

## Generation Interconnection

This analysis was completed to assess the reliability impact for a new generator interconnecting to the PJM system as a capacity resource.

### Network Impacts -558 MW Injection into the Portland 230kV substation (G38)

Potential network impacts for the injection of 558 MW into the Portland 230 kV substation was evaluated for summer peak conditions in 2005.

### Generator Deliverability

- 1) The Portland – Kittatinny 230 kV circuit is overloaded at **116%** of the emergency rating (793 MVA) for the outage of the Portland – Greystone 230 kV circuit. The G38 project contributes approximately 182 MW to the loading on this circuit.
- 2) The Portland – Greystone 230 kV circuit is overloaded at **107%** of the emergency rating (739 MVA) for the outage of the Portland – Kittatinny 230 kV circuit. The G38 Project contributes approximately 119 MW to the loading on this circuit.
- 3) The Glendon – Northwood 115 kV circuit is overloaded at **111%** of the emergency rating (112 MVA) for the outage of the Hosensack – Steel City 500 kV circuit. The G38 project contributes approximately 14 MW to the loading on this circuit.

### Multiple Facility Contingency – Tower Line Outages (MAAC Criteria IIC)

- 4) The Portland – Greystone 230 kV circuit is contingency overloaded at **104%** of the emergency rating (739 MVA) for the Kittatinny – Portland and Kittatinny – Pohatcong 230 kV tower line outage. The G38 project contributes approximately 119 MW to the loading on this circuit.
- 5) The Portland – Kittatinny 230 kV circuit is contingency overloaded at **115%** of the emergency rating (793 MVA) for the Gilbert – Morristown and Portland – Greystone 230 kV tower line outage. The G38 project contributes approximately 184 MW to the loading on this circuit.
- 6) The Kittatinny – Newton 230 kV circuit is contingency overloaded at **100%** of the emergency rating (739 MVA) for the Portland – Greystone and Kittatinny – Pohatcong 230 kV tower line outage. The G38 project contributes approximately 75 MW to the loading on this circuit.

The G38 project was also studied with the Neptune Merchant Transmission project modeled as a 1200 MW load at the Sayreville 230 kV substation. The overloads previously identified were approximately 5% higher with the addition of the Neptune project.

## **System Reinforcements**

- 1) The Portland – Kittatinny 230 kV overload will be eliminated by reconductoring the circuit (8.1) miles with 1590 45/7 Kcmil ACSS conductor. The estimated cost is \$2.025 million and the estimated time for completion is 2 years from execution of an Interconnection Service Agreement.
- 2) The Portland – Greystone 230 kV overload will be eliminated by reconductoring the circuit (33.24) miles with 1590 45/7 Kcmil ACSS conductor. The estimated cost is \$8.1 million and the estimated time for completion is 2 years from execution of an Interconnection Service Agreement.
- 3) To alleviate the Martins Creek – Morris Park – Gilbert 230 kV overloads listed above, the Martins Creek – Morris Park – Gilbert 230 kV path will be upgraded to include a second 1590 ACSR circuit on the existing structures for most of the path (the initial 0.37 mile section of the path will require new single circuit construction in parallel with the existing line). The Delaware River crossing, which consists of a 0.3 mile section built to 2-2493 ACAR construction, will not require upgrading.

## **Specific upgrades include:**

- From Martins Creek 230 kV substation to the Delaware River crossing, install a second 0.37 mile section of single circuit 1590 ACSR parallel with the existing single circuit Martins Creek – Morris Park 230 kV line. The estimated cost is \$0.865 million
- Upgrade the line termination by replacing equipment in Bay 0 with 3000 amp equipment at Martins Creek 230 substation. The estimated cost is \$0.735 million

The above listed work will be done by PPL Utilities. The estimated cost is \$1.4 million.

- String 1590 45/7 kcmil ACSR conductor at 125 degrees C on the vacant side of the Martins Creek-Morris Park Tap double circuit tower line from the Delaware River crossing to the Morris Park Tap (7.8 miles). The estimated cost is \$1.451 million
- String 1590 45/7 kcmil ACSR conductor at 125 degrees C on the vacant side of the Morris Park Tap-Gilbert double circuit tower line from Morris Park Tap to the Route 78 crossing (3.0 miles) and from the other side of Route 78 to Gilbert substation (7.25 miles). The estimated cost is \$1.945 million.
- String 2493 kcmil ACAR conductor at 100 degrees C on the vacant side of the Morris Park Tap-Gilbert double circuit tower line where it crosses Route 78 (.3 miles). The estimated cost is \$0.166 million.

- Tie the ends of both circuits together to form a new single circuit. The work will include
- Connecting each new single conductor on the double circuit tower line at the Delaware River to the existing single circuit, double conductored, 500kV tower.
- Tying each of the single conductors on the double circuit tower line together at Morris Park Tap and connecting the resultant tap to the Morris Park 230kV bus.
- Tying each of the single conductors on the double circuit tower line together at Gilbert substation and Connecting the resultant circuit to the Gilbert 230kV bus.

The estimated cost is \$0.316 million

The above listed work will be done by First Energy. The estimated cost is \$3.878 million.

The total cost to upgrade the Martins Creek-Morris Park-Gilbert line is \$5.278 million. It is estimated it will take 24-36 months from initiation of design engineering to complete the upgrade.

Line lengths (ft)

**Martins Creek – Morris Park**

38966 + 2080 + 1603 (river crossing, 2-2493 ACAR 500 kV const) + 1793 (steel pole) + 199

**Morris Park - Gilbert**

38274 + 1440 + 15669

- 4) The overload on the Glendon Northwood circuit will be alleviated by replacing the 4/0 copper bus and drop loop wire at Glendon substation to accommodate an increase of the line to its conductor rating. The estimated cost is \$58,000 and the estimated time to complete is 9 months.

Note: An assumption made in developing the time estimates for implementing the identified system reinforcements is that the Martins Creek-Morris Park-Gilbert 230 kV path, the Portland-Greystone 230 kV line and the Portland-Kittatinny 230 kV line can be outaged whenever necessary to complete the work required. Due to the critical nature of these circuits, their outage will need to be coordinated by the PJM OI. It is not likely that the required outages will be permitted during the summer period.

Further note that the above estimated costs do not include a tax gross-up. As a reference, the current tax rate for Jersey Central is 38 percent.