Queue R88
Providence Heights #2 138kV
Feasibility Study Report

Network Impacts

The #R88 project was studied as a 75 MW (15 MW of capacity) injection at Crescent Ridge TSS 981 138 kV substation in the ComEd territory. Project #R88 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 were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the System Impact Study)

1. The portion of the ComEd-owned Powerton to Junction B 138 kV line #1352 is loaded from 99.64% to 107% 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). This project contributes approximately 13 MW to cause this thermal violation.

Short Circuit

(Summary of impacted circuit breakers)

To be completed in the System Impact Study.

Contribution to Previously Identified Overloads

(#R88 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

1. Contribution of 25 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 178% to 186% 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). This overload was caused by projects prior to the R-queue with an additional contribution from project #R29. The System Impact Study for this project will define the cost allocation, if any, for this generation project. Rough estimates to eliminate the overload are around $50,000.

2. Contribution of 5 MW further overloads the Nelson to Walton Road (#P20) 345 kV line #15502 from 103% to 104% of its applicable load dump rating (1572 MVA) for the Cherry Valley to Silver Lake 345 kV line and Cherry Valley to Glidden 138 kV line tower outage (#15616 & #15627). This overload was first caused by project #R64 with an additional contribution from project #R65. The System Impact Study for this project will define the cost allocation, if any, for this generation project. Rough estimates to eliminate the overload are around $1.4 million.

3. Contribution of 5 MW further overloads the Walton Road (#P20) to Electric Junction 345 kV line #18402 from 114% to 115% of its applicable load dump rating (1572 MVA) for the Cherry Valley to Silver Lake 345 kV line and Cherry Valley to Glidden 138 kV line tower outage (#15616 & #15627). This overload was first caused by project #R33 with additional contributions from projects #R54, #R55, #R59, #R64 and #R65. The System Impact Study for this project will define the cost allocation, if any, for this generation project. Rough estimates to eliminate the overload are around $7.2 million.

4. Contribution of 11 MW further overloads the ComEd-owned Castleton Road (#P39) to the AmerenCILCO-owned Edwards Station 138 kV line #99523 from 120% to 127% of its applicable load dump rating (164 MVA) for the Kewanee - Hennepin – Streator and Crescent Ridge - Oglesby – Mazon 138 kV tower line outage (#6101 & #7713). This overload was first caused by project #R29 with an additional contribution from project #R33. The necessary reinforcements and associated cost estimates will be available at the System Impact Study phase for this project. The present line rating is limited by equipment at the AmerenCILCO-owned Edwards Station operated by MISO.

5. Contribution of 8 MW further overloads the #O22 to Dresden 345 kV line #1202 from 107% to 108% of its applicable load dump rating (1718 MVA) for the #O22 to Goodings Grove and #O27 to Goodings Grove 345 kV tower line outage (#19601 & #97503). This overload was caused by projects prior to the R-queue with additional contributions from projects #R29 and #R79. The System Impact Study for this project will define the cost allocation, if any, for this generation project. Rough estimates to eliminate the overload are around $0.5 million.

Potential Overloads

1. Contribution of 11 MW further loads the ComEd-owned #N15 to La Salle County 138 kV line #0112 from 96.5% to 99.7% of its applicable load dump rating (344 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

Stability and Reactive Power Requirements 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 Powerton to Junction B portion of 138kV line #1352 can be relieved by upgrading the line relaying to remove the forward trip limitation. These relaying upgrades may involve work at several AmerenIP-owned substations. Additional coordination with MISO may be required.

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 System Impact Study)

To be determined in the System Impact Study

Potential Issues

Impacts on the MISO member transmission systems are not included in this analysis, but they will be included in the System 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 17 MW further overloads the portion of ComEd-owned Kewanee 138kV South Transfer Bus between the connection of line #6101 and line #7421 from 177% to 185% 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. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.

2. Contribution of 12 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 224% to 229% of its normal rating (189 MVA). This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.

3. Contribution of 8 MW further overloads the Kewanee to Castleton Road (#P39) 138 kV line #7423 from 102% to 107% of its emergency rating (164 MVA) for the outage of the ComEd-owned Kewanee 138kV Main Bus to the AmerenIP-owned Kewanee 138kV circuit breaker #105 circuit. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.

