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 -500 MW Injection into the Seward 230kV substation

Network Impacts

Potential network impacts for the injection of 500 MW into the Seward 230 kV bus, coincident with the retirement of 196 MW from the Seward 115 kV bus, were evaluated for summer peak conditions in 2004.

The analysis performed for this project included upgrades to the Shade Gap – Roxbury 115 kV line, and a revised breaker configuration at the Erie West 345 kV substation as shown in Figure #2. The analysis also included the addition of two line breakers at the Homer City 345 kV substation, an upgraded replacement for the existing Westfall 115/46 kV transformer and a new 350 MVAR SVC at the Juniata 500 kV substation. 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 15 MW to the overload on the Blairsville 138/115 kV transformer.

Single Contingency (MAAC Criteria IIA)

- The new generation contributes 170 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 generation contributes 15 MW to the overload on the Blairsville 138/115 kV transformer for the loss of the Erie West – Ashtabula – Perry 345 kV circuit.

- The new generation contributes 185 MW to the overload on the Seward 230/115 kV transformer for the loss of the Homer City – Shelocta – Keystone 230 kV circuit.

- The new generation contributes 80 MW to the overload on the Johnstown – Altoona 230 kV circuit for the loss of the Homer City – Shelocta – Keystone 230 kV circuit.

- The new generation contributes 20 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 generation contributes 25 MW to the overload on the Seward – Florence 115 kV circuit for the loss of Homer City – Shelocta – Keystone 230 kV circuit.

- The new generation contributes 145 MW to the post-contingency voltage drop problem at Juniata 500 kV for the outage of the Hunterstown – Conastone 500 kV circuit and Hunterstown 500/230 kV #1 transformer. This problem was previously identified for an earlier queued generator interconnection project, and is what necessitates the new 350 MVAR SVC at Juniata 500 kV. The violation is eliminated with the new SVC and, as such, the Seward project will be allocated a percentage of the costs for the upgrade based on its MW contribution in relation to other new generators.

- The new generation contributes 15 MW to the overload on the Shade Gap – Roxbury 115 kV circuit for the outage of Lewistown – Juniata 230 kV circuit. This overload was previously identified for an earlier queued generator interconnection project. The new generator will be allocated a percentage of the costs for the upgrade based on their MW contribution in relation to other new generators.

- The new generator contributes 15 MW to the post-contingency overload on Erie South 345/230 kV #1 for the outage of Erie West – Ashtabula – Perry 345 kV and Erie West 345/115 kV #1. This overload was previously identified for an earlier queued generator interconnection project. The new generator will be allocated a percentage of the costs for the upgrades based on their MVA contribution in relation to other new generators.

Multiple Facility Contingency (MAAC Criteria IIC)

- No new post-contingency overloads.

Short Circuit Analysis

- Two 230 kV circuit breakers at Seward substation exceed their interrupting capability (110.0% of 24 kA rating).

System Reinforcements

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

1) Rebuild the Shade Gap to Roxbury 115 kV line (13.5 miles) with 795 kcmil 26/7 ACSR designed for 125 degree C operation using wood pole H-frames. Estimated Cost = $5.5 million.

2) Add breakers and reconfigure the Erie West 345 kV substation. See Figure #2. Estimated Cost = $2.978 million.

3) Install a 350 MVAR SVC at Juniata 500 kV substation. Estimated Cost = $14.5 million.

4) Install a 0.10 pu series reactor for the Blairsville 138/115 kV transformer. Estimated Cost = $2.0 million.

5) Install a 0.05 pu series reactor for the Garrett – Garrett Tap 115 kV line. Estimated Cost = $1.0 million.

6) Replace the two 230 kV breakers at Seward with new 40 kA breakers. Estimated Cost = $0.58 million.

7) Install a second 230/115 kV transformer at Seward. Estimated Cost = $4.1 million.

