

#Q68 – Kincaid-Pana (Christian County) 345kV Generation Interconnection

This analysis was completed to assess the reliability impact for a new generator interconnecting to the PJM system as a capacity resource.

Network Impacts

The #Q68 project was studied as a Capacity resource of 765 MW evaluated (Option #1) connected into the Kincaid 345 kV substation and (Option #2) connected into a tap of the Kincaid to North Pana (AmerenCIPS) to Coffeen (AmerenCIPS) 345 kV line 2105 equidistant from the Kincaid 345kV substation and the tap to the North Pana substation. Project #Q68 was evaluated for compliance with the PJM Reliability Criteria for summer peak conditions in 2011. Potential network impacts were as follows:

Option #1 - Interconnection into Kincaid 345 kV:

Generator Deliverability

No problems were identified.

Multiple Facility Contingency

No problems were identified

Contribution to Previously Identified Overloads

1. The Wilton Center-Livingston 3 Saunemin Wind Farm (O51) 345 kV line L11212 further overloads for the loss of the Dresden-Odell 345 kV line 18814. Pre and post-Q68 loadings on the monitored facility are 105% and 123% of its emergency rating (1234 MVA) for a 221-MW contribution from the Q68 project. This thermal violation was first caused by the O51 project.
2. Contribution of 16 MW further overloads the Powerton-Powerton JCTB portion of 138 kV line 1352 loads from 104% to 114% of its emergency rating (178 MVA) for the loss of the Canton-Cuba-Havana 138 kV line.

Short Circuit

There were no overdutied circuit breakers due to Q68 identified at this time, however, the short circuit evaluation will be reviewed in the Impact Study.

Stability

The Q68 project will impact the Kincaid Stability Schemes due to the interconnection into Station 21 Kincaid. The impact on these schemes will be assessed further during the Impact Study.

New System Reinforcements

None

Contribution to Previously Identified System Reinforcements

1. The overload of the L11212 Wilton Center-Livingston 3 Saunemin Wind Farm (O51) line can be alleviated by reconductoring a 0.19 mile section. The estimated cost of the reconductor is **\$88,000**.
2. The overload of the Powerton-Powerton JCTB portion of the 138kV line 1352 can be alleviated by replacing the terminal leads and disconnect switches at the Powerton terminal. The estimated cost of replacing the equipment is **\$890,000**

MISO Potential Issues

Impacts on the MISO member transmission systems are not finalized 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. The list below identifies circuits in MISO that PJM has identified could be impacted by the interconnection of the Q68 project.

1. Contribution of 23 MW increases the loading on Cat Moss to Hallock 138 KV line from 155% to 171% of its emergency rating (143 MVA).
2. Contribution of 103 MW increases the loading on Lansvlam 138 KV to Lansvlam 345 KV line from 109% to 142% of its emergency rating (308 MVA).
3. Contribution of 18 MW increases the loading on Wash St.138 KV to Raab Rd. 138 KV line from 110% to 121% of its emergency rating (165 MVA).
4. Contribution of 12 MW increases the loading on Blmgtn E 138 KV to Cltn Tap 138 KV line from 108% to 120% of its emergency rating (96 MVA).
5. Contribution of 18 MW increases the loading on MC9 TP 138 KV to Raab Rd. 138 KV line from 102% to 114% of its emergency rating (165 MVA).
6. Contribution of 18 MW increases the loading on Elpaso T 138 KV to MC9 TP 138 KV line from 102% to 113% of its emergency rating (165 MVA).
7. Contribution of 14 MW increases the loading on Wash St. 138 KV to Blmgtn W 138 KV line from 105% to 111% of its normal rating (239 MVA).
8. Contribution of 107 MW increases the loading on Brokaw2 345 KV to Clinton 345 KV line from 101% to 110% of its emergency rating (1195 MVA).
9. Contribution of 22 MW increases the loading on 1346A TP 138 KV to Kickapoo 138 KV line from 94% to 107% of its emergency rating (170 MVA).
10. Contribution of 8 MW increases the loading on 02Grnfld 138 KV to 02Lakeview 138 KV line from 100% to 104% of its normal rating (182 MVA).
11. Contribution of 12 MW increases the loading on CLT RT54 138 KV to S Clntn 138 KV line from 94% to 103% of its emergency rating (131 MVA).
12. Contribution of 12 MW increases the loading on N DEC E 138 KV to CO HY 20 138 KV line from 95% to 102% of its emergency rating (161 MVA).
13. Contribution of 55 MW increases the loading on E Spfld 138 KV to Eastdale 138 KV line from 80% to 99% of its emergency rating (287 MVA).

14. Contribution of 22 MW increases the loading on Richland 138 KV to Hallock 138 KV line from 264% to 270% of its emergency rating (143 MVA).
15. Contribution of 13 MW increases the loading on Hennepin 138 KV to LTV TP E 138 KV line from 132% to 139% of its emergency rating (191 MVA).
16. Contribution of 8 MW increases the loading on Rsw East 138to Spng Bay 138 KV line from 132% to 137% of its emergency rating (143 MVA).
17. Contribution of 8 MW increases the loading on Richland 138 KV to Spng Bay 138 KV line from 129% to 134% of its emergency rating (143 MVA).
18. Contribution of 13 MW increases the loading on LTV TP E 138 KV to Richland 138 KV line from 125% to 132% of its emergency rating (195 MVA).
19. Contribution of 7 MW increases the loading on Tazewell 138 KV to Flint 138 KV line from 118% to 123% of its emergency rating (156 MVA).
20. Contribution of 7 MW increases the loading on E Peoria 138 KV to Flint 138 KV line from 111% to 115% of its emergency rating (156 MVA).

