Queue S57
Collins
Feasibility Study Report

Option 1

The #S57 project was studied as a 1500 MW (300 MW of capacity) injection at two alternative interconnection points in the ComEd area. Option #1 of the proposed interconnection is into the existing 345kV Bus at Station 23 Collins (Interconnection Substation)**.**

Network Impacts

Option #1 connects into Station 23 Collins 345 kV substation. Project #S57 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. 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 were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

1. Contribution of 29 MW overloads the Wolfs Crossing 345/138kV transformer (TR 81) from 95.49% to 100.17% of its applicable load dump rating (610 MVA) for the Wolfs Crossing to Electric Junction 345kV tower line outage (#14321 & #14323).

2. Contribution of 29 MW overloads the Wolfs Crossing 345/138kV transformer (TR83) from 95.77% to 100.45% of its applicable load dump rating (610 MVA) for the Wolfs Crossing to Electric Junction tower line outage (#14321 & #14323).

3. Contribution of 27 MW overloads the Wolfs Crossing to Frontenac 138kV line #11102 from 94.1% to 102.8% of its applicable load dump rating (265 MVA) for the Wolfs Crossing to Electric Junction tower line outage (#14321 & #14323).

Short Circuit

(Summary of impacted circuit breakers)

To be determined in the System Impact Study

Contribution to Previously Identified Overloads
(#S57 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 30 MW further overloads the Conastone – Peachbottom 500 kV ckt#2 150.32% to 151.45% (DC power flow) of its emergency rating (2598 MVA) for the Conastone – Peachbottom 500 kV ckt#1 single line outage (PJM17). Previous project(s) S12, S17, S18, S23, S29, S32, S33, S52, S55 and S56 contribute(s) to the loading by 131.4MW(5.06%), 35.8MW(1.37%), 198.9MW(7.66%), 78.1MW(3%), 144.4MW(5.55%), 83.6MW(3.21%), 47.9MW(1.85%), 79.8MW(3.07%), 76.9MW(2.96%) and 57.2MW(2.2%) respectively. It must be noted that the same thermal violation (DC power flow: 112.5%) already exists in the 2012 base case.

2. Contribution of 30 MW further overloads the Conastone – Peachbottom 500 kV ckt#1 150.32% to 151.45% (DC power flow) of its emergency rating (2598MVA) for the Conastone – Peachbottom 500 kV ckt#2 single line outage (PJM17_2). Previous project(s) S12, S17, S18, S23, S29, S32, S33, S52, S55 and S56 contribute(s) to the loading by 131.4MW(5.06%), 35.8MW(1.37%), 198.9MW(7.66%), 78.1MW(3%), 144.4MW(5.55%), 83.6MW(3.21%), 47.9MW(1.85%), 79.8MW(3.07%), 76.9MW(2.96%) and 57.2MW(2.2%) respectively. It must be noted that the same thermal violation (DC power flow: 112.5%) already exists in the 2012 base case.

3. Contribution of 27 MW further overloads the Kemptown – North North West 500kV line loads from 185.11% to 186.39% (DC power flow) of its normal rating (2078MVA). Previous project(s) S12, S17, S18, S29, S52, S55 and S56 contribute(s) to the loading by 120.5MW(5.79%), 25.2MW(1.22%), 140.3MW(6.75%), 96MW(4.62%), 78.4MW(3.77%), 69.7MW(3.35%) and 53.6MW(2.58%) respectively. It must be noted that the same thermal violation (DC power flow: 155.0%) already exists in the 2012 base case.

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 two (2) ComEd-owned Wolfs Crossing 345/138kV transformers (TR81 & TR83) can be relieved by installing one (1) new 345/138kV transformer, 138kV reactor, four (4) 138kV circuit breakers, and the associated 138kV switchyard facilities at Plano (TSS 167). This has been roughly estimated to cost $ 19,000,000.

2. The overload on the portion of 138kV line 11102 from Wolfs Crossing to Frontenac can be relieved by reconductoring approximately 2.6 miles of transmission line to achieve a higher rating. This has been roughly estimated to cost $ 1,000,000.

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

The #S57 Option 1 project may impact stability at Dresden and/or Kendall County stations due to the interconnection into the existing Station 23 Collins. Stability studies will be performed during the System Impact Study.

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.