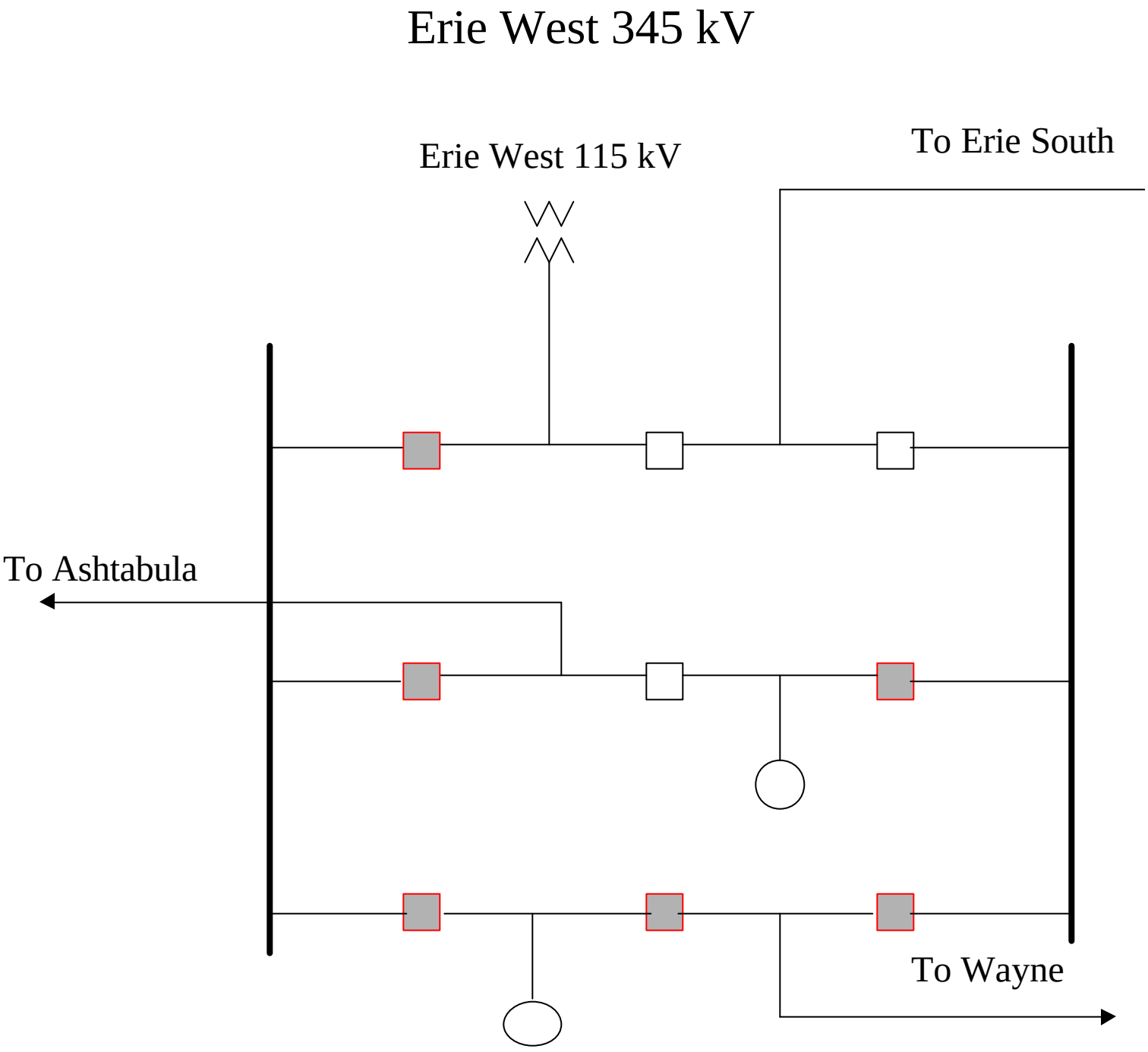
8) Upgrade the 1.2 kA disconnect switch at Shelocta 230 kV to 2.0 kA. Estimated Cost = $0.6 million.

9) Upgrade the 1.2 kA line trap at Altoona 230 kV to 2.0 kA. Estimated Cost = $.05 million

Total cost estimate for the network enhancements is $31.3 million.

Cost allocation percentages are not provided as part of the Feasibility Study analysis. Cost allocation will be provided in the Impact Study report.

Figure #2


Erie West 345 kV
Erie West 115 kV
To Erie South
To Ashtabula
To Wayne