

Impact of MISO DPP-2014-August

Generators on PJM Facilities

1. MISO generators studied:

Table 1 – MISO DPP-2014-AUG

| Project Number | POI | Area | Max Output | Fuel Type |
|----------------|--|----------|------------|-----------|
| J285 | Proposed O'Brien County 345kV substation | 635 MEC | 250 | Wind |
| J289 | 161 kV substation on Winterset Junction to Creston 161 kV Line | 627 ALTW | 20 | Wind |
| J316 | MDU 230 kV Tatanka-Ellendale line | 661 MDU | 150 | Wind |
| J320 | Xcel's existing High Bridge 115 kV substation | 600 XEL | 55 | Gas |
| J325 | ITC Minden Station | 219 ITC | 4 | Wind |
| J327 | Raphson 120kV substation | 219 ITC | 150 | Wind |
| J329 | Pella West Substation | 635 MEC | 55 | Hydro |
| J332 | Point Substation | 210 SIGE | 83 | Gas |
| J339 | Gibson City South Substation | 357 AMIL | 68 | Gas |
| J340 | ITC Grassmere 345kV Substation | 219 ITC | 100 | Wind |
| J343 | 161 kV substation on Creston-Clarinda line | 635 MEC | 150 | Wind |
| J344 | 161 kV substation on Poweshiek-Oskaloosa line | 627 ALTW | 169 | Wind |
| J348 | Entergy Stuttgart Rcuskey-Almyra115 kV line | 351 EES | 81 | Solar |
| J354 | ITC Grassmere | 219 ITC | 52 | Wind |

2. Results Summary

- The steady state analysis performed identified thermal impacts on PJM system for J285 and J344 projects from Table 1.
- There were no thermal impacts on PJM system identified for the rest of the projects from Table 1.

3. Summer Peak analysis

- Model used – PJM Z1 2017SP with the above MISO generators and previous MISO DPP generators added
- Contingencies used – All PJM category B and C contingencies
- Monitored areas – All PJM areas
- Analysis type – Generation Deliverability
- All generators were scaled to their respective capacity portions for base case and category B events
- All generators were scaled to their respective total capabilities for category C events
- Results – **No overloads were identified**

4. Light Load analysis

- Model used – PJM Z1 2016LL with the above MISO generators and higher queued MISO DPP generators (wind, coal, and nuclear) added to the model
- Contingencies used – All PJM category B and C contingencies
- Monitored areas – All PJM areas
- Analysis type – Generation Deliverability
 - All wind generators were scaled to 80% of their respective total capabilities for base case, category B, and category C events
 - The coal generator was scaled to 45% of its respective total capabilities for base case, category B, and category C events
- Results :

Table 2 – Light load results (MW impacts of MISO projects are highlighted in yellow)

| Name | Name | CKT | KVs | Areas | Rating | FN AC Flow | FN AC % | Cont Label | Cont Type | J285 | J344 |
|----------|----------|-----|-----|-------|--------|------------|---------|------------------|-----------|-------|-------|
| CORDO; B | NELSO; B | 1 | 345 | ComEd | 1479 | 1711.77 | 115.74 | '345-L0404_-R' | single | 23.13 | 24.9 |
| QUAD3-11 | H471 ; | 1 | 345 | ComEd | 1528 | 1717.66 | 112.41 | '345-L15503_B-R' | single | 23.14 | 24.86 |
| H471 ; | NELSO; B | 1 | 345 | ComEd | 1528 | 1716.76 | 112.35 | '345-L15503_B-R' | single | 23.14 | 24.86 |

- MISO DPP-2012-August group drives all three of these overloads.
 - MISO projects that drive and contribute to these overload in DPP-2012-Aug choose not to upgrade the lines but instead wait for MISO Fargo-Sandburg-Oak Grove MVP to be built
 - MISO DPP-2012-August projects that contribute to these overloads may be curtailed until the MVP is built
 - MISO's J278 from DPP-2013-February chose to upgrade the Cordova – Nelson 345kV line and will share cost responsibility for the upgrade with any other project that elects the same option and meets cost allocation criteria
- Proposed Upgrades:

- To alleviate overload on Cordova – Nelson 345kV line: Upgrade 2 345kV CB's at TSS 155 Nelson and reconductor 0.4 miles of 2338 ACAR OVHD conductor. Cost **\$8M**.
- To alleviate overload on Quad 3-11 – H471 345kV line: upgrade 345kV BT 1-2 CB at ESS H471. Cost **\$3M**.
- To alleviate overload on H471 – Nelson 345kV line: upgrade 345kV BT 1-2 CB at ESS H471. Cost **\$3M**. (same as above)
- See Appendix 1 for cost allocation tables
- MVP option:
 - MISO Fargo-Sandburg-Oak Grove MVP was tested and proved to alleviate all identified overloads.
- Cost responsibility:
 - MISO's J285 and J344 will have cost allocation towards non-MVP upgrades based on MW impacts if these DPP projects chose to go in-service prior to the MVP. See Appendix 1
 - MISO's J285 and J344 will have no cost responsibility but may be curtailed if they chose to wait until the MVP is in-service
 - All other projects from Table 1 have no cost responsibility

Appendix 1 – Cost allocations:

1. Cordova – Nelson 345kV: Upgrade 2 345kV CB's at TSS 155 Nelson and reconductor 0.4 miles of 2338 ACAR OVHD conductor. Cost **\$8M.**

| Project | Impact, MW | Impact, % | Cost, \$M |
|---------|------------|-----------|-----------|
| J278 | 22 | 31.42% | 2.5132 |
| J285 | 23.13 | 33.03% | 2.6423 |
| J344 | 24.9 | 35.56% | 2.8445 |

2. Quad 3-11 – H471 - Nelson 345kV: upgrade 345kV BT 1-2 CB at ESS H471. Cost **\$3M.**

| Project | Impact, MW | Impact, % | Cost, \$M |
|---------|------------|-----------|-----------|
| J285 | 23.13 | 48.16% | 1.4447 |
| J344 | 24.9 | 51.84% | 1.5553 |