Generation Interconnections

This analysis was completed to assess the reliability impact for a new generator interconnecting to the PJM system as a capacity resource.

Network Impacts -70 MW Injection into the Elm St. 115kV substation (E14)

Network Impacts

Potential network impacts for the injection of 70 MW into the Elm Street 115 kV bus were evaluated for summer peak conditions in 2005. The analysis performed for this project included system upgrades required for earlier queued projects.

Normal System

- No identified problems

Single Contingency (MAAC Criteria IIA)

- Project E14 contributes to the post-contingency voltage drop problem at Juniata 500 kV for the outage of Hunterstown - Conastone 500 kV and Hunterstown 500/230 kV #1. This overload was previously identified for an earlier queued generator interconnection project

Multiple Facility Contingency (MAAC Criteria IIC)

- No identified problems.

Generator Deliverability

- The E14 project contributes approximately 15 MW to the Warren - Falconer 115 kV circuit which was identified as an overload for a previous project.
- The E14 project contributes approximately 25 MW to the previously identified contingency overload on Glade - Glade Tap 230 kV for the outage of Erie South - Union City 230 kV. The reinforcements identified to resolve this overload are no longer adequate with the addition of project E14. The Glade-Glade Tap 230kV circuit is now overloaded at 102 % of its emergency rating (617 MVA) for an outage of the Erie West-Perry 230kV circuit. As such, the E14 project will share in the cost allocation for the previously identified reinforcements and will also require additional upgrades in this area. All reinforcements to resolve the Glade - Glade Tap 230 kV overload are identified in the system reinforcements section of this report

Short Circuit Analysis

- No problems were identified.

System Reinforcements

1) The installation of a 350 MVAR SVC at Juniata 500 kV will resolve the voltage violation identified previously. The cost is estimated at $20 million with a 4 year lead time. Project E14 will be allocated a percentage of the costs for the upgrade based on its MW contribution in relation to other new generators.
2) The overload on the Warren-Falconer 115 kV line, shown as 1 above, will be alleviated by the addition of the following upgrades:

- Rebuild the Warren-Falconer 115 kV transmission line (16.6 miles) using 795 kcmil 26/7 ACSR at 125 degrees C. The estimated cost is $7.936 million and the estimated time for completion is 2 3/4 years.
- At Warren 115 kV substation replace two 600/5 ampere current transformers with 1200/5 current transformers to accommodate the increase in the Warren-Falconer line conductor capability. The estimated cost is $0.168 million and the estimated time for completion is 1 1/4 years.
- At Falconer 115 kV substation replace one 115kV circuit breaker, two 600/5 ampere current transformers with 1200/5 ampere current transformers, and the conductor from the line to the breaker, the breaker to the bus and the bus itself to accommodate the increase in the Warren-Falconer line conductor capability. The estimated cost is $0.685 million and the estimated time to completion is 1 3/4 years.

Project E14 will be allocated a percentage of the costs for the upgrade based on its MW contribution in relation to other new generators.

3) The previously identified overload on the Glade - Glade Tap 230kV line and the Union City - Erie South 230kV circuit will be alleviated by the addition of the following network upgrades. Project E14 analysis was done with these reinforcements modeled. Prior to issuance of this report the B49 project and several others have withdrawn.

- Acquire and install a 230/115kV (224 MVA) transformer at the Union City 230kV substation. The estimated cost is $4.54 million and the estimated time for completion is 2 years.
- Construct a new 115kV line of approximately 4 miles from the Union City 230kV substation to the Union City 115kV substation. The developer will be responsible for acquiring the right-of-way. The estimated cost for the line construction is $3.752 million and the estimated time for construction, after acquisition of the right-of-way is 2 years
- Acquire and install one 115kV circuit breaker with associated switches for the termination of the new 115kV line at Union City 230kV substation location. The estimated cost is $0.98million and the estimated time for completion is 2 years.
4) Install a 350 MVAR SVC at Juniata 500 kV substation. Estimated Cost = $14.5

million.

- Add a new position at Union City 115kV substation for termination of the new 115kV line. The estimated cost is $0.966 million and the estimated time for completion is 2 years.

Project E14 will be allocated a percentage of the costs for these upgrade based on its MW contribution in relation to other new generators.

In addition, the new overload on the Glade-Glade Tap circuit caused by project E14 will be alleviated by replacing structure 299 type s-70 with type S-75, structure 297 type AM-60 with type AM-65, structure 29A type s-75-60 with type S-90-85, structure 292 type DS-75 with type DS-80 and structure 291 type S-80 with type S-85. This will allow the line to be rated at 140 degrees centigrade (546/658 MVA normal/4-hour emergency). The estimated cost for this upgrade is $120,000 and completion is estimated to take 9 months.

The analysis results and system reinforcements listed above were completed prior to the withdrawal of project E38 Erie West, A42 Atlantic, A43 Portland, B49 Erie South-Warren. The withdrawal of the projects listed could have a significant impact on the network reinforcements required for interconnection of this project to the transmission system.