

#T129 Printz 230 kV (30 MW)
Generator 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

The T129 project was studied as a 30 MW Capacity injection into the Printz 230 kV bus. Project T129 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

NETWORK IMPACTS

Generator Deliverability

(Normal System with all facilities in-service and Single, or N-1, contingencies for the Capacity portion only of the interconnection)

1. The Llanerch – Bryn Mawr 138kV line loads from **99.85% to 100.6%** of its emergency rating (229MVA) for the single line contingency outage of the Tunnel – Parrish 230kV line, Parrish 230- 13.8 kV transformer, and the Grays Ferry 230 – 13.8 kV transformer (PE27). This project contributes approximately **1.6MW** to cause this thermal violation.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only for the full energy output. Stuck breaker and bus fault contingencies will be performed for the Impact Study)

No problems were identified.

Short Circuit Analysis

Not required because there are no changes to the generator or transformer impedances.

Stability Analysis

Not required because there are no changes to the generator or transformer impedances, or machine dynamic characteristics.

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. “Network Impacts”, identified for earlier generation or transmission interconnection projects in the PJM Queue)

2. The Printz - Ridley 230kV line further loads from **136.29% to 137.42%** of its emergency rating (1432MVA) for the single contingency outage of the Eddystone – Island Road 230kV line and the Island Road 230 – 13.8 kV transformer (PE23). This project contributes approximately **16.2MW** to the thermal violation.
3. The Grays Ferry – Tunnel 230kV line further loads from **124.09% to 125.10%** of its emergency rating (1395MVA) for the single contingency outage of the Concord – Lenape 230kV line, the Concord 230 – 34.5 kV transformer, and the Lenape 230 – 34.5 kV transformer (PE69). This project contributes approximately **14.1MW** to the thermal violation.
4. The Tunnel - Parrish 230kV line further loads from **121.84% to 122.86%** of its emergency rating (1395MVA) for the single line contingency outage of the Concord – Lenape 230 kV line, the Concord 230 – 34.5 kV transformer, and the Lenape 230 – 34.5kV transformer (PE69). This project contributes approximately **14.1MW** to the thermal violation.
5. The Ridley - Morton 230kV line further loads from **130.24% to 131.24%** of its emergency rating (613MVA) for the single contingency outage of the Foulk – Chichester 230 kV line, and the Foulk 230 – 13.8 kV transformer (PE4). This project contributes approximately **6.2MW** to the thermal violation.
6. The Morton – Middletown 230kV line further loads from **122.37% to 123.38%** of its emergency rating (613MVA) for the single line contingency outage of the Foulk – Chichester 230 kV line, and the Foulk 230 – 13.8 kV transformer (PE4). This project contributes approximately **6.2MW** to the thermal violation.

NETWORK UPGRADE REQUIREMENTS

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. “Network Impacts”, initially caused by the addition of this project generation)

1. The emergency rating of Llanerch to Bryn Mawr 138kV line (130-36) can be increased to a minimum of 248 MVA based on the new Exelon ratings method at **no cost**.

Contribution to Previously Identified System Reinforcements *(This project contributes to the Network Impact causing the need for these Network Upgrades. This project will be allocated a cost to be determined during the Impact Study)*

2. Printz to Ridley Upgrade - Reconductor the Printz to Ridley portion of 220-46 line (3.15 miles on railroad right of way) with ACSS/TW conductor and replace terminal equipment at Printz and Ridley. The estimated cost is **\$7,700,000**, and it will take **36 months** to complete.
3. Grays Ferry to Tunnel Upgrade - Rebuild the Grays Ferry to Tunnel 230kV line (.3 miles) and replace terminal equipment at both ends of the line. The estimated cost is **\$5,800,000**, and it will take **36 months** to complete.

Note: The Grays Ferry - Tunnel line is scheduled for reconductoring in 2011 but the new rating will be inadequate for the Queue T129 overload magnitude.

4. Tunnel to Parrish Upgrade - Rebuild the Tunnel to Parrish 230kV line (2.4 miles on railroad right of way) and replace terminal equipment at both ends of the line. The estimated cost is **\$11,500,000** and it will take **36 months** to complete.

Note: The Tunnel – Parrish 230 kV line is also scheduled for reconductoring in 2011 but the new rating will be inadequate for the T129 overload magnitude.

5. Ridley to Morton Upgrade - Parallel the existing 220-46 line (1.72 miles) 230kV pipe type underground cable with a second cable between Ridley and Morton substations and replace relay equipment at Morton. The estimated cost is **\$8,300,000**, and it will take **48 months** to complete.
6. Morton to Middletown Upgrade - Parallel the existing 220-66 line (4.2 miles) 230kV pipe type underground cable with a second cable between Morton and Middletown substations. The estimated cost is **\$18,000,000** and it will take **48 months** to complete.