

Generator Interconnection

This analysis was completed to assess the reliability impact for a new generator interconnecting to the PJM System as a Capacity Resource.

Network Impacts (Option #1)

The R05 project was studied as a 50 MW (10 MW of capacity) injection at the Tinker Tap on the East Carbondale – Lackawanna 69 kV line. Project R05 was evaluated for compliance with reliability criteria for summer peak conditions in 2011. Potential network impacts were as follows:

NETWORK IMPACTS

Local Impacts

(Impacts to the lower voltage system not studied by PJM. Impacts are based on violations to Transmission Owner published Planning Reliability Criteria for normal system with all facilities in-service and contingency conditions)

- 1) If Queue R05 requires a December 2009 in-service date, the planned “Lackawanna - East Carbondale D/C 138/69 kV Line Project” reinforcement may need to be advanced to accommodate the Waymart/Brownell change-over to the East Carbondale Tap.

Generator Deliverability

(Normal system with all facilities in-service and Single, or N-1, contingencies for the Capacity portion only of the interconnection)

No problems identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only for the full energy output. Stuck breaker and bus fault contingencies will be performed for the Impact Study)

No problems identified.

Short Circuit Analysis

No problems identified.

Stability Analysis

Will be performed for the Impact Study.

Power Factor and Zero Voltage Ride – Through Analysis

Will be performed for the 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 identified.

NETWORK UPGRADE REQUIREMENTS

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. “Network Impacts”, initially caused by the addition of this project generation)

- 1) Lackawanna - East Carbondale D/C 138/69 kV Line Project: -- rebuild/reconductor line segment between Lackawanna and Edella substations. This project is currently scheduled for a November 2009 in-service. Initial operation at 69kV; future operation at 138kV. A one-year advancement in this project would cost approximately \$200,000.

Contribution to Previously Identified System Reinforcements *(This project contributes to the Network Impact causing the need for these Network Upgrades. This project will be allocated a cost to be determined during the Impact Study)*

None identified.

POTENTIAL ISSUES

Delivery of the Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request with all earlier queues at their energy output. Any problems identified below may result in operational restrictions to the project under study or other PJM generation. The developer can proceed with network upgrades to eliminate the potential congestion at their discretion by submitting a Merchant Transmission Interconnection request now or in the future. **These are not required reliability upgrades.**

As a result of the aggregate energy resources in the area, the following potential congestion was identified:

None identified.

Network Impacts (Option #2)

The R05 project was studied as a 50 MW (10 MW of capacity) injection into the Tiffany – Thompson 115 kV line. Project R05 was evaluated for compliance with reliability criteria for summer peak conditions in 2011. Potential network impacts were as follows:

NETWORK IMPACTS

Generator Deliverability

(Normal system with all facilities in-service and Single, or N-1, contingencies for the Capacity portion only of the interconnection)

No problems identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only for the full energy output. Stuck breaker and bus fault contingencies will be performed for the Impact Study)

No problems identified.

Short Circuit Analysis

Will be performed for the Queue R05 Impact Study.

Stability Analysis

Will be performed for the Queue R05 Impact Study.

Power Factor and Zero Voltage Ride – Through Analysis

Will be performed for the Queue R05 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)

None identified.

NETWORK UPGRADE REQUIREMENTS

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. “Network Impacts”, initially caused by the addition of this project generation)

None identified.

Contribution to Previously Identified System Reinforcements *(This project contributes to the Network Impact causing the need for these Network Upgrades. This project will be allocated a cost to be determined during the Impact Study)*

None identified.

POTENTIAL ISSUES

Delivery of the Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request with all earlier queues at their energy output. Any problems identified below may result in operational restrictions to the project under study or other PJM generation. The developer can proceed with network upgrades to eliminate the potential congestion at their discretion by submitting a Merchant Transmission Interconnection request now or in the future. **These are not required reliability upgrades.**

As a result of the aggregate energy resources in the area, the following potential congestion was identified:

It is estimated that the cost to mitigate the problems from 1 to 7 listed below (impacts to FE) is in excess of \$54,000,000.

1. Contribution of 49 MW further overloads the P45opt2 –Tiffany 115kV line from 91.8% to 134.4% (DC power flow) of its normal rating (115 MVA).
2. Contribution of 20 MW further overloads the North Meshhoppin – Oxbow 230 kV line from 113.4% to 117.4% (DC power flow) of its normal rating (499 MVA).
3. Contribution of 21 MW further overloads the Oxbow – Lackawanna 230 kV line from 137.4% to 141.5% (DC power flow) of its emergency rating (504 MVA) for the generator outage of Susquehanna unit#1 (PL57).

4. Contribution of 10 MW further overloads the Homer Ct – Shelocta 230 kV line from 156.1% to 157.3% (DC power flow) of its emergency rating (854 MVA) for the outage of Erie West – Wayne 345 kV line and Wayne 345/115 kV transformer (PN32).
5. Contribution of 11 MW further overloads the Shelocta – Keystone 230 kV line from 158.1% to 159.3% (DC power flow) of its emergency rating (854 MVA) for the outage of Erie West – Wayne 345 kV line and Wayne 345/115 kV transformer (PN32).
6. Contribution of 7 MW further overloads the Keystone 500/230 kV ckt#4 transformer from 180.1% to 181.5% (DC power flow) of its emergency rating (465 MVA) for the outage of Keystone 500/230 kV ckt#3 transformer (PJM30).
7. Contribution of 7 MW further overloads the Keystone 500/230 kV ckt#3 from 178.4% to 179.8% (DC power flow) of its emergency rating (471 MVA) for the outage of Keystone 500/230 kV ckt#4 transformer (PJM31).
8. Contribution of 6 MW further overloads the Lackawanna – Peckville 230 kV line from 101.7% to 102.7% (DC power flow) of its emergency rating (574 MVA) for the outage of Wescosville – Alburdis 500 kV line and Wescosville – Susquehanna 500 kV line and Wescosville 500/138 kV transformer (PJM66).
9. Contribution of 6 MW further overloads the PECKVILLE-PECKV-H5 230 kV line from 106.6% to 107.5% (DC power flow) of its emergency rating (558 MVA) for the outage of Wescosville – Alburdis 500 kV line and Wescosville – Susquehanna 500 kV line and Wescosville 500/138 kV transformer (PJM66).
10. Contribution of 5 MW further overloads the BLMGR-H2-BLMNG GR 230kV line from 102.6% to 103.6% (DC power flow) of its emergency rating (558 MVA) for the outage of Wescosville – Alburdis 500 kV line and Wescosville – Susquehanna 500 kV line and Wescosville 500/138 kV transformer (PJM66).
11. Contribution of 5 MW further overloads the PECKV-H5-BLMGR-H2 230kV line loads from 108.9% to 109.9% (DC power flow) of its emergency rating (558 MVA) for the outage of Wescosville – Alburdis 500 kV line and Wescosville – Susquehanna 500 kV line and Wescosville 500/138 kV transformer (PJM66).