Contribution of 10 MW further overloads the ComEd to Ameren/IP (PJM to MISO) tie described as the Oglesby Tap to the Ameren/IP Oglesby Substation portion of 138kV line #7713 from 119% to 126% of its emergency rating (143MVA) for the outage of the Kewanee to Crescent Ridge 138 kV line #7413. The overloaded facilities are owned by Ameren (a MISO member) and any required upgrades will be included in the Impact 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 148 MW further overloads the Conastone – Peachbottom 500 kV ckt#2 from 193.3% to 199.0% (DC power flow) of its emergency rating (2598 MVA) for the Conastone – Peachbottom 500 kV ckt#1 single line contingency outage (PJM17). Previous project(s) S06, S12, S14, S17, S18, S23, S26, S29, S31, S32, S33, S36, S37, S45, S46, S51, S52, S54, S55 and S56 contribute(s) to the loading by 20MW(.8%), 131.4MW(5.1%), 6.6MW(.3%), 35.8MW(1.4%), 198.9MW(7.7%), 78.1MW(3.0%), 7.4MW(.3%), 144.4MW(5.6%), 44.4MW(1.7%), 83.6MW(3.2%), 47.9MW(1.8%), 17.2MW(.7%), 17.2MW(.7%), 13.6MW(.5%), 19.5MW(.8%), 14.2MW(.5%), 86.5MW(3.3%), 14.3MW(.6%), 76.9MW(3.0%) and 57.2MW(2.2%) respectively. It must be noted that the same thermal violation (DC power flow: 149.8%) already exists in the 2012 base case.

2. Contribution of 148 MW further overloads the Conastone – Peachbottom 500 kV ckt#1 from 193.3% to 199.0% (DC power flow) of its emergency rating (2598 MVA) for the Conastone – Peachbottom 500 kV ckt#2 single line contingency outage (PJM17_2). Previous project(s) S06, S12, S14, S17, S18, S23, S26, S29, S31, S32, S33, S36, S37, S45, S46, S51, S52, S54, S55 and S56 contribute(s) to the loading by 20MW(.8%), 131.4MW(5.1%), 6.6MW(.3%), 35.8MW(1.4%), 198.9MW(7.7%), 78.1MW(3.0%), 7.4MW(.3%), 144.4MW(5.6%), 44.4MW(1.7%), 83.6MW(3.2%), 47.9MW(1.8%), 17.2MW(.7%), 17.2MW(.7%), 13.6MW(.5%), 19.5MW(.8%), 14.2MW(.5%), 86.5MW(3.3%), 14.3MW(.6%), 76.9MW(3.0%) and 57.2MW(2.2%) respectively. It must be noted that the same thermal violation (DC power flow: 149.8%) already exists in the 2012 base case.

3. Contribution of 97 MW further overloads the North North West – Conastone 500 kV line from 113.6% to 118.2% (DC power flow) of its normal rating (2078 MVA). Previous project(s) S18, S29, S52, S54 and S56 contribute(s) to the loading by 174.7MW(8.4%), 124.8MW(6.0%), 81.6MW(3.9%), 12.4MW(.6%) and 49.2MW(2.4%) respectively.

4. Contribution of 85 MW further overloads the South Bend – Keystone 500 kV line from 128.2% to 131.5% (DC power flow) of its emergency rating (2595 MVA) for the Kemptown – North North West 500 kV single line contingency outage (PJM13B_NNWEST_B). Previous project(s) S06, S12, S14, S31, S36, S37, S45, S46, S51, S52, S54, S55 and S56 contribute(s) to the loading by 11.4MW(.4%), 77MW(3.0%), 7.3MW(.3%), 25.4MW(1.0%), 9.8MW(.4%), 9.8MW(.4%), 8MW(.3%), 11.5MW(.4%), 8.2MW(.3%), 45.1MW(1.7%), 8.2MW(.3%), 43.9MW(1.7%) and 33MW(1.3%) respectively. It must be noted that the same thermal violation (DC power flow: 116.2%) already exists in the 2012 base case.

5. Contribution of 8 MW further overloads the Greene – Roxbury 138 kV line from 130.0% to 135.3% (DC power flow) of its emergency rating (142 MVA) for the Kemptown – North North West 500 kV single line contingency outage (PJM13B_NNWEST_B). Previous project(s) S12, S18, S29 and S52 contribute(s) to the loading by 8.9MW(6.2%), 14MW(9.8%), 9.8MW(6.9%) and 7.2MW(5.1%) respectively. It must be noted that the same thermal violation (DC power flow: 101.9%) already exists in the 2012 base case.

