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 - 330 MW Injection

Injection of 330 MW into the Delco Tap 230kV substation was evaluated for network impacts. The following impacts were determined:

Normal System

- No identified problems.

Multiple Facility Contingency - Tower Line Outages (MAAC Criteria IIC)

1) The Mickleton - Thorofare 230 kV circuit was overloaded to 105% due to the outage of the Mickleton - Monroe 230 kV double circuit tower line. (note: the addition of the 2nd circuit to the Mickleton - Monroe double circuit tower line was was required as a result of reliability violation identified below in item "7)".

Generator Deliverability

2) The Master - North Philadelphia 230 kV circuit was overloaded. This overload was identified for a previous project. Project #E19 contributes approximately 50MW towards this overload.

3) The Parrish - Master 230 kV circuit was overloaded. This overload was identified for a previous project. Project #E19 contributes approximately 45 MW towards this overload.

4) The North Philadelphia - Waneeta 230 kV circuit was overloaded. This overload was identified for a previous project. Project #E19 contributes approximately 30 MW towards this overload.

5) The Project #A27 - Graysferry circuit was overloaded due to the outage of the Macdade - Morton and Morton Tap - Project #A19 230 kV circuits. This overload was identified for a previous project. Project #E19 contributes approximately 60 MW towards this overload

6) The Project #A19 - Morton Tap 230 kV circuit was overloaded due to the outage of the Graysferry - Project #A27 230 kV circuit. This overload was identified for a previous project. Project #E19 contributes approximately 65 MW towards this overload.

7) The Mickleton - Monroe 230 kV circuit was overloaded due to the outage of the Eagle Point -

Gloucester 230 kV circuit together with the Gloucester 26/230 kV transformer. This overload was identified for a previous project. Project #E19 contributes approximately 30 MW towards this overload.

8) The Graysferry - Parrish 230 kV circuit was overloaded due to the outage of the Concord - Lenape 230 kV together with the Concord 230 - 35kV transformer. This overload was previously identified. Project #E19 contributes approximately 100 MW towards this overload.

Although the loading on the Delco-Tap - Trainer 230 kV circuit was below its emergency rating for the outage of the Red Lion - Hope Creek 500 kV circuit under the current study assumptions, numerous new projects proposed in the Lower Delaware Valley area were required to be dispatched to back off the loading on this facility. Should one or more of these projects reduce in size or withdraw from the queue, the loading on this circuit may increase above the reliability threshold.

Short Circuit Analysis

9) Project #E19 fault current contribution increases the interrupting requirement for six circuit breakers which were already identified to be overdutied as a result of earlier queued projects. As a result, Project #E19 may have a cost allocation responsibility for replacement or upgrade of the following circuit breakers:

Substation CB
Chichester 45
Chichester 135
Chichester 195
Chichester 255
Chichester 365
Chichester 395

System Reinforcements

1) The Mickleton - Thorofare 230 kV circuit overload can be eliminated by replacing a Power Line Carrier line trap at the Thorofare terminal and relacement/upgrade of one transmission line structure. The cost is estimated at $0.254 million and can be completed within 18 months.

Conectiv work
Mickleton - Thorofare replace or perhaps reconfigure one tower
cost: $0.204 million
Time: 12 - 18 months
PSEG work
To replace the line trap at Thorofare with one rated 230kV, 2000A.
Cost: approximately $0.05 million
Time: Installation time is one month

2) The Master - North Philadelphia 230 kV circuit overload can be eliminated by reconductoring the Master - N. Philadelphia 230kV circuit. The cost is estimated at $11.9 million and can be completed within 36 months.

3) The Parrish - Master 230 kV circuit can be eliminated by reconductoring the Parrish - Master circuit. The cost is estimated at $ 7.7 million and can be completed within 36 months.

4) The North Philadelphia - Waneeta 230 kV overload can be eliminated by reconductoring the North Philadelphia - Waneeta circuit. The cost is estimated at $8.4 million and can be completed within 36 months.

5) The A27 - Graysferry 230 kV overload can be eliminated by reconductoring the A27 - Graysferry conductor. The cost is estimated at $ 2.0 million and can be completed within 36 months.

6) The A19 - Morton Tap 230 kV overload can be eliminated by replacing the Morton Tap 230 kV switch. The cost is estimated at $ 0.06 million and can be completed within 36 months.

7) The Mickleton - Monroe 230 kV overload can be eliminated by adding a second circuit to the existing Mickleton - Monroe 230 kV double circuit tower line. The cost is estimated at $ 7.2 million and can be completed within 18 - 24 months.

8) The Graysferry - Parrish 230 kV overload can be eliminated by reconductoring the Graysferry - Parrish 230 kV circuit. The cost is estimated at $ 14.7 million and can be completed within 36 months.

9) The cost to replace / upgrade the six overdutied Chichester 230kV circuit breakers is estimated at $1.5 million.

The total cost of all #E19 related network upgrades is estimated at $52 million. However, except for the Mickleton - Thorofare upgrade, there are several earlier queued projects that may have a cost allocation toward these upgrades. Also, it should be noted that all of the aforementioned upgrades for earlier queued projects are either in the design (Facilities Study) or construction stage. Preliminary Facilities Study results for reinforcements 2,3,4, and 8 indicate that the cost of construction for these reinforcements may be considerably less than originally estimated and presented in this report. Also, see the Transmission Expansion Advisory Committee (TEAC) May 31 - June 1 , 2001 meeting presentation material posted on the PJM website for further information about upgrade requirements for earlier queued projects in the Lower Delaware Valley (LDV) cluster area.