#W2-048 –Pontiac MidPoint - Lanesville 345kV
Generation Interconnection

General

The Interconnection Customer (IC) is proposing a 62.5MW Energy-only wind farm to be interconnected to the ComEd transmission system. The proposed in-service date for this project is January 1, 2012 and is currently under review. **Impacts on the MISO member transmission systems are not included in this analysis, but they will be included in the Impact Study, which may reveal upgrades needed in the MISO system not identified in this Feasibility Study.**

This Generation Interconnection Feasibility Study provides analysis results to aid the Interconnection Customer in assessing the practicality and cost of incorporating the facility into the PJM system. This study was limited to load flow analyses of probable contingencies. Preliminary estimates of the scope, cost, and lead time for construction of facilities are provided below. If the interconnection customer elects to pursue a System Impact Study, a more comprehensive analysis will be performed.

Option 1:

The W2-048 project was studied as a 62.5MW Energy-only injection at Pontiac MidPoint – Brokaw 345kV line in the ComEd area.

Direct Connection Cost Estimate

The total preliminary estimate for Direct Connection work performed by ComEd is given in the following table:

Description	Total Cost
Install new 345kV three breaker ring bus (assuming ComEd engineers, procures and builds the substation)	$15,000,000
345kV transmission line tie-in (by ComEd)	$2,000,000
Total	**$17,000,000**

Table 1. Direct Connection Cost Estimate

Revenue Metering and SCADA Requirements

For PJM: The Interconnection Customer (IC) will install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

For ComEd: The Interconnection Customer (IC) will install equipment necessary to provide bi-directional Revenue Metering (KWH, KVARH) and real time data (KW, KVAR, circuit breaker status, and 138 kV voltage) for IC's generating Resource. See ComEd Applicable Standards available on the PJM website ("TO Standards") – "Exelon Energy Delivery Interconnection Guidelines (Generators Greater than 20 MW)".

Network Impacts

The Queue Project W2-048 was studied as a 62.5MW (0 MW Capacity) injection tapping the Pontiac MidPoint – Brokaw 345kV line in the ComEd's system. Project W2-048 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. Potential network impacts were as follows:

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No violations were identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

No violations were identified.

Short Circuit

(Summary of impacted circuit breakers)

To be determined in the System Impact Study.

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)

Item 1a. The PONTI; B-LORET; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 120.14% to 121.60% (**DC power flow**) of its rating (1234 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 27.98 MW to the thermal violation.

CONTINGENCY '345-L8014_T_-S' / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1 / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1 / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1 / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1 / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1 / PONTI; B 138 PONTI; R 138
END

Item 1b. The PONTI; R-DRESD; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 114.92% to 115.93% (**DC power flow**) of its rating (1528 MVA) for the single line contingency ('345-L11212_B-S'). This project contributes approximately 27.85 MW to the thermal violation.

CONTINGENCY '345-L11212_B-S' / CONTINGENCY # 425
TRIP BRANCH FROM BUS 270926 TO BUS 270704 CKT 1 / WILTO; B 345 LORET; B 345
END

Item 1c. The LORET; B-WILTO; B 345 kV line (from bus 270704 to bus 270926 ckt 1) loads from 147.87% to 149.27% (**DC power flow**) of its rating (1280 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 27.96 MW to the thermal violation.

CONTINGENCY '345-L8014_T_-S' / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1 / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1 / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1 / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1 / PONTI;2M 138 PONTI;2C 34.5

CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1 / PONTI; B 138
PONTI; R 138
END

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially cause 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.)

For item 1a, to mitigate the overload on PONTI; B-LORET; B 345 kV line 8012, ComEd has proposed to upgrade one 345kV circuit breaker at TSS 80 Pontiac MidPoint and modify transmission structures to increase line conductor clearance along 11.5 miles of line 8012. The upgrade is estimated to cost **$8,000,000**. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

For item 1b, to mitigate the overload on PONTI; R-DRESD; R 345 kV line 8014, ComEd has proposed to upgrade two 345kV circuit breakers at TSS 80 Pontiac MidPoint and modify transmission structures to increase line conductor clearance along 43 miles of line 8014. The upgrade is estimated to cost **$27,500,000**. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

For item 1c, to mitigate the overload on LORET; B-WILTO; B 345 kV line 11212, ComEd has proposed to upgrade two 345kV circuit breakers at TSS 112 Wilton Center and modify transmission structures to increase line conductor clearances along 40 miles of the 345kV line 11212. The upgrade is estimated to cost **$21,000,000**. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

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.

Note: Only the most severely overloaded conditions are listed below. 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 shall study all overload conditions associated with the overloaded element(s) identified.

As a result of the aggregate energy resources in the area, no violations were identified.

Option 2:

The W2-048 project was studied as a 62.5MW Energy-only injection into the Blue Mound (Blue) - Latham Tap of Kincaid – Pontiac MidPoint line in the ComEd area.

Attachment Facilities

The Interconnection Customer proposed to tap the Blue Mound - Latham 345kV line. If this option is chosen, costs to connect and any reinforcements will be provided in the System Impact Study phase.

Network Impacts

The Queue Project W2-048 was studied as a 62.5MW (0 MW Capacity) injection into the Blue Mound (Blue) - Latham Tap of Kincaid – Pontiac MidPoint 345kV line in the ComEd area. Project W2-048 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. Potential network impacts were as follows:

Generator Deliverability
(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No violations identified.

Multiple Facility Contingency
(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

No violations were identified.

Short Circuit
(Summary of impacted circuit breakers)

To be determined in the System Impact Study.

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)

Item 2a. (CE) The Cayuga Ridge (Blue)-Wilton Center (Blue) 345 kV line (from bus 270704 to bus 270926 ckt 1) loads from 116.22% to 118.14% (DC power flow) of its emergency rating (1280 MVA) for the single contingency '345-L8014_T_-S'. This project contributes approximately 24.63 MW to the thermal violation.

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CONTINGENCY '345-L8014_T_-S'     / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1          / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1          / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1          / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1          / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1         / PONTI; B 138 PONTI; R 138
END
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Item 2b. (CE) The Pontiac Mid-Point-Cayuga Ridge (Blue) 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 112.61% to 114.61% (DC power flow) of its emergency rating (1234 MVA) for the single contingency '345-L8014_T_-S'. This project contributes approximately 24.65 MW to the thermal violation.

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CONTINGENCY '345-L8014_T_-S'     / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1          / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1          / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1          / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1          / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1         / PONTI; B 138 PONTI; R 138
END
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Item 2c. (CE) The Pontiac Mid-Point-Dresden (Red) 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 113.48% to 115.3% (DC power flow) of its emergency rating (1341 MVA) for the single contingency '345-L11212_B-S'. This project contributes approximately 24.44 MW to the thermal violation.

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CONTINGENCY '345-L11212_B-S'     / CONTINGENCY # 425
TRIP BRANCH FROM BUS 270926 TO BUS 270704 CKT 1          / WILTO; B 345 LORET; B 345
END
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New System Reinforcements
(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially cause 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.)

If this option is chosen, reinforcements and cost allocations for this upgrade will be determined during the System Impact Study phase.

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.

Note: Only the most severely overloaded conditions are listed below. 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 shall study all overload conditions associated with the overloaded element(s) identified.

As a result of the aggregate energy resources in the area, no violations were identified.