#X2-022 –Pontiac MidPoint - Lanesville 345kV
Generation Interconnection

General

The Interconnection Customer (IC) is proposing an 189MW Energy-only wind farm to be interconnected to the ComEd transmission system. The proposed in-service date for this project is November 30, 2012 and is currently under review. This project is phase 2 of project W2-048. **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 X2-022 project was studied as an 189.0MW (0MW Capacity) injection at W2-048 OPT1 345kV substation in the ComEd area, as shown in **Figure # 1**.

Attachment Facilities

The Interconnection Customer is proposing to construct an 189MW Energy-only wind farm to be connected to the Pontiac MidPoint - Lanesville 345kV line in ComEd (See **Figure #1** below). Assuming that project W2-048 is built first, the only costs for the X2-022 interconnection will be relay modifications at the W2-048 new substation, approximately **$100,000**. However, if W2-048 withdraws from the queue, the new three-breaker ring bus (approximately **$17,000,000**) will have to be built by X2-022 prior to being put in-service.

The Interconnection Customer is responsible for constructing all of the facilities on the Interconnection Customer's side of the Point of Interconnection.

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 X2-022 was studied as a 189MW (0 MW Capacity) injection into the W2-048 OPT1 345kV substation in the ComEd area. Project X2-022 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)

No violations were identified.

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.)

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.

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, the following violations were identified:

Item 1a. The DRESD; R-ELECT;4R 345 kV line (from bus 270717 to bus 270731 ckt 1) loads from 109.35% to 111.4% (**DC power flow**) of its rating (1479 MVA) for the single line contingency ('345-L1222__R-S'). This project contributes approximately 30.2 MW to the thermal violation.

CONTINGENCY '345-L1222__R-S' / CONTINGENCY # 487
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1 / DRESD; R 345 ELWOO; R 345
END

Item 1b. The W2-048 OPT1-PONTI; R 345 kV line (from bus 902392 to bus 270853 ckt 1) loads from 126.6% to 134.31% (**DC power flow**) of its rating (1441 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 111.09 MW to the thermal violation.

CONTINGENCY '345-L8002___-S' / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 / PONTI; B 345 BLUEM; B 345
END

Item 1c. The PONTI; R-DRESD; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 148.7% to 153% (**DC power flow**) of its normal rating (1245 MVA) for non-contingency condition. This project contributes approximately 53.44 MW to the thermal violation.

Item 1d. The DRESD; R-ELWOO; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 153.6% to 156.76% (**DC power flow**) of its normal rating (1479 MVA) for the single line contingency ('345-L1223_TR-S'). This project contributes approximately 46.68 MW to the thermal violation.

CONTINGENCY '345-L1223_TR-S' / CONTINGENCY # 488
TRIP BRANCH FROM BUS 270717 TO BUS 270731 CKT 1 / DRESD; R 345 ELECT;4R 345
TRIP BRANCH FROM BUS 275180 TO BUS 270717 CKT 1 / DRESD;3M 138 DRESD; R 345
TRIP BRANCH FROM BUS 275180 TO BUS 271336 CKT 1 / DRESD;3M 138 DRESD; B 138
TRIP BRANCH FROM BUS 275180 TO BUS 275280 CKT 1 / DRESD;3M 138 DRESD;3C 34.5
END

Item 1e. The PONTI; B-LORET; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 203.33% to 210.18% (**DC power flow**) of its normal rating (1234 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 84.62 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 1f. The PONTI; R-DRESD; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 219.7% to 225.98% (**DC power flow**) of its normal rating (1341 MVA) for the single line contingency ('345-L11212_B-S'). This project contributes approximately 84.21 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 1g. The LORET; B-WILTO; B 345 kV line (from bus 270704 to bus 270926 ckt 1) loads from 234.4% to 241.01% (**DC power flow**) of its normal rating (1280 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 84.56 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

Option 2:

The X2-022 project was studied as an 189.0MW (0MW Capacity) injection into the W2-048 OPT2 345kV substation 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 X2-022 was studied as an 189.0MW (0MW Capacity) injection into the W2-048 OPT2 345kV substation in the ComEd area. Project X2-022 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)

No violations identified.

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, the following violations were identified:

Item 2a. (CE) The W4-005 TAP-Latham Tap Of Kincaid-Pontiac Midpoint Line. Ip T 345 kV line (from bus 905040 to bus 270804 ckt 1) loads from 105.45% to 119.61% (DC power flow) of its emergency rating (1334 MVA) for the operational contingency '345-L8002___-S'. This project contributes approximately 188.92 MW to the thermal violation.

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CONTINGENCY '345-L8002___-S'    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1          / PONTI; B 345 BLUEM; B 345
END
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Item 2b. (CE) The Dresden (Red)-Dresdon Midpoint 83 345/138 kV transformer (from bus 270717 to bus 275180 ckt 1) loads from 110.39% to 110.76% (DC power flow) of its emergency rating (480 MVA) for the operational contingency '345-L1222__R-S'. This project contributes approximately 11.05 MW to the thermal violation.

