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 - 500 MW Injection

Network impacts for the injection of 500 MW into the Edgemoor 230kV Substation are as follows:

During normal operation, with all transmission facilities in-service, power flow simulation

indicates that all voltages can be adjusted within an acceptable range but the following transmission line thermal overloads were found: (The overload of these facilities may not be solely due to the addition of this generator. MVA values listed are this project's approximate contribution to the overload)

138 kV

- Christiana - Edgemoor 138kV; 25 MVA.

230 kV

- Mickleton-Monroe 230 kV line; 20 MVA

- Master - N. Phila. (220-44 line); 55 MVA
- N. Phila. - Waneeta (220-49 line); 40 MVA
- Grays Ferry - Parrish (220-27 line); 85 MVA
- Master - Parrish (220-45 line); 50 MVA
- Gloucester - Eagle Point (P2242 line); 20 MVA

Single contingency and towerline outage analyses were also performed. The following facilities were found to exceed emergency ratings for single contingency outages: (The overload of these facilities may not be solely due to the addition of this generator. MVA values listed are this project's approximate contribution to the overload)

138 kV

- Christiana - Edgemoor 138kV; 25 MVA.

230 kV

- Mickleton-Monroe 230 kV; 20 MVA
- Master - N. Phila. (220-44 line); 55 MVA
- N. Phila. - Waneeta (220-49 line); 40 MVA
- Grays Ferry - Parrish (220-27 line); 85 MVA
- Master - Parrish (220-45 line); 50 MVA
- Gloucester - Eagle Point (P2242 line); 20 MVA
- Eddystone - Morton Tap; 80 MVA

500 kV

- Conastone 500/230kV transformer; 20 MVA

(Note: All normal operation and contingency overloads shown for local and regional system impacts may not be solely due to the injection of 500 MW by this project. In some instances this project aggravates an overload which exists from injection of generation which was earlier in Queue A).

The cost and construction time estimates for required network upgrades are as follows:

138 kV Upgrades

- Upgrade Edgemoor - Christiana 138kVcircuit. ($ 0.2M)

230 kV Upgrades

- #2 Mickleton-Monroe 230 kV. (Substation: $5.4M; Line: $2.1M)
- Grays Ferry - Parrish 230 kV (220-27 line); $10 Million
- Master - N. Philadelphia 230 kV (220-44 line); $8 Million
- N. Philadelphia - Waneeta 230 kV (220-49 line); $6 Million
- Master - Parrish (220-45 line); $4 Million
- Gloucester - Eagle Point (P2242 line); $5 Million
- Eddystone - Morton Tap; $7.7M

500 kV Upgrades

- Conastone 500/230kV transformer; $20M

Estimated time for construction of upgrades is 24-36 months assuming that it is possible to concurrently perform all of the work and obtain the required outages to transmission facilities.

A short circuit analysis was not performed for this project because the results will be highly dependent upon assumptions about connection of nearby projects which are earlier in Generator Interconnection Request Queue A. Many 230 kV circuit breakers in this area of the transmission system may become overdutied and require replacement if several new generators connect. A 230 kV circuit breaker replacement is estimated to cost $350,000 and take 12-18 months to complete. Replacing multiple circuit breakers can take longer if facility outages can not be obtained to allow for work to be performed

concurrently.