6. Contribution of 134 MW further overloads the Kemptown – North North West 500 kV line from 228.5% to 235.0% (DC power flow) of its normal rating (2078MVA). Previous project(s) S06, S12, S14, S17, S18, S26, S29, S31, S36, S37, S45, S46, S52, S54, S55 and S56 contribute(s) to the loading by 18.1MW(.9%), 120.5MW(5.8%), 6MW(.3%), 25.2MW(1.2%), 140.3MW(6.7%), 6.7MW(.3%), 96MW(4.6%), 40.3MW(1.9%), 15.6MW(.7%), 15.6MW(.8%), 12.2MW(.6%), 17.5MW(.8%), 84.9MW(4.1%), 13.5MW(.6%), 69.7MW(3.3%) and 53.6MW(2.6%) respectively. It must be noted that the same thermal violation (DC power flow: 192.5%) already exists in the 2012 base case.

Option 2

The #S57 project was studied as a 1500 MW (300 MW of capacity) injection at two alternative interconnection points in the ComEd area. Option 2 of the proposed interconnection of S57 is into the existing 765kV ring bus at Station 23 Collins**.**

Network Impacts

The #S57 project was studied as a 1500 MW (300 MW of capacity) injection at two alternative interconnection points in the ComEd area. Option #2 connects into Station 23 Collins 765 kV ring bus. Project #S57 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. 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 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 Problems were identified

Short Circuit
(Summary of impacted circuit breakers)

To be completed in the System Impact Study

Contribution to Previously Identified Overloads
(#S57 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 29 MW further overloads the Conastone – Peachbottom 500 kV ckt#1 from 150.32% to 151.45% (DC power flow) of its emergency rating (2598 MVA) for the Conastone – Peachbottom 500 kV ckt#2 single line outage (PJM17_2). Previous project(s) S12, S17, S18, S23, S29, S32, S33, S52, S55 and S56 contribute(s) to the loading by 131.4MW(5.06%), 35.8MW(1.37%), 198.9MW(7.66%), 78.1MW(3%), 144.4MW(5.55%), 83.6MW(3.21%), 47.9MW(1.85%), 79.8MW(3.07%), 76.9MW(2.96%) and 57.2MW(2.2%) respectively. It must be noted that the same thermal violation (DC power flow: 112.5%) already exists in the 2012 base case.

2. Contribution of 29 MW further overloads the Conastone – Peachbottom 500 kV ckt#2 from 150.32% to 151.45% (DC power flow) of its emergency rating (2598 MVA) for the Conastone – Peachbottom 500 kV ckt#1 single line outage (PJM17). Previous project(s) S12, S17, S18, S23, S29, S32, S33, S52, S55 and S56 contribute(s) to the loading by 131.4MW(5.06%), 35.8MW(1.37%), 198.9MW(7.66%), 78.1MW(3%), 144.4MW(5.55%), 83.6MW(3.21%), 47.9MW(1.85%), 79.8MW(3.07%), 76.9MW(2.96%) and 57.2MW(2.2%) respectively. It must be noted that the same thermal violation (DC power flow: 112.5%) already exists in the 2012 base case.

3. Contribution of 27 MW further overloads the Kemptown – North North West 500 kV line from 185.11% to 186.39% (DC power flow) of its normal rating (2078 MVA). Previous project(s) S12, S17, S18, S29, S52, S55 and S56 contribute(s) to the loading by 120.5MW(5.79%), 25.2MW(1.22%), 140.3MW(6.75%), 96MW(4.62%), 78.4MW(3.77%), 69.7MW(3.35%) and 53.6MW(2.58%) respectively. It must be noted that the same thermal violation (DC power flow: 155.0%) already exists in the 2012 base case.

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)

None

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

The #S57 Option 2 project may impact stability at Dresden and/or Kendall County stations due to the interconnection into the existing Station 23 Collins. Stability studies will be performed during the System Impact Study.

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 147 MW further overloads the Conastone – Peachbottom 500 kV ckt#1 from 193.3% to 199.0% (DC power flow) of its emergency rating (2598MVA) for the Conastone – Peachbottom 500 kV ckt#2 single line outage (PJM17_2). Previous project(s) S06, S12, S14, S17, S18, S23, S26, S29, S31, S32, S33, S36, S37, S45, S46, S51, S52, S54, S55 and S56 contribute(s) to the

loading by 20MW(.8%), 131.4MW(5.1%), 6.6MW(.3%), 35.8MW(1.4%), 198.9MW(7.7%), 78.1MW(3.0%), 7.4MW(.3%), 144.4MW(5.6%), 44.4MW(1.7%), 83.6MW(3.2%), 47.9MW(1.8%), 17.2MW(.7%), 17.2MW(.7%), 13.6MW(.5%), 19.5MW(.8%), 14.2MW(.5%), 86.5MW(3.3%), 14.3MW(.6%), 76.9MW(3.0%) and 57.2MW(2.2%) respectively. It must be noted that the same thermal violation (DC power flow: 149.8%) already exists in the 2012 base case.

