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 -560 MW Injection into the North Temple 230kV kV substation (H10)

Network Impacts

The #H10 project was studied as 560 MW capacity injection into the North Temple 230kV substation. Project # H10 was evaluated for compliance with reliability criteria for summer peak conditions in 2005. Potential network impacts were as follows:

Generator Deliverability

1. The North Temple – Hosensack 230 kV circuit is contingency overloaded at 100% of the emergency rating (624 MVA) for outage of the North Temple – Lyons 230 kV circuit. The H10 project contributes approximately 227 MW to the loading on this circuit.

2. The Muhlenberg – Rosedale 69kV cirvuit is contingency overloaded at 116% of the emergency rating (89MVA) for the outage of the North Temple – Riverview – Carpentar Technology 69 kV circuit. The H10 project contributes approximately 27MW to the loading on this circuit.

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

No identified problems.

Short Circuit

No identified problems.

New System Reinforcements

1. The North Temple – Hosensack 230 kV circuit overload can be relieved by reconductoring, the North Temple – Hosensack 230 kV circuit with 1590 Kcmil 45/7 ACSR. The cost is estimated at **$4.8 million** and it is expected to take two years to complete.

2. The Muhlenberg – Rosedale 69kV circuit overload can be relieved by upgrading terminal equipment at Muhlenberg 69kV substation. The cost is estimated at **$0.025 million** and it is expected to take 26 weeks to complete.

Contribution to Previously Identified System Reinforcements

The H10 project will contribute to the cost of the following previously identified network reinforcements:

1. Upgrading the Martins Creek – Morris Park 230 kV circuit to include a 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 miles section built to 2-2493 ACAR construction, will not require upgrading.

Note that the estimated times listed below to complete each of the sections of the Martins Creek-Morris Park-Gilbert 230 kV project are identical as this is a "start-to-finish" type of job that that cannot be completed in phases. Further note that an assumption made in developing the time estimates is that the Martins Creek - Morris Park - Gilbert 230 kV line can be outaged whenever necessary to complete the work required. Due to the critical nature of this circuit, its outage will need to be coordinated with the PJM OI. It is not likely that the outage of this circuit will be approved during the summer period.

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 **$0.535 million**.

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

- String 1590 45/7 Kcmil 45/7ACSR conductor at 125 degrees C on the vacant side of Martins Creek-Morris Park Tap 230 kV double circuit tower line from the Delaware River crossing to the Morris Park Tap (7.8 miles).

	Estimated Cost ($M)	Estimated Time (yr.)
Engineer and Design	0.226	.25
Acquisition of Materials	1.206	.50
Construction	0.886	.50
Total	**2.318**	1.25

- String 1590 45/7 Kcmil ACSR conductor at 125 degrees C on the vacant side of Morris Park Tap - Gilbert 230 kV double circuit tower line from Morris Park Tap to the Route 78 crossing (3.0 miles) and from other side of Route 78 to the Gilbert substation (7.25 miles).

	Estimated Cost ($M)	Estimated Time (yr.)
Engineer and Design	0.306	.25
Acquisition of Materials	1.611	.50
Construction	1.189	.50
Total	**3.106**	1.25

- String 2493 Kcmil ACAR conductor at 100 degrees C on the vacant side of Morris Park Tap - Gilbert 230 kV double circuit tower line where it crosses Route 78 (.3 miles).

	Estimated Cost ($M)	Estimated Time (yr.)
Engineer and Design	0.025	.25
Acquisition of Materials	0.138	.50

Construction	0.102	.50
Total	**0.265**	1.25

- Tie the ends of both new circuits together to form a new single circuit. This includes work to:
- Connect each single conductor on the double circuit tower line at the Delaware River to the existing single circuit, double conductored, 500 kV tower.
- Tie each of the single conductors on the double circuit tower line together at Morris Park Tap and connect the resultant tap to the Morris Park 230 kV bus.
- Tie each of the single conductors on the double circuit tower line together at the Gilbert substation and connect the resultant circuit to the Gilbert 230 kV bus.

	Estimated Cost ($M)	Estimated Time (yr.)
Engineer and Design	0.050	.25
Acquisition of Materials	0.262	.50
Construction	0.193	.50
Total	**0.505**	1.25

The above listed work will be done by First Energy. The estimated cost is **$6.194 million**.

The total cost, summation of the PPL Electric Utilities and First Energy costs, to upgrade the Martins Creek-Morris Park-Gilbert line is **$7.594 million**. It is estimated it will take 12 months from completion of design engineering to complete the upgrade.

Note that the First Energy estimated costs do not include a tax gross-up. The reason is that this is a separate item that will be resolved in the Interconnection Agreement. The adder for taxes will therefore depend on the tax laws in effect at the time and the terms that are negotiated. As a reference, the current tax rate for New Jersey is 38 percent. There is no CIAC included in the above estimates.

Cost allocation percentages are not provided as part of the Feasibility Study analysis, however, cost allocation will be provided during the Impact Study evaluations.