# Queue #O48
# Hays Mill 23 kV

**Network Impacts**
The **#O48 project was studied as a total injection of 36 MW (7.2 MW Capacity) into the 23 kV bus of the Arnold Substation**. Project #O48 was evaluated for compliance with reliability criteria for summer peak conditions in 2009. Potential network impacts were as follows:

**Generator Deliverability**
O48 overloads the Garrett-Garrett 115 kV line for loss of Rockwood-Somerset 115 kV (with capacity injection it loads to 103.6% (and with capacity+energy injection it loads to 133.5 %).

**Multiple Facility Contingency**
None identified.

**Contribution to Previously Identified Overloads**
None identified.

**New System Reinforcements**
Due to the delta 115kV winding of the existing transformer, 3 phase potential devices and 3V0 relays are required on the Arnold 115kV bus. This is not a FirstEnergy/Penelec owned substation and estimates for upgrades need to be obtained from Arnold REC and are the responsibility of the Interconnection Customer.

Depending upon Generation Project Queue L13 (Casselman Windfarm):

- If L13 moves forward, line relaying will be required at Arnold Substation. This is not a FirstEnergy/Penelec owned substation and estimates for upgrades need to be obtained from Arnold REC.
- If L13 does not move forward, the existing transfer trip from Rockwood substation over leased telephone line shall be replaced with a fiber optic communications channel due to protection related problems caused by the delta 115kV winding of the existing Arnold transformer. Estimated cost is $770,000.

To mitigate the Garrett – Garrett 115 kV overload will require the replacement of substation conductor at one substation. The cost for this is $100,000.

**Contribution to Previously Identified System Reinforcements**
None.

**Short Circuit**
No problems were identified

**Delivery of Energy Portion of interconnection Request**

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

As a result of the aggregate energy resources in the area, the following violations were identified:

The #O48 project contributes 12 MW to the overload of the Garret 115/138kV transformer for the outage of the Keystone-Shelocta-Homer 230 kV circuit, which had been previously caused by project #O17.

O48 overloads the Garrett-Garrett 115 kV line for loss of Rockwood-Somerset 115 kV - to mitigate the loading to 133.5% for the energy portion of the generation Penelec would replace substation conductor at both substations, a disconnect switch, upgrade a couple of CTs and reconductor 1.9 miles of 115 kV line.

The Altoona-N39 230 kV line does not overload past its emergency rating if only capacity of all previous N queue and O queue projects in the area are dispatched. The mitigation may include reconductoring approximately 16 miles of Altoona-N39 230 kV line.

The Somerset-Rockwood 115 kV line does not overload past its emergency rating for the loss of the Garrett 138-115 kV transformer contingency if only capacity for queue O48 is accounted for. It loads to 81.6% of its emergency rating. However, the line overloads past its emergency rating (100.7%) if the energy portion is studied. To mitigate the overload for the energy portion would require the upgrade of terminal equipment – 2 115 kV disconnect switches, one each at Somerset and Rockwood.