

Generation Interconnection

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

The England #G26 project was studied as a 350 MW capacity injection into the England 138kV substation. Project #G26 was evaluated for compliance with reliability criteria for summer peak conditions in 2005. Potential network impacts were as follows:

Generator Deliverability

- 1) The BL England – Scull #2 138 kV circuit is overloaded at 126% of the normal rating (215 MVA). The BL England - Scull # 2 138kV circuit is also contingency overloaded at 137% of the emergency rating (311 MVA) for the loss of the BL England – Scull # 1 – Mill – Lewis 138 kV circuit. The project contributes approximately 129 MW to both the normal and contingency overload.
- 2) The Scull # 2 – Mill # 2 138kV circuit is overloaded at 116% of the normal rating (215 MVA). The Scull # 2 – Mill # 2 138kV circuit is also contingency overloaded at 152% of the emergency rating (268 MVA) for the loss of the BL England – Scull # 1 – Mill – Lewis 138 kV circuit. The project contributes approximately 118MW to the normal and 186 MW to the contingency overload.
- 3) The Mill # 2 – Lewis 138 kV circuit is contingency overloaded at 128% of the emergency rating (215 MVA) for the loss of the BL England – Scull # 1 – Mill – Lewis 138 kV circuit. The project contributes approximately 128 MW.
- 4) The BL England – Scull # 1 138kV circuit is overloaded at 104% of the normal rating (215 MVA). The BL England – Scull # 1 circuit is also contingency overloaded at 135% of the emergency rating (292 MVA) for the loss of the BL England – Scull # 2 – Mill – Lewis 138 kV circuit. The project contributes approximately 97MW to the normal and 170 MW to the contingency overload.
- 5) The Scull # 1 – Mill # 1 138 kV circuit is overloaded at 139% of the emergency rating (268 MVA) for the loss of the BL England – Scull # 2 – Mill – Lewis 138 kV circuit. The project contributes approximately 170 MW.
- 6) The Mill # 1 - Lewis 138kV circuit is contingency overloaded at 178% of the emergency rating (208 MVA) for the loss of the BL England – Scull # 2 – Mill – Lewis 138 kV circuit. The project contributes approximately 170 MW.
- 7) The Churchtown 230/69 kV transformer is contingency overloaded at 111% of the emergency rating (300 MVA) for the loss of the Mickleton – Bridgeport 230 kV circuit. The G26 project contributes approximately 33 MW.
- 8) The Churchtown – Deepwater 69 kV circuit is contingency overloaded at 119% of the emergency rating (256 MVA) for the loss of the Mickleton – Bridgeport 230 kV circuit. The G26 project contributes approximately 33 MW.
- 9) The Woodstown – Clayton 69 kV circuit is contingency overloaded at 112% of the emergency rating (54 MVA) for the loss of the Mickleton – Bridgeport 230 kV circuit. The G26 project contributes approximately 12 MW.
- 10) The Sheildalloy Tap – North Central 69 kV circuit is contingency overloaded at 117% of the emergency rating (91 MVA) for the loss of the Mickleton – Bridgeport 230 kV circuit. The G26 project contributes approximately 34 MW.

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

No identified problems.

Short Circuit

Short circuit analysis was not performed due to the magnitude of reinforcements required to eliminate the identified overloads. Any required breaker replacements are not expected to materially alter the total network reinforcement cost.

New System Reinforcements

Overloads 1, 2 and 3 can be relieved by reconductoring the 138 kV circuit from BL England – Scull #2 – Mill – Lewis. (estimated cost: \$3.2 million)

Overloads 4, 5 and 6 can be relieved by reconductoring the 138 kV circuit from BL England – Scull #1 – Mill – Lewis. (estimated cost: \$3.2 million)

Overload 7 can be relieved by replacing the Churchtown 230/69 kV transformer with higher rating transformer. (estimated cost: \$1.8 million)

Overload 8 can be relieved by reconductoring the 69kV circuit from Churchtown – Deepwater. (estimated cost: \$0.1 million)

Overload 9 can be relieved by reconductoring the 69 kV circuit from Woodstown – Clayton. (estimated cost: \$0.2 million)

Overload 10 can be relieved by reconductoring the 69 kV circuit from Sheildalloy Tap – North Central. (estimated cost: \$0.5 million)

The total **new Network Upgrades** are estimated to cost **\$9.00 Million**. The construction cost for network upgrades may be subject to a CIAC (Contribution in Aid to Construction) state and federal tax gross up, which can add as much as **\$3.24 Million**.

The estimated time required to construct the new network upgrades is **18-24 months**. This estimate is highly dependent upon the ability to secure the required facility outages.

Contribution to Previously Identified System Reinforcements

The new generator will be allocated a percentage of the costs for the previously identified network reinforcements as follows:

- 1) The project contributes approximately 28 MW to the overload on the Graysferry – Parrish 230 kV circuit. The overload can be relieved by reconductoring the 230 kV circuit from Graysferry to Parrish at estimated cost of \$3.444 million.
- 2) The project contributes approximately 21 MW to the overload on the Eddystone – Morton Tap 230 kV circuit. The overload can be relieved by replacing some of the circuit's terminal equipments at estimated cost of \$0.06 million.
- 3) The project contributes approximately 18 MW to the A27 – Graysferry 230 kV circuit. The project also contributes approximately 18 MW to the A19 – Morton Tap 230kV circuit. The overloads can be relieved by constructing a new 230kV line from A27 to Parrish at estimated cost of \$65 million.
- 4) The project contributes approximately 18 MW to the B48 – Graceton 230 kV circuit. The overload can be relieved by reconductoring the 230 kV circuit from B48 to Graceton at estimated cost of \$1.8 million.

The total estimated cost for **previously identified network upgrades** is **\$70.304 Million**. This estimate already includes CIAC (Contribution in Aid to Construction) state and federal tax gross up. Project #G26 will be required to share the cost of these upgrades. Project #G26's cost allocation will be determined as part of the #G26 Impact Study.

The estimated time required to construct the new network upgrades is **36-48 months**. This estimate is highly dependent upon the ability to secure the required facility outages.