

Queue Position # S103 – Warren 115 kV Substation
Generation Interconnection

Network Impacts

The Queue Position #S103 project was studied as a 57 MW injection (capacity) into the Warren 115 kV substation in the Penelec system. Queue Position #S103 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

Direct Connection

This project presently has an existing connection at the Warren 115 kV substation. The developer is responsible for constructing/upgrading all of the facilities on its side of the point of interconnection, which will be between the 115 kV circuit breaker and the Warren 115 kV bus.

Item	Description	Conceptual Cost Estimate
1	Warren CT 115 kV circuit breaker maintenance review and testing.	\$24,928
2	Possible repair to the Warren CT 115 kV circuit breaker and/or associated equipment.	TBD Developer cost.
3	Possible replacement/upgrade of Warren CT 115 kV circuit breaker.	TBD Developer cost.
4	Relay and control work at Warren 115 kV Substation.	\$180,000
5	Reconductor/upgrade of approximately 23.64 miles of 230 kV transmission line between Juniata and the S44 Option 1 interconnection substation. Replace/upgrade disconnect switch at Juniata substation	\$11,905,000
6	Reconductor/upgrade of approximately 1 mile of 230 kV transmission line between Lewistown and the S44 Option 1 interconnection substation	\$1,000,000

Conceptual Estimate:

\$13,109,928

Estimated Lead Time:

2.0 years from signed ISA

Notes:

- Detailed Engineering & Construction Estimates TBD via Facility Study
- The above estimates do not include 1) tax gross-up, 2) property costs and site development up to rough grade which is to be provided by the developer, 3) interconnection metering and

generation SCADA to be provided by the developer, 4) engineering and field activities for design review and commissioning of the developer's facilities, and 5) Real estate costs that may be required for right-of-way easements to extend the 115 kV line.

Note the Blairsville 138/115 kV transformer, Garrett 138/115 kV transformer, and Warren – Falconer 115 kV line were modeled as normally open to alleviate loading concerns on the associated equipment under normal operating conditions, consistent with current Penelec operating procedures.

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No problems were identified.

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.

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)

1. Contribution of 7 MW further overloads the S44Copt1 – Juniata 230 kV line from 114% to 115% of its emergency rating (617 MVA) for the **generator** outage of Fordmill90 and Fordmill91 generators at buses 4565 & 4569 (Cont Id. PE506).
2. Contribution of 7 MW further overloads the Lewistown - S44Copt1 230 kV line from 102% to 103% of its emergency rating (617 MVA) for the **generator** outage of Fordmill90 and Fordmill91 generators at buses 4565 & 4569 (Cont Id. PE506).

New System Reinforcements

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

See overload conditions above.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study.)

1. To mitigate this overload would require the reconductor/upgrade of approximately 23.64 miles of 230 kV transmission line between Juniata and the S44 Option 1 interconnection substation (estimated to cost approximately \$11,820,000). It also requires the replacement/upgrade of a disconnect switch at Juniata substation (estimated to cost approximately \$85,000).

2. To mitigate this overload would require the reconductor/upgrade of approximately 1 mile of 230 kV transmission line between Lewistown and the S44 Option 1 interconnection substation (estimated to cost approximately \$1,000,000).

Short Circuit

To be determined during System Impact Study.