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 - 800 MW Injection

Network impacts for the injection of 800 MW into the Eagle Point 230kV Substation are as follows:

With the injection of 800MW at Eagle Point power flow simulation indicates overloading of the Eagle Point to Gloucester 230kV path and the Eagle Point to Mickleton 230kV path. This will require the addition of two new 230kV circuits; one from Eagle Point to Gloucester, and another from Eagle Point to Mickleton. The estimated cost to construct these two circuits and to perform associated 230kV substation work at Gloucester, Mickleton, Deptford, and Thorofare is $12.8M. Construction leadtime is approximately 24 months.

Following the addition of the 230kV circuits identified above, further loadflow analysis for normal system operation (with all transmission facilities in service) produces the following overloads:

- Gloucester-Cuthbert Boulevard 138kV circuit (122% of its normal rating)
- Delco Tap-Mickleton 230kV circuit (140% of its 452 MVA normal rating)
- Gloucester 230/138kV transformer was (118% of its 265 MVA normal rating)

The transmission reinforcements needed to alleviate the Gloucester-Cuthbert Boulevard overload include conversion of the Cuthbert Boulevard-Camden 138kV cable circuit to 230kV operation, installation of a Phase Angle Regulator in this circuit, terminal facilities at Gloucester and Camden, and conversion of the Cuthbert Boulevard Substation to 230kV. The estimated costs for these facilities are $15.0 million for station work and $10.0 million for the replacement of the 138 kV cable with 230 kV cable. The Phase Angle Regulator in this circuit will be needed to control the contingency loading of one Eagle Point Gloucester 230 kV circuit for the loss of the other Eagle Point Gloucester 230 kV circuit.

Following the addition of the transmission system reinforcements listed above, all normal overloads are resolved. However, single contingency and towerline outage analyses indicate that the following contingency overloads will exist:

- Mickleton - Delco Tap - Trainer - Chichester 230kV line, for the outage of the Eagle Point-Gloucester 230kV towerline, (185% of its 566 MVA emergency rating)
- Monroe - Mickleton 230kV line, for the outage of the Eagle Point-Gloucester

230kV towerline, (123% of its 444 MVA emergency rating)

Upgrade of the 11.2 mile Mickleton - Delco Tap - Trainer - Chichester 230kV circuit was identified as a possible requirement as a result of network impacts associated with Generator Interconnection Request Queue #A13 (Mickleton 230kV). In that instance, the upgrade was estimated to cost $3.3M - $9M and to take 18-24 months to complete. The uncertainty in those estimates reflected the uncertainty of whether adequate circuit thermal capability could be obtained without replacement of existing transmission line structures. The most critical structures are those used to cross the Delaware River. The additional overload contributed by this 800 MW project will make it less certain that the upgrade can be made without extensive structure replacement which may cost several times the amount listed above with possibly a much longer permitting and construction time. A more detailed evaluation will be required at the impact study level to determine the design limitations to the existing circuit and to explore other alternatives.

To relieve Mickleton-Monroe 230kV circuit overloads a second Mickleton-Monroe 230kV circuit can be constructed by adding a set of conductors to open positions on the existing double circuit towerline. This will also require the addition of circuit breakers and line positions at the Mickleton and Monroe Substations. The estimated cost to construct the second Mickleton-Monroe 230kV circuit is $1.5M, and the addition of line positions and circuit breakers at Mickleton and Monroe substations is estimated to cost $3.9M. It will take approximately 18-24 months to construct these upgrades.

Short circuit analysis indicates that this project will contribute to the overduty of Mickleton Substation 230 kV circuit breaker "R" which was identified as a network impact associated with Generator Interconnection Request Queue #A13 (Mickleton 230kV). Replacement of Mickleton Substation 230kV circuit breaker "R" is estimated to cost $0.5M and take 12-18 months to complete.