Queue R96
Lancaster – Maryland 138kV
Feasibility Study Report

Network Impacts

The #R96 project was studied as a 200 MW (40 MW of capacity) injection into the Maryland to Baileyville Wind Farm (#K02_CE18) 138 kV line #12402 in the ComEd territory. Project #R96 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 Lancaster to Lancaster Wind Farm (#K04_CE19) 138 kV line #11921 is loaded from 95% to 121% of its applicable load dump rating (345 MVA) for the Sabrooke to Freeport and Sabrooke to Wempletown 138 kV tower line outage (#19414 & #17113). This project contributes approximately 88 MW to cause this thermal violation.

2. The Baileyville Wind Farm (#K02_CE18) to Titan Tire Tap portion of 138 kV line #11902 is overloaded from 80% to 122% of its applicable load dump rating (247 MVA) for the Byron to Cherry Valley 345kV tower line outage (#0621 & #0622). This project contributes approximately 105 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

(#R96 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 43 MW further overloads the Nelson to Walton Road (#P20) 345 kV line #15502 from 104% to 106% of its applicable load dump rating (1572 MVA) for the Cherry Valley to Silver Lake 345 kV and Cherry Valley to Glidden 138 kV tower line outage (#15616 & #15627). This overload was first caused by project #R64 with

additional contributions from projects #R65 and #R88. 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.

2. Contribution of 43 MW further overloads the Walton Road (#P20) to Electric Junction 345 kV line #18402 from 115% to 118% of its applicable load dump rating (1572 MVA) for the Cherry Valley to Silver Lake 345 kV and Cherry Valley to Glidden 138 kV tower line outage (#15616 & #15627). This overload was first caused by project #R33 with additional contributions from projects #R54, #R55, #R59, #R64, #R65 and #R88. 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.
3. Contribution of 9 MW further overloads the station equipment in series with the bus tie 2-3 circuit breaker at TSS 113 Waterman from 184% to 187% of its applicable load dump rating (265 MVA) for the Walton Road (#P20) to Electric Junction and Plano to Electric Junction 345 kV tower line outage (#18402 & #16703). This overload was caused by projects prior to the R-queue with additional contributions from projects #R33, #R54, #R55, #R59 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 $1 million.

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 Lancaster to Lancaster Wind Farm (#K04_CE19) 138 kV line #11921 can be relieved by reconductoring approximately 3 miles of transmission line to achieve a higher rating. This has been roughly estimated to cost $ 1,122,000.The overload of the Baileyville Wind Farm (#K02_CE18) to Titan Tire Tap portion of 138 kV line#11902 can be relieved by upgrading the line relaying to remove the forward trip limitation. These relaying upgrades may involve work at Baileyville Wind Farm TSS 992 and Lancaster TSS 119. This has been roughly estimated to cost $ 200,000.

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 System Impact Study)

To be determined in the System Impact Study

Potential Issues

During certain maintenance outages the #R96 project will be required to be taken off line. For example, during a maintenance outage of 138kV line #11902, a single contingency of 138kV line #12411 from Maryland to Dixon/Sterling would island the wind generation at Baileyville Wind Farm and #R96 into the load at Maryland. The typical duration of a maintenance outage on the ComEd system is one week.

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 84 MW overloads the Freeport to Titan Tire tap portion of 138 kV line #19414 from 203% to 249% of its emergency rating (182 MVA) for the outage of the Wempletown to Lancaster Wind Farm (#K04_CE19) 138 kV line #17121. This overload was first caused by project #R16 with additional contributions from projects #R55 and #R64.
2. Contribution of 47 MW overloads the Freeport to Titan Tire tap portion of 138 kV line #19414 from 142% to 175% of its normal rating (140 MVA). This overload was first caused by project #R64.
3. Contribution of 84 MW overloads the Lancaster to Freeport 138 kV line #11901 from 311% to 368% of its emergency rating (145 MVA) for the outage of the Wempletown to Lancaster Wind Farm (#K04_CE19) 138 kV line #17121. This overload was caused by projects prior to the R-queue with additional contributions from projects #R16, #R55, and #R64.
4. Contribution of 47 MW overloads the Lancaster to Freeport 138 kV line #11901 from 193% to 227% of its normal rating (140 MVA). This overload was first caused by project #R16 with additional contributions from projects #R55 and #R64.

5. Contribution of 116 MW overloads the #R96 to Maryland 138 kV line #12402 from 82% to 132% of its emergency rating (232 MVA) for the outage of the Wempletown to Lancaster Wind Farm (#K04_CE19) 138 kV line #17121.
6. Contribution of 200 MW overloads the #R96 to Baileyville Wind Farm (#K02_CE18) 138 kV line (formerly #12402) from 20% to 106% of its emergency rating (232 MVA) for the outage of the #R55 to Sterling (Dixon) portion of the former 138 kV line #12411.