



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 - 540 MW Injection

Network impacts for the injection of 540 MW into the Emilie 230kV Substation or the Wheelabrator-Mercer 230kV line are as follows:

Emilie 230kV Substation

During normal operation, with all transmission facilities in-service, the power flow simulation indicates that all voltages can be adjusted within an acceptable range and that no overloads were caused or aggravated by injection of 540 MW at Emilie 230 kV. Single contingency and towerline outage analysis results also indicate that no overloads were caused or aggravated by injection of 540 MW at Emilie 230 kV.

A short circuit analysis was not performed for this project because the results would be highly dependent upon assumptions about connection of nearby projects which are earlier in Generator Interconnection Request Queue A. Many 230kV circuit breakers in this area of the transmission system may become overdutied and require replacement if several new generators connect. A 230kV 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.

Wheelabrator - Mercer 230kV line

During normal operation, with all transmission facilities in-service, the power flow simulation indicates that all voltages can be adjusted within an acceptable range and that there were no overloads.

Single contingency outage and towerline outage analysis resulted in the following:

- Trenton-Mercer 230kV circuit (109 % of its 4 hr. emergency rating) for the outage of the Lawrence-Mercer / Trenton-Mercer 230kV tower line.
- (2) Trenton 230/138kV transformers (127 % and 122 % of their 4 hr. emergency ratings) for the outage of the Lawrence-Mercer 230kV circuit.
- Trenton-Kuser Rd. 230/138kV transformer (19 % of its 4 hr. emergency rating) for the outage of the Trenton-Mercer 230kV / Trenton-Mercer Tap tower line.

Transmission reinforcements, required to alleviate the above limitations, consist initially of constructing a 230kV ring bus at Trenton switching station, then disconnecting and reconnecting all the existing circuits onto the new ring bus. This reinforcement reduces the Trenton-Mercer contingency overload to 102 % for the outage of the Trenton-Kuser Rd.-Mercer 230kV towerline. The Trenton 230/138kV transformers still remained a limit (25 % over their 24hr rating) for the outage of the Lawrence-Trenton 230kV circuit. Also, the reinforcement introduces a new contingency overload into the area. The flows on one Trenton 230/138kV transformer, for the outage of the other Trenton 230/138kV transformer, are 101 % to 117 % of emergency rating. Further analysis showed that installing a 230/138kV transformer connecting the Mercer substation 230kV bus to the Mercer Tap 138kV bus would alleviate the limitation affecting the two Trenton 230/138kV transformers.

The required reinforcements to relieve all limitations consist of the following:

- Construct a four circuit breaker 230kV ring bus at Trenton switching station and rearrange the existing circuits.
- Install a 400 MVA 230/138kV transformer connecting the Mercer 230kV substation bus to the Mercer Tap 138kV. Includes one 230kV CB and one 138kV CB, and bus positions at Mercer 230kV and 138kV buses.

The estimated cost for the required network reinforcements is \$ 8.3M and the required leadtime for construction is two years.