Option #2 - Interconnection into a tap of the Kincaid – North Pana – Coffeen 345 kV line 2105:

Generator Deliverability

No problems were identified.

Multiple Facility Contingency

No problems were identified

Contribution to Previously Identified Overloads

1. The Wilton Center-Livingston 3 Saunemin Wind Farm (O51) 345 kV line L11212 further overloads for the loss of the Dresden-Odell 345 kV line 18814. Pre and post-Q68 loadings on the monitored facility are 105% and 120% of its emergency rating (1234 MVA) for a 191MW contribution from the Q68 project. This thermal violation was first caused by the O51 project.
2. Contribution of 16 MW further overloads the Powerton-Powerton JCTB portion of 138 kV line 1352 loads from 104% to 113% of its emergency rating (178 MVA) for the loss of the Canton-Cuba-Havana138 kV line.

Short Circuit

There were no overdutied circuit breakers due to Q68 identified at this time, however, the short circuit evaluation will be reviewed in the Impact Study.

Stability

The Q68 project will impact the Kincaid Stability Schemes due to the interconnection on line 2105. The impact on these schemes will be assessed further during the Impact Study.

New System Reinforcements

None

Contribution to Previously Identified System Reinforcements

3. The overload of the L11212 Wilton Center-Livingston 3 Saunemin Wind Farm (O51) line can be alleviated by reconductoring a 0.19 mile section. The estimated cost of the reconductor is **\$88,000**.
4. The overload of the Powerton-Powerton JCTB portion of the 138kV line 1352 can be alleviated by replacing the terminal leads and disconnect switches on the Powerton terminal. The estimated cost of replacing the equipment is **\$890,000**

MISO Potential Issues

Impacts on the MISO member transmission systems are not finalized 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. The list below identifies circuits in MISO that PJM has identified could be impacted by the interconnection of the Q68 project.

1. Contribution of 22 MW increases the loading on Cat Moss to Hallock 138 KV line from 155% to 170% of its emergency rating (143 MVA).
2. Contribution of 76 MW increases the loading on Lansvlam 138 KV to Lansvlam 345 KV line from 109% to 134% of its emergency rating (308 MVA).
3. Contribution of 256 MW increases the loading on Pana 345 KV to Pana 138 KV line from 68% to 132% of its emergency rating (400 MVA).
4. Contribution of 16 MW increases the loading on Wash St.138 KV to Raab Rd. 138 KV line from 110% to 120% of its emergency rating (165 MVA).
5. Contribution of 11 MW increases the loading on Blmgtn E 138 KV to Cltn Tap 138 KV line from 108% to 120% of its emergency rating (96 MVA).
6. Contribution of 16 MW increases the loading on MC9 TP 138 KV to Raab Rd. 138 KV line from 102% to 112% of its emergency rating (165 MVA).
7. Contribution of 16 MW increases the loading on Elpaso T 138 KV to MC9 TP 138 KV line from 102% to 112% of its emergency rating (165 MVA).
8. Contribution of 12 MW increases the loading on Wash St. 138 KV to Blmgtn W 138 KV line from 105% to 110% of its normal rating (239 MVA).
9. Contribution of 95 MW increases the loading on Brokaw2 345 KV to Clinton 345 KV line from 101% to 109% of its emergency rating (1195 MVA).
10. Contribution of 19 MW increases the loading on Brokaw2 345 KV to Clinton 345 KV line from 94% to 105% of its emergency rating (1195 MVA).
11. Contribution of 8 MW increases the loading on 02Grnfld 138 KV to 02Lakeview 138 KV line from 100% to 104% of its normal rating (182 MVA).
12. Contribution of 11 MW increases the loading on CLT RT54 138 KV to S Clinton 138 KV line from 94% to 103% of its emergency rating (131 MVA).

13. Contribution of 11 MW increases the loading on N DEC E 138 to CO HY 20 138 KV line from 95% to 102% of its emergency rating (161 MVA).
14. Contribution of 77 MW increases the loading on Pana IP 138 KV to Moweaq T 138 KV line from 73% to 100% of its emergency rating (287 MVA).
15. Contribution of 21 MW increases the loading on Richland 138 KV to Hallock 138 KV line from 264% to 279% of its emergency rating (143 MVA).
16. Contribution of 12 MW increases the loading on Hennepin 138 KV to LTV TP E 138 KV line from 132% to 139% of its emergency rating (191 MVA).
17. Contribution of 7 MW increases the loading on RSW East 138 KV to Spng Bay 138 KV line from 132% to 137% of its emergency rating (143 MVA).
18. Contribution of 7 MW increases the loading on Richland 138 KV to SPNG Bay 138 KV line from 129% to 134% of its emergency rating (143 MVA).
19. Contribution of 12 MW increases the loading on LTV TP E 138 KV to Richland 138 KV line from 125% to 131% of its emergency rating (195 MVA).
20. Contribution of 7 MW increases the loading on Tazewell 138 KV to Flint 138 KV line from 118% to 123% of its emergency rating (156 MVA).
21. Contribution of 7 MW increases the loading on E Peoria 138 KV to Flint 138 KV line from 111% to 115% of its emergency rating (156 MVA).