Generation 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 - 240 MW into the Elko - Forrest 230 kV Line

Potential network impacts for the injection of 240 MW into the Elko - Forrest 230 kV line were evaluated for summer peak conditions in 2004.

Network Impacts

Potential network impacts for the injection of 240 MW into the Elko - Forrest, 230 kV line was evaluated for summer peak conditions in 2004. The analysis performed for this project included upgrades to the Shade Gap - Roxbury 115 kV line, a revised breaker configuration at the Erie West 345 kV substation as shown in Attachment 1, the addition of one line breaker at the Homer City 345 kV substation, the replacement of the existing Westfall 115/46 kV transformer, a series reactor on the Blairsville 138/115 kV transformer, a new 350 MVAR SVC at the Juniata 500 kV substation, a second Seward 230/115 kV transformer, a new 500 kV substation at Homer City along with one 500/345 kV transformer connection to the existing Homer City 345 kV substation, and an upgrade to terminal equipment on the Eclipse - Clark Summit 115 kV line. These enhancements were determined to be necessary for previously queued generator interconnection projects.
A summary of the results follows:

Normal System

- The new generator contributes 35 MW to the overload on the Homer City - Shelocta 230 kV circuit.
- The new generator contributes 1 MW to the overload on the Westfall 115/46 kV transformer.
- The new generator contributes 5 MW to the overload on the Blairsville 115/138 kV transformer.

Generator Deliverability

- The new generator causes a 1.3 MW overload on the Ridgway - Whetstone 115 kV circuit for the loss of the Elko - Forrest 230 kV circuit.
- The new generator contributes 35 MW to the overload on the Keystone 500/230 kV transformer #1 for the loss of the Keystone 500/230 kV transformer #2.

- The new generator contributes 45 MW to the overload on the Homer City - Shelocta 230 kV circuit for the loss of the Erie West - Ashtabula - Perry 345 kV circuit.

- The new generator contributes 1 MW to the overload on the Utica Junction - Eclipse 115 kV circuit for the loss of the Erie West - Ashtabula - Perry 345 kV circuit.

- The new generator contributes 10 MW to the overload on the Blairsville 138/115 kV transformer for the loss of the Homer City - Shelocta - Keystone 230 kV circuit.

- The new generator contributes 7 MW to the overload on the Garrett - Garrett Tap 115 kV circuit for the loss of the Homer City - Shelocta - Keystone 230 kV circuit.

- The new generator contributes 5 MW to the overload on the Seward - Florence 115 kV circuit for the loss of the Homer City - Shelocta - Keystone 230 kV circuit.

- The new generator contributes 100 MW to the post-contingency voltage drop problem at Juniata 500 kV for the outage of the Hunterstown - Conastone 500 kV circuit and the Hunterstown 500/230 kV #1.

- The new generator contributes 20 MW to the overload on the Shade Gap - Roxbury 115 kV circuit for the outage of the Lewistown - Juniata 230 kV circuit.

Multiple Facility Contingency (MAAC Criteria IIC)

- The new generator contributes 10 MW to the overload on the Homer City 345/230 kV transformer #2 for the line fault with stuck breaker condition involving the outage of the Homer City - Watercure 345 kV line and the Homer City 345/230 kV transformer #1.

Short Circuit Analysis

- No identified problems.

System Reinforcements

The new generator can expect to either pay a portion or the entire cost for the following system upgrades:

1. Build a 500 kV substation at Homer City and install four breakers. Estimated Cost = $9 million.
2. Re-route the Keystone - Conemaugh 500 kV line through Homer City. Estimated Cost = $1.8 million.
3. Install one 345/500 kV transformer at Homer City with connections. Estimated Cost = $5 million.
4. Replace the Westfall 115/46 kV transformer. Estimated Cost = $0.7 million.
5. Install a breaker at the end of the Homer City - Watercure 345 kV line. Estimated Cost = $1.75 million.
6. Install a 350 MVAR SVC at Juniata 500 kV substation. Estimated Cost = $14.5 million.
7. Install a 0.04 pu series reactor for the Blairsville 138/115 kV transformer. Estimated Cost = $1.5 million.
8. Upgrade the Shade Gap to Roxbury 115 kV line. Estimated Cost = $5.5 million.
9. Upgrade terminal equipment to increase rating of Ridgway - Whetstone 115 kV. Estimated cost = $0.1 million.
10. The 0.05 pu series reactor for the Garrett - Garrett Tap 115 kV line (initially identified for project B34) is no

longer required with the addition of this project.

11. Upgrade of the 1.2 kA disconnect switch at Shelocta 230 kV (initially identified for project B34) is no longer required with the addition of this project.
12. Upgrade of the 1.2 kA line trap at Altoona 230 kV (initially identified for project B34) is no longer required with the addition of this project.
13. Upgrade of the series reactor for the Blairsville 138/115 kV transformer to 0.10 pu is no longer required with the addition of this project.
14. Additional breaker at the end of the Homer City - Stolle Rd. 345 kV line is no longer required with the addition of this project.

Total cost estimate for network reinforcements = $39.4 million. The estimated time to complete the construction for the system reinforcements is four years. The generation project is anticipated to be in service prior to completion of the network reinforcements required for this project to get capacity interconnection rights. Evaluations can be performed to analyze system conditions when the generation is ready for service prior to all projects being completed to determine if any interim capacity interconnection rights could be granted.

At the feasibility study level, specific cost allocation percentages will not be provided.

Attachment 1

Erie West 345 kV Substation