2. Contribution of 147 MW further overloads the Conastone – Peachbottom 500 kV ckt#2 from 193.3% to 199.0% (DC power flow) of its emergency rating (2598MVA) for the Conastone – Peachbottom 500 kV ckt#1 single line outage (PJM17). Previous project(s) S06, S12, S14, S17, S18, S23, S26, S29, S31, S32, S33, S36, S37, S45, S46, S51, S52, S54, S55 and S56 contribute(s) to the loading by 20MW(.8%), 131.4MW(5.1%), 6.6MW(.3%), 35.8MW(1.4%), 198.9MW(7.7%), 78.1MW(3.0%), 7.4MW(.3%), 144.4MW(5.6%), 44.4MW(1.7%), 83.6MW(3.2%), 47.9MW(1.8%), 17.2MW(.7%), 17.2MW(.7%), 13.6MW(.5%), 19.5MW(.8%), 14.2MW(.5%), 86.5MW(3.3%), 14.3MW(.6%), 76.9MW(3.0%) and 57.2MW(2.2%) respectively. It must be noted that the same thermal violation (DC power flow: 149.8%) already exists in the 2012 base case.

3. Contribution of 97 MW further overloads the North North West – Conastone 500 kV line from 113.6% to 118.2% (DC power flow) of its normal rating (2078 MVA). Previous project(s) S18, S29, S52, S54 and S56 contribute(s) to the loading by 174.7MW(8.4%), 124.8MW(6.0%), 81.6MW(3.9%), 12.4MW(.6%) and 49.2MW(2.4%) respectively.

4. Contribution of 85 MW further overloads the South Bend – Keystone 500 kV line from 128.2% to 131.5% (DC power flow) of its emergency rating (2595 MVA) for the Kemptown – North North West 500 kV single line outage (PJM13B_NNWEST_B). Previous project(s) S06, S12, S14, S31, S36, S37, S45, S46, S51, S52, S54, S55 and S56 contribute(s) to the loading by 11.4MW(.4%), 77MW(3.0%), 7.3MW(.3%), 25.4MW(1.0%), 9.8MW(.4%), 9.8MW(.4%), 8MW(.3%), 11.5MW(.4%), 8.2MW(.3%), 45.1MW(1.7%), 8.2MW(.3%), 43.9MW(1.7%) and 33MW(1.3%) respectively. It must be noted that the same thermal violation (DC power flow: 116.2%) already exists in the 2012 base case.

5. Contribution of 8 MW further overloads the Greene – Roxbury 138 kV line from 130.0% to 135.3% (DC power flow) of its emergency rating (142 MVA) for the Kemptown – North North West 500 kV single line outage (PJM13B_NNWEST_B). Previous project(s) S12, S18, S29 and S52 contribute(s) to the loading by 8.9MW(6.2%), 14MW(9.8%), 9.8MW(6.9%) and 7.2MW(5.1%) respectively. It must be noted that the same thermal violation (DC power flow: 101.9%) already exists in the 2012 base case.

6. Contribution of 133 MW further overloads the Kemptown – North North West 500 kV line from 228.5% to 234.9% (DC power flow) of its normal rating (2078MVA). Previous project(s) S06, S12, S14, S17, S18, S26, S29, S31, S36, S37, S45, S46, S52, S54, S55 and S56 contribute(s) to the loading by 18.1MW(.9%), 120.5MW(5.8%), 6MW(.3%), 25.2MW(1.2%), 140.3MW(6.7%), 6.7MW(.3%), 96MW(4.6%), 40.3MW(1.9%), 15.6MW(.7%), 15.6MW(.8%), 12.2MW(.6%), 17.5MW(.8%), 84.9MW(4.1%), 13.5MW(.6%), 69.7MW(3.3%) and 53.6MW(2.6%) respectively. It must be noted that the same thermal violation (DC power flow: 192.5%) already exists in the 2012 base case.

7. Contribution of 105.5 MW further overloads the Plano to Electric Junction 345 line #16704 from 105.9% to 113.7% (DC power flow) of its emergency rating (1341 MVA) for the outage of the Plano to Electric Junction 345kV line #16703. It must be noted that the same thermal violation (DC power flow: 105.9%) already exists in the 2012 base case.