#V4-021– Keystone 345kV
Generation Interconnection

Network Impacts

The queue V4-021 project was studied as a 300MW (39MW of which was capacity) injection into Dayton's system at the Keystone 345kV substation. Project V4-021 was evaluated for compliance with reliability criteria for summer peak conditions in 2014. 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)

No problems were identified.

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.

Steady-State Voltage Requirements
(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined in the System Impact Study.

Stability and Reactive Power Requirement for Low Voltage Ride Through
(Summary of the 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)

None.

AEP's Analysis:

Unlike PJM, AEP performs AC analysis for interconnection projects in the feasibility stage. In analyzing the V2-019A Merchant Transmission Project with all other Wind Interconnection Projects in the AEP footprint at 13-20% (based on the queue position) of their total capacity, AEP identified numerous (>100) new overloads on the AEP bulk (100 kV and above) system. Furthermore, a number of other contingencies did not converge, and the project contributed to increased flows on several existing overload conditions on the AEP system. The higher level PJM analysis only recognized 3 new overloads on the AEP system. Considering the extensive differences between AEP and PJM analyses and methodologies, until these differences are addressed, AEP will be unable to verify the results of the PJM analyses for V2-019A and subsequent projects, including the subject of this report; V4-021.

While not validating the PJM results by performing any power flow studies, AEP is complying with the PJM request to provide information for the V4-021 interconnection project regarding attachment facilities and transmission improvements that address system conditions identified by PJM. Please note that these transmission improvements are based on the information shared by PJM, were determined without the benefit of detailed engineering studies, and are therefore preliminary in nature. The extent of improvements needed for the interconnection may vary by type of project and its position in the queue. AEP will work with PJM to resolve the differences in results during the Impact Study stage.

AEP is unable to comment on the feasibility of connection to Keystone Station, as AEP does not own those facilities.

Since there are no required upgrades identified by PJM for V4-021, no upgrade costs are provided at this time. The impact study will include a stability study to review the stability of the two generators connected at Keystone station.

Please note that project V2-019A has withdrawn from the queue since the analysis provided above by AEP was given.

Potential Congestion due to Local Energy Deliverability

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.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

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

The Keystone – Sorenson 345kV line (from bus 243225 to bus 243232 ckt 1) loads from 90.61% to 102.67% (DC power flow) of its emergency rating (1301MVA) for the operational contingency ('4814_B2') as a result of V4-021. This project contributes approximately 151.6MW to cause this thermal violation.