bus 235277 to bus 235252 ckt 1) loads from 101.62% to 102.35% (**DC power flow**) of its emergency rating (376 MVA) for the line fault with failed breaker contingency outage of 'AP-P2-3-WP-138-204'. This project contributes approximately 6.1 MW to the thermal violation.

CONTINGENCY 'AP-P2-3-WP-138-204'	/* 214	
DISCONNECT BRANCH FROM BUS 235135 TO BUS 235161 CKT 1		/* 01ALLENP 138 01CHARLR 138
DISCONNECT BRANCH FROM BUS 235155 TO BUS 235161 CKT 1		/* 01CALIFN 138 01CHARLR 138
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235270 CKT 1		/* 01CHARLR 138 01WESTRV 138
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235260 CKT 1		/* 01CHARLR 138 01UNIONJ 138
END		

Please refer to Appendix 4 for a table containing the generators having contribution to this flowgate.

4. (AP - AP) The 01YUKON-01SMTH62 138 kV line (from bus 235277 to bus 235252 ckt 1) loads from 101.45% to 102.19% (**DC power flow**) of its emergency rating (376 MVA) for the bus fault outage of 'AP-P2-2-WP-138-019'. This project contributes approximately 6.1 MW to the thermal violation.

CONTINGENCY 'AP-P2-2-WP-138-019'	/* CHARLEROI #1 138KV BUS	
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235260 CKT 1		/* 01CHARLR 138 01UNIONJ 138
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235155 CKT 1		/* 01CHARLR 138 01CALIFN 138
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235135 CKT 1		/* 01CHARLR 138 01ALLENP 138
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235270 CKT 1		/* 01CHARLR 138 01WESTRV 138
DISCONNECT BRANCH FROM BUS 235161 TO BUS 235872 CKT 1		/* 01CHARLR 138 01CHAR 25
END		

Steady-State Voltage Requirements

To be determined during later study phases.

Short Circuit

None

Affected System Analysis & Mitigation

NYISO Impacts:

None

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

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 later study phases.

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)

(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

1. (AP - AP) The 01ALLENP-01CHARLR 138 kV line (from bus 235135 to bus 235161 ckt 1) loads from 112.09% to 119.78% (**DC power flow**) of its emergency rating (179 MVA) for the tower line contingency outage of 'AP-P7-1-WPP-138-80'. This project contributes approximately 13.77 MW to the thermal violation.

APS:

Existing PJM baseline project to reconductor line (b2965). This project has an ISD of 06/01/2022. The estimated cost \$7.08 M. Customer responsible for the cost of accelerating the project to 2021.

2. (AP - AP) The 01ALLENP-01CHARLR 138 kV line (from bus 235135 to bus 235161 ckt 1) loads from 111.14% to 118.83% (**DC power flow**) of its emergency rating (179 MVA) for the tower line contingency outage of 'AP-P7-1-WPP-138-78'. This project contributes approximately 13.77 MW to the thermal violation.

Same as Contribution to Previously Identified #1

3. (AP - AP) The 01YUKON-01SMTH62 138 kV line (from bus 235277 to bus 235252 ckt 1) loads from 101.62% to 102.35% (**DC power flow**) of its emergency rating (376 MVA) for the line fault with failed breaker contingency outage of 'AP-P2-3-WP-138-204'. This project contributes approximately 6.1 MW to the thermal violation.

APS:

Existing PJM baseline project to reconductor line (b2966). This project has an ISD of 06/01/2022. The estimated cost \$3.19 M. Customer responsible for the cost of accelerating the project to 2021.

4. (AP - AP) The 01YUKON-01SMTH62 138 kV line (from bus 235277 to bus 235252 ckt 1) loads from 101.45% to 102.19% (**DC power flow**) of its emergency rating (376 MVA) for the bus fault outage of 'AP-P2-2-WP-138-019'. This project contributes approximately 6.1 MW to the thermal violation.

Same as Contribution to Previously Identified #3

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)

To be determined at later study phases

Appendix 3

Flowgate Information: Allenport – Charleroi 138 kV Line PJM Queue Position: AD1-069

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 gauge 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.

(AP - AP) The 01ALLENP-01CHARLR 138 kV line (from bus 235135 to bus 235161 ckt 1) loads from 112.09% to 119.78% (**DC power flow**) of its emergency rating (179 MVA) for the tower line contingency outage of 'AP-P7-1-WPP-138-80'. This project contributes approximately 13.77 MW to the thermal violation.

CONTINGENCY 'AP-P7-1-WPP-138-80'
/* 58

DISCONNECT BRANCH FROM BUS
235161 TO BUS 235277 CKT 1 /*
01CHARLR 138 01YUKON 138

DISCONNECT BRANCH FROM BUS
235270 TO BUS 235277 CKT 1 /*
01WESTRV 138 01YUKON 138

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
236523	01WDPWR_K20	0.04
920571	AA2-161 C	26.98
920572	AA2-161 E	1.47
934451	AD1-069 C	2.02
934452	AD1-069 E	11.74

Appendix 4

Flowgate Information: Yukon – Smithton 138 kV 62 Line PJM Queue Position: AD1-069

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.

(AP - AP) The 01YUKON-01SMTH62 138 kV line (from bus 235277 to bus 235252 ckt 1) loads from 101.62% to 102.35% (**DC power flow**) of its emergency rating (376 MVA) for the line fault with failed breaker contingency outage of 'AP-P2-3-WP-138-204'. This project contributes approximately 6.1 MW to the thermal violation.

CONTINGENCY 'AP-P2-3-WP-138-204'
/* 214

DISCONNECT BRANCH FROM BUS
235135 TO BUS 235161 CKT 1 /*
01ALLENP 138 01CHARLR 138

DISCONNECT BRANCH FROM BUS
235155 TO BUS 235161 CKT 1 /*
01CALIFN 138 01CHARLR 138

DISCONNECT BRANCH FROM BUS
235161 TO BUS 235270 CKT 1 /*
01CHARLR 138 01WESTRV 138

DISCONNECT BRANCH FROM BUS
235161 TO BUS 235260 CKT 1 /*
01CHARLR 138 01UNIONJ 138

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
915692	Y3-103 E	-5.48
920571	AA2-161 C	47.36
920572	AA2-161 E	2.58
934451	AD1-069 C	0.9
934452	AD1-069 E	5.2