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 - 396 MW Injection at Linden

Potential network impacts for the injection of an additional 396 MW near the Linden 230 kV substation were evaluated for summer peak conditions in 2004. Six cases were developed for the Linden project. Three pre-project cases at a uniform, high east and high west generation scenarios, and post-project at the same generation outage patterns. These cases had all generation, queued prior to the subject project, and the necessary transmission enhancements required for those projects modeled.

A summary of the load flow analysis for addition of the subject project follows:

A) Normal Conditions (results were similar for all three post project cases. The results listed below are for the uniform outage scenario.)

- Results in a normal overload of 6% on the Aldene-Springfield Rd. 138 kV circuit.
- Results in a normal overload of 7% on the Brunswick-Edison 230 circuit.
- Results in a normal overload of 14% on the Linden (Cogen)-Warinanco 230 kV circuit. (wave trap limited)
- Results in a normal overload of 2% on the Brunswick 230/138 kV transformer.

B) Single Contingency

- Contingency overload of 27% on the Linden (Cogen)-Warinanco 230 kV circuit for the outage of the Linden (Project A26)-Deans 230 kV circuit.
- Contingency overload of 7% on the Aldene-Warinanco 230 kV circuit for the outage of the Linden (Project A26)-Deans 230 kV circuit.
- Contingency overload of 9% on the Aldene-New Dover 230 kV circuit for the outage of the Linden (Project A26)-Deans 230 kV circuit.
- Contingency overload of 14% on the Brunswick-Deans 230 kV circuit for the outage of the Brunswick-Edison 230 kV circuit. (Over the wave trap rating not the conductor emergency rating)

- Contingency overload of 25% on both the Sewaren-Woodbridge 138 kV circuits for the outage of the Sewaren-Metuchen 230 kV circuit. (Over the wave trap rating not the conductor rating.)

- Contingency overload of 5% on either of the Linden-Sewaren 230 kV circuits for the outage of the Linden (Project A26)-Sewaren circuit.

Note: Contingencies listed show the highest percent overload. Other outages have lesser overload impacts.

C) Tower Line Contingency

- Contingency overload of 11% on the Brunswick-Edison 230 kV circuit for the outage of the Deans-Aldene, Deans-Linden (Project A26) 230 kV tower line.
- Contingency overload of 2 % on the Deans-Meadow Rd 230 kV circuit for the outage of the Deans-Aldene, Deans-Linden (Project A26) 230 kV tower line.
- Contingency overload of 6% on either of the Linden-Sewaren circuits for the outage of the Deans-Aldene, Deans-Linden (Project A26) 230 kV tower line.
- Contingency overload of 11% on the Sewaren-Pierson Ave. S 230 kV circuit for the outage of the Deans-Aldene, Deans-Linden (Project A26) 230 kV tower line
- Contingency overload of 6% on the Meadow Rd.-Pierson Ave. S 230 kV circuit for the outage of the Deans-Aldene, Deans-Linden (Project A26) 230 kV tower line.
- Contingency overload of 2% on the Minue St R-Linden (Project A26) 230 kV circuit for the outage of the Deans-Aldene, Deans-Linden (Project A26) 230 kV tower line.
- Contingency overload of 2% on the Whippany-Roseland 230 kV circuit for the outage of the Deans-Aldene, Deans-Linden (Project A26) 230 kV tower line.
- Contingency overload of 35% on both of the Linden-Sewaren 230 kV circuits for outage of the Deans-Linden (Project A26), Sewaren-Linden (Project A26) 230 kV tower line.
- Contingency overload of 45% on the Linden (Project A52)-Warinanco 230 kV circuit for the outage of the Deans-Linden (Project A26), Sewaren-Metuchen tower lin.e
- Contingency overload of 22% on the Aldene-New Dover 230 kV circuit for the outage of the Deans-Linden (Project A26), Sewaren-Metuchen tower line.
- Contingency overload of 23% on the Aldene-Warinanco 230 kV circuit for the outage of the Deans-Linden (Project A26), Sewaren-Metuchen tower line.
- Contingency overload of 25% on both the Sewaren-Woodbridge 138 kV circuits for the outage of the Deans-Linden (Project A26), Sewaren-Metuchen tower line.

- Contingency overload of 29% on the Sewaren-Woodbridge 138 kV circuit for the outage of the Sewaren-Metuchen, Sewaren-Roseland 230 kV circuit.
- Contingency overload of 33% on the Sewaren-Woodbridge M 138 kV circuit for the outage of the Sewaren-Metuchen,Sewaren-Deans 230 kV tower line.

Note: Contingencies listed show the highest percent overload. Other outages have lesser overload impacts.

The following list of reinforcements were added and evaluated to determine if they will alleviate the overloads described.

- Reconductor the Sewaren-Metuchen 138 kV circuit to and convert to 230 kV operation.
- Separate the two Metuchen-Brunswick bundled 230 kV circuits and reconductor with 1033 ACSR conductor. Connect to the converted Sewaren-Metuchen 230 kV circuit
- String conductors on the vacant circuit between Adams and Sunnymeade.
- Isolate the Brunswick-Adams circuit at Brunswick and connect to the Brunswick-Sewaren circuit described above.
- Install a third 230 kV underground circuit from Linden to Sewaren
- Install a new 230 kV underground circuit from Linden to New Dover.
- Construct a new 5 breaker ring bus at New Dover and terminate the new circuit from Linden and loop in the Sewaren-Roseland and the Deans-Aldene 230 kV circuits
- Replace the existing 138 kV high side transformers at Lafayette Rd. and Woodbridge with 230 kV high side transformers.

It is estimated the transmission line upgrades listed above will cost approximately $56 million and the associated substation enhancements will cost approximately $13 million. The construction of all the facilities will require two years lead time.

A short circuit evaluation was not completed for this installation due to the uncertainty of the number of projects to be installed in this area. The more generation that is added the greater potential for breaker replacements. It is estimated that replacement of a 230 kV breaker will cost approximately $350,000. A complete short circuit analysis will be performed in the Impact Study.