4. Contribution of 14 MW further overloads the TSS107 Dixon to TDC317 Dixon portion of the 138 kV line #15508 from 141% to 145% of its emergency rating (420 MVA) for the 345/138 kV Nelson Transformer #82 outage. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.

5. Contribution of 12 MW further overloads the Kewanee to Normandy portion of 138 kV line #7408 from 124% to 129% of its emergency rating (210 MVA) for the Normandy to Schauff Rd (#O09) 138 kV line #12511 outage. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.

6. Contribution of 5 MW further overloads the Kewanee to Hennepin Tap portion of 138 kV line #6101 from 137% to 140% 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. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.

7. Contribution of 12 MW further overloads the Kewanee to Normandy (#P37) 138 kV line #7411 from 120% to 127% of its emergency rating (191 MVA) for the Kewanee to Normandy 138 kV line #7408 outage. This overload was first caused by project #R29.

8. Contribution of 8 MW further overloads the Nelson to Nelson Tap portion of 138 kV line #15508 from 125% to 128% of its emergency rating (280 MVA) for the Rock Falls to Schauff Rd (#O09) 138 kV line #13311 outage. This overload was caused by projects prior to the R-queue with additional contributions from projects #R29, #R54 and #R65.

9. Contribution of 14 MW further overloads the Nelson Tap to Dixon portion of 138 kV line #15508 from 138% to 140% of its emergency rating (445 MVA) for the outage

of the 345/138 kV Transformer #82 at Nelson. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.

10. Contribution of 8 MW further overloads the Normandy (#P37) to Schauff Road (#O09) 138 kV line #12511 from 179% to 184% of its emergency rating (184 MVA) for the outage of a Byron generating unit. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.
11. Contribution of 59 MW overloads the Oglesby Tap to Oglesby portion of 138 kV line #7713 from 88% to 124% of its emergency rating (165 MVA) for the Kewanee to Crescent Ridge 138 kV line #7413 outage.
12. Contribution of 10 MW further overloads the Oglesby Tap to Mazon portion of 138 kV line #7713 from 163% to 173% of its emergency rating (115 MVA) for the La Salle Co. to #N15 138 kV line #0112 outage. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.
13. Contribution of 15 MW further overloads the Rock Falls to Nelson 138 kV line #15509 from 316% to 324% of its emergency rating (184 MVA) for the Nelson to Schauff Rd (#O29) 138 kV line #15508 outage. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.
14. Contribution of 9 MW further overloads the Rock Falls to Nelson 138 kV line #15509 from 232% to 239% of its normal rating (140 MVA).
15. Contribution of 75 MW further overloads the Crescent Ridge to Oglesby Tap portion of 138 kV line #7713 from 116% to 161% of its emergency rating (168 MVA) for the Kewanee to Crescent Ridge 138 kV line #7413 outage. This overload was initially caused by projects prior to the R-queue.
16. Contribution of 26 MW overloads the Crescent Ridge to Oglesby Tap portion of 138 kV line #7713 from 98% to 114% of its normal rating (168 MVA).
17. Contribution of 15 MW further overloads the Schauff Road (#O09) to Rock Falls 138 kV line #13311 from 335% to 343% of its emergency rating (184 MVA) for the Nelson to Schauff Rd (#O29) 138 kV line #15508 outage. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.
18. Contribution of 9 MW further overloads the Schauff Road (#O09) to Rock Falls 138 kV line #13311 from 258% to 263% of its normal rating (140 MVA).
19. Contribution of 15 MW further overloads the Schauff Road (#O29) to Nelson Tap portion of 138 kV line #15508 from 248% to 253% of its emergency rating (265 MVA) for the Schauff Rd (#O09) to Rock Falls 138 kV line #13311 outage. This overload was caused by projects prior to the R-queue with an additional contribution from project #R29.
20. Contribution of 9 MW further overloads the Schauff Road (#O29) to Nelson Tap portion of 138 kV line #15508 from 186% to 191% of its normal rating (209 MVA).