# Queue R29 Kewanee 138kV

**Network Impacts**

The #R29 project was studied as a 200 MW (40 MW of capacity) injection into the Kewanee 138 kV substation in the ComEd territory. Project #R29 was evaluated for compliance with reliability criteria for summer peak conditions in 2011. Potential network impacts were as follows:

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

No problems were identified.

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

1. The portion of ComEd-owned Kewanee 138 kV South Transfer Bus between the connection of line #6101 and #7421 is loaded from 85% to 103% of its applicable load dump rating (323 MVA) for the LaSalle County Station to Mazon and Crescent Ridge – Oglesby – Mazon 138 kV tower line outage (#0108 & #7713). This project contributes approximately 56 MW to cause this thermal violation.
2. The ComEd-owned Castleton Road (#P39) to the AmerenCILCO-owned Edwards Station 138 kV line #99523 is loaded from 98% to 119% of its applicable load dump rating (164 MVA) for the Normandy (#P37) to Schauff Road (#O09) and Kewanee to Schauff Road (#O29) 138 kV tower line outage (#12511 & #7408). This project contributes approximately 33 MW to cause this thermal violation.
3. The ComEd-owned Normandy (#P37) to Schauff Road (#O09) 138 kV line #12511 is loaded from 95% to 104% of its applicable load dump rating (316 MVA) for the Lockport to Kendall County 345 kV tower line outage (#10805 & #10806). This project contributes approximately 28 MW to cause this thermal violation.

**Short Circuit**
*(Summary of impacted circuit breakers)*

To be determined in the System Impact Study.

**Contribution to Previously Identified Overloads**
***(#R29 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)***

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1. Contribution of 130 MW further overloads the ComEd-owned Kewanee 138 kV bus tie circuit breaker #110 circuit between the Main Bus and the South Transfer Bus from 136% to 186% of its applicable load dump rating (264 MVA) for the Kewanee - Hennepin – Streator and Kewanee - Crescent Ridge 138 kV tower line outage (#6101 & #7413).
2. Contribution of 67 MW further overloads the ComEd-owned Kewanee 138 kV Main Bus to the AmerenIP-owned Kewanee 138 kV circuit breaker #105 and series equipment from 156% to 177% of its applicable load dump rating (323 MVA) for the Kewanee - Hennepin – Streator and Crescent Ridge - Oglesby – Mazon 138 kV tower line outage (#6101 & #7713).
3. Contribution of 46 MW further overloads the ComEd-owned Schauff Road (#O09) to Rock Falls 138 kV line #13311 from 228% to 247% of its applicable load dump rating (244 MVA) for the Dixon to Nelson and Nelson to Schauff Road (#O29) 138 kV tower line outage (#15507 & 15508 ).
4. Contribution of 46 MW further overloads the ComEd-owned Nelson to Rock Falls 138 kV line #15509 from 214% to 233% of its applicable load dump rating (244 MVA) for the Nelson - Dixon and Nelson – Dixon - Schauff Road (#O29) 138 kV tower line outage (#15507 & #15508).
5. Contribution of 25 MW further overloads the ComEd-owned Crescent Ridge to Oglesby portion of 138 kV line #7713 from 126% to 141% of its applicable load dump rating (168 MVA) for the Normandy (#P37) to Schauff Road (#O09) and Kewanee to Schauff Road (#O29) 138 kV tower line outage (#12511 & #7408).
6. Contribution of 28 MW further overloads the ComEd-owned Nelson Tap to Schauff Road (#O29) portion of 138 kV line #15508 from 110% to 118% of its applicable load dump rating (351 MVA) for the Lockport to Kendall County 345 kV tower line outage (#10805 & #10806).
7. Contribution of 22 MW further overloads the ComEd-owned Mazon to Oglesby portion of 138 kV line #7713 from 122% to 140% of its applicable load dump rating (122 MVA) for the Normandy (#P37) to Schauff Road (#O09) and Kewanee to Schauff Road (#O29) 138 kV tower line outage (#12511 & #7408).
8. Contribution of 22 MW further overloads the ComEd-owned Dresden Station to Katydid Road (#O22/#O23) 345 kV line #1202 from 102% to 104% of its applicable load dump rating (1718 MVA) for the Katydid Road (#O22/#O23) to Goodings Grove and Livingston 2 (#O27) to Goodings Grove 345 kV tower line outage (#19601 & #97503).
9. Contribution of 41 MW further loads the ComEd-owned Powerton to Junction B 138 kV line #1352 from 76% to 99.64% of its applicable load dump rating (176 MVA) for the Normandy (#P37) to Schauff Road (#O09) and Kewanee to Schauff Road (#O29) 138 kV tower line outage (#12511 & #7408).

