Queue R16 Lena 138kV

Network Impacts

The #R16 project was studied as a 200 MW (40 MW of capacity) injection into the Lena to Lancaster 138 kV line #11904 adjacent to the Lena substation in the ComEd territory (same location as #P46). Project #R16 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 and No contingency or Single contingencies for the full energy output for radial conditions)

1. The portion of 138kV line #11904 (formerly line #11902) from the interconnection point of the #P46 and #R16 projects to the Eleroy Tap overloads from 40% to 120% of its normal rating (250 MVA). The #R16 project contributes 200 MW to cause this violation when operating at its full energy output along with the #P46 project. No other R-Queue projects contribute to this condition.

2. The portion of 138kV line #11904 (formerly line #11902) from the Eleroy Tap to Lancaster overloads from 35% to 115% of its normal rating (250 MVA). The #R16 project contributes 200 MW to cause this violation when operating at its full energy output along with the #P46 project. The magnitude of this overload will vary depending on the load at Eleroy. No other R-Queue projects contribute to this condition.

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 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

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

No problems were identified.

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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 on the portion of 138kV line #11904 (formerly line #11902) from the interconnection point of the #P46 and #R16 projects to the Eleroy Tap can be relieved by reconductoring approximately 7.2 miles of transmission line to achieve a higher rating. The estimated cost for this reconductoring this section of the line is $**2,736,000**.

2. The overload on the portion of 138kV line #11904 (formerly line #11902) from the Eleroy Tap to Lancaster can be relieved by reconductoring approximately 4.2 miles of transmission line to achieve a higher rating. The estimated cost for this reconductoring this section of the line is $**1,596,000**.

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)

None

Potential Issues

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

*There are several wind generation plants proposed in the general area of the **#R16** project, each with only 20% of their peak output level considered as a Capacity Resource, and the remaining 80% as an energy only resource. If all of the wind*

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generation plants are at their maximum output level simultaneously, a significant number of the transmission facilities, and many underlying system facilities are likely to be overloaded, restricting operation to a lower output level.

*PJM and the Transmission owner studied the delivery of the energy portion of this interconnection request. The following analysis has been performed to inform the Interconnection Customer of potential congestion issues (operational restrictions) that may occur and affect the **#R16** project's ability to operate at full output for certain system conditions. The upgrades listed below are not required reliability upgrades for the Queue **#R16** interconnection. Please note that the number of facilities identified below as requiring upgrades may be quite extensive with a number of these facilities requiring reconductoring/rebuilding of transmission lines. Some of the reconductoring/rebuilding projects can be done in a short time frame while others are quite extensive and will require a long time to complete. In general, the time necessary to design and rebuild an extensive facility upgrade will take approximately 2-3 years to complete. If the **#R16** Interconnection Customer wants to pursue construction of any of these upgrades, a separate Transmission Interconnection request must be submitted and the upgrades must be performed as merchant transmission projects.*

As a result of the aggregate energy resources in the area, the following violations were identified:

1. Contribution of 122 MW overloads the Lancaster to Freeport 138 kV line #11901 from 117% to 200% of its emergency rating (145 MVA) for the outage of the Wempletown to Freeport Wind Farm (#K04_CE19) 138 kV line #17121.
2. Contribution of 69 MW overloads the Lancaster to Freeport 138 kV line #11901 from 83% to 132% of its normal rating (140 MVA).
3. Contribution of 200 MW overloads the Lancaster to Freeport Wind Farm (#K04_CE19) 138 kV line #11921 from 33% to 109% of its emergency rating (261 MVA) for the outage of Lancaster to Freeport 138 kV line #11901 which also opens the 138kV line #11902 circuit breaker at Lancaster.
4. Contribution of 200 MW overloads the Freeport Wind Farm (#K04_CE19) to Pecatonica portion of 138 kV line #17121 from 63% to 140% of its emergency rating (261 MVA) for the outage of the Lancaster to Freeport 138 kV line #11901 which also opens the 138kV line #11902 circuit breaker at Lancaster.
5. Contribution of 200 MW overloads the Pecatonica to Wempleton portion of 138 kV line #17121 from 59% to 136% of its emergency rating (261 MVA) for the outage of the Lancaster to Freeport 138 kV line #11901 which also opens the 138kV line #11902 circuit breaker at Lancaster.

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