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CONTINGENCY '345-L1222__R-S'    / CONTINGENCY # 487
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1          / DRESD; R 345 ELWOO; R 345
END
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Item 2c. (CE) The Dresdon Midpoint 83-Dresden (Blue) 138 kV line (from bus 275180 to bus 271336 ckt 1) loads from 110.34% to 110.71% (DC power flow) of its emergency rating (480 MVA) for the operational contingency '345-L1222__R-S'. This project contributes approximately 11.05 MW to the thermal violation.

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CONTINGENCY '345-L1222__R-S'    / CONTINGENCY # 487
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1          / DRESD; R 345 ELWOO; R 345
END
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Item 2d. (CE) The Cayuga Ridge (Blue)-Wilton Center (Blue) 345 kV line (from bus 270704 to bus 270926 ckt 1) loads from 234.14% to 239.96% (DC power flow) of its emergency rating (1280 MVA) for the operational contingency '345-L8014_T_-S'. This project contributes approximately 74.47 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 2e. 7. (CE) The Pontiac Mid-Point-Cayuga Ridge (Blue) 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 203.05% to 209.09% (DC power flow) of its emergency rating (1234 MVA) for the operational contingency '345-L8014_T_-S'. This project contributes approximately 74.53 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 2f. (CE) The Dresden (Red)-Tss 111 Electric Junction Red Bus, Bus 4 345 kV line (from bus 270717 to bus 270731 ckt 1) loads from 109.27% to 111.05% (DC power flow) of its emergency rating (1479 MVA) for the operational contingency '345-L1222__R-S'. This project contributes approximately 26.30 MW to the thermal violation.

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CONTINGENCY '345-L1222__R-S'    / CONTINGENCY # 487
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1        / DRESD; R 345 ELWOO; R 345
END
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Item 2g. (AMIL/CE) The Brokaw 345 kV Bus 1-Pontiac Mid-Point 345 kV line (from bus 348847 to bus 270853 ckt 1) loads from 125.59% to 129.95% (DC power flow) of its emergency rating (1441 MVA) for the operational contingency '345-L8002___-S'. This project contributes approximately 62.78 MW to the thermal violation.

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CONTINGENCY '345-L8002___-S'    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1        / PONTI; B 345 BLUEM; B 345
END
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Item 2h. (CE) The Pontiac Mid-Point-Dresden (Red) 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 219.44% to 224.96% (DC power flow) of its emergency rating (1341 MVA) for the operational contingency '345-L11212_B-S'. This project contributes approximately 73.91 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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Item 2i. (CE) The Pontiac Mid-Point-Dresden (Red) 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 148.52% to 152.27% (DC power flow) of its normal rating (1245 MVA) for non contingency condition. This project contributes approximately 46.69 MW to the thermal violation.

Item 2j. (CE/AMIL) The Latham Tap Of Kincaid-Pontiac Midpoint Line. Ip T-Latham 345 kV Bus 1 345 kV line (from bus 270804 to bus 348856 ckt 1) loads from 146.50% to 156.2% (DC power flow) of its emergency rating (1123 MVA) for the operational contingency '345-L8002___-S'. This project contributes approximately 108.95 MW to the thermal violation.

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CONTINGENCY '345-L8002___-S'    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1          / PONTI; B 345 BLUEM; B 345
END
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Item 2k. (CE) The Dresden (Red)-Elwood Energy Center (Red) 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 153.46% to 156.21% (DC power flow) of its emergency rating (1479 MVA) for the operational contingency '345-L1223_TR-S'. This project contributes approximately 40.67 MW to the thermal violation.

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CONTINGENCY '345-L1223_TR-S'    / CONTINGENCY # 488
TRIP BRANCH FROM BUS 270717 TO BUS 270731 CKT 1          / DRESD; R 345 ELECT;4R 345
TRIP BRANCH FROM BUS 275180 TO BUS 270717 CKT 1          / DRESD;3M 138 DRESD; R 345
TRIP BRANCH FROM BUS 275180 TO BUS 271336 CKT 1          / DRESD;3M 138 DRESD; B 138
TRIP BRANCH FROM BUS 275180 TO BUS 275280 CKT 1          / DRESD;3M 138 DRESD;3C 34.5
END
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Item 2l. (CE) The Blue Mound (Blue)-Pontiac Mid-Point 345 kV line (from bus 270668 to bus 270852 ckt 1) loads from 124.02% to 129.92% (DC power flow) of its emergency rating (1528 MVA) for the operational contingency '345-L8001___-S'. This project contributes approximately 90.18 MW to the thermal violation.

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CONTINGENCY '345-L8001___-S'    / CONTINGENCY # 734
TRIP BRANCH FROM BUS 270853 TO BUS 348847 CKT 1          / PONTI; R 345 7BROKAW T1 345
END
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Item 2m. (CE) The Blue Mound (Blue)-Pontiac Mid-Point 345 kV line (from bus 270668 to bus 270852 ckt 1) loads from 111.78% to 118.18% (DC power flow) of its normal rating (1334 MVA) for non contingency condition. This project contributes approximately 85.37 MW to the thermal violation.