**Steady-State Voltage Requirements**

*(Summary of VAR requirements based upon the results of the steady-state voltage studies.)*

To be determined in the System Impact Study

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**Stability and Reactive Power Requirement for Low Voltage Ride Through**
*(Summary of VAR requirements based upon the results of the dynamic studies.)*

To be determined in the System Impact Study

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

1. The overload of the ComEd-owned Kewanee 138kV South Transfer Bus between the connection of line #6101 and #7421 can be relieved by rebuilding the 3-phase, 450 foot long South Transfer Bus with a larger size wire. Estimated cost for this upgrade is $1,100,000 and an estimated timeframe of 18-24 months.
2. The overload of the Castleton Road (#P39) to the AmerenCILCO-owned Edwards Station 138 kV line #99523 can be relieved by completing upgrades at the AmerenCILCO-owned Edwards Station. The ComEd-owned portion of the 138kV transmission line #99523 consists of 477 and 1,113 kcmil ACSR wire and is not the limiting element. The existing limitation is a current transformer thermal at the AmerenCILCO-owned Edwards Station. Estimated cost for this upgrade will be determined in conjunction with other Midwest ISO transmission owner impacts in the System Impact Study.
3. The overload of the ComEd-owned Normandy (#P37) to Schauff Road (#O09) 138 kV line #12511 can be relieved by reconductoring approximately 6 miles of transmission line to achieve a higher rating. Estimated cost for this upgrade is $1,950,000 and an estimated timeframe of 18-24 months.

**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 in the System Impact Study

**Potential Issues**

During certain maintenance outages the #R29 project will be required to be taken off line. For example, during a maintenance outage on the 138kV Transfer Bus at Kewanee, there would be no outlet for the generation of #R29. Similar issues may occur for other combinations of maintenance outages involving these and other elements in the ComEd and Ameren systems. The typical duration of a maintenance outage on the ComEd system is one week

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**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**.

**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.

As a result of the aggregate energy resources in the area, the following violations were identified:

1. Contribution of 119 MW further overloads the ComEd-owned Kewanee 138kV bus tie circuit breaker #110 circuit between the Main Bus and the South Transfer Bus from 173% to 242% of its normal rating (172 MVA).
2. Contribution of 141 MW further overloads the ComEd-owned Kewanee 138kV bus tie circuit breaker #110 circuit between the Main Bus and the South Transfer Bus from 209% to 274% of its emergency rating (221 MVA) for the 138 kV line #12511 outage.
3. Contribution of 28 MW further overloads the Normandy (#P37) to Schauff Road (#O09) 138 kV line #12511 from 133% to 146% of its normal rating (208 MVA).
4. Contribution of 28 MW further overloads the Normandy (#P37) to Schauff Road (#O09) 138 kV line #12511 from 114% to 127% of its emergency rating (264 MVA) for the outage of a Byron generating unit.
5. Contribution of 50 MW further overloads the ComEd-owned Kewanee 138 kV Main Bus to the AmerenIP-owned Kewanee 138 kV circuit breaker #105 and series equipment from 196% to 222% of its normal rating (189 MVA).
6. Contribution of 46 MW further overloads the Schauff Road (#O09) to Rock Falls 138 kV line #13311 from 309% to 334% of its emergency rating (184 MVA) for the 138 kV line #15508 outage.
7. Contribution of 27 MW further overloads the Crescent Ridge to Oglesby Tap portion of 138 kV line #7713 from 144% to 160% of its emergency rating (168 MVA) for the outage of the ComEd-owned Kewanee 138kV Main Bus to the AmerenIP-owned Kewanee 138kV circuit breaker #105 circuit.
8. Contribution of 46 MW further overloads the Rock Falls to Nelson 138 kV line #15509 from 290% to 316% of its emergency rating (184 MVA) for the 138 kV line #15508 outage.
9. Contribution of 48 MW further overloads the Schauff Road (#O29) to Nelson Tap portion of 138 kV line #15508 from 229% to 247% of its emergency rating (265 MVA) for the outage of 138 kV line #13311.
10. Contribution of 28 MW further overloads the Schauff Road (#O09) to Rock Falls 138 kV line #13311 from 237% to 257% of its normal rating (140 MVA).

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11. Contribution of 55 MW further overloads the ComEd-owned Kewanee 138kV Main Bus to the AmerenIP-owned Kewanee 138kV circuit breaker #105 and series equipment from 177% to 200% of its emergency rating (244 MVA) for the outage of 138 kV line #7713.
12. Contribution of 72 MW further overloads the portion of ComEd-owned Kewanee 138kV South Transfer Bus between the connection of line #6101 and line #7421 from 147% to 177% of its emergency rating (244 MVA) for the outage of the ComEd-owned Kewanee 138kV Main Bus to the AmerenIP-owned Kewanee 138kV circuit breaker #105 circuit.
13. Contribution of 28 MW further overloads the Schauff Road (#O29) to Nelson Tap portion of 138 kV line #15508 from 173% to 186% of its normal rating (209 MVA).
14. Contribution of 28 MW further overloads the Rock Falls to Nelson 138 kV line #15509 from 212% to 231% of its normal rating (140 MVA).
15. Contribution of 85 MW further overloads the portion of ComEd-owned Kewanee 138kV Main Transfer Bus between the connection of line #7423 and circuit breaker #110 from 139% to 173% of its emergency rating (244 MVA) for the 138 kV line #12511 outage.
16. Contribution of 58 MW further overloads the portion of ComEd-owned Kewanee 138kV Main Transfer Bus between the connection of line #7423 and line #7408 from 110% to 134% of its emergency rating (244 MVA) for the 138 kV line #12511 outage.
17. Contribution of 69 MW overloads the portion of ComEd-owned Kewanee 138 kV Main Transfer Bus between the connection of line #7423 and circuit breaker #110 from 99% to 135% of its normal rating (189 MVA).
18. Contribution of 43 MW overloads the portion of ComEd-owned Kewanee 138kV Main Transfer Bus between the connection of line #7423 and line #7408 from 82% to 105% of its normal rating (189 MVA).
19. Contribution of 17 MW overloads the Crescent Ridge to Oglesby Tap portion of 138 kV line #7713 from 95% to 105% of its normal rating (168 MVA).
20. Contribution of 44 MW further overloads the TSS107 Dixon to TDC317 Dixon portion of the 138 kV line #15508 from 130% to 141% of its emergency rating (420 MVA) for the 345/138 kV Nelson Transformer # 82 outage .
21. Contribution of 37 MW further overloads the Kewanee to Hennepin Tap portion of 138 kV line #6101 from 118% to 137% of its emergency rating (190 MVA) for the outage of the ComEd-owned Kewanee 138kV Main Bus to the AmerenIP-owned Kewanee 138kV circuit breaker #105 circuit.
22. Contribution of 44 MW further overloads the Nelson Tap to Dixon portion of 138 kV line #15508 from 126% to 136% of its emergency rating (445 MVA) for the outage of the 345/138 kV Transformer # 82 at Nelson.
23. Contribution of 17 MW further overloads the Oglesby Tap to Mazon portion of 138 kV line #7713 from 143% to 157% of its emergency rating (115 MVA) for the 138 kV line #0112 outage.
24. Contribution of 38 MW further overloads the Kewanee to Normandy portion of 138 kV line #7408 from 105% to 123% of its emergency rating (210 MVA) for the 138 kV line #12511 outage.

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25. Contribution of 30 MW further overloads the ComEd-owned Castleton Road (#P39) to the AmerenCILCO-owned Edwards Station 138 kV line #99523 from 111% to 133% of its emergency rating (143 MVA) for the outage of the ComEd-owned Kewanee 138kV Main Bus to the AmerenIP-owned Kewanee 138kV circuit breaker #105 circuit.
26. Contribution of 27 MW further overloads the Nelson to Nelson Tap portion of 138 kV line #15508 from 102% to 112% of its emergency rating (280 MVA) for the 138 kV line #13311 outage.

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