

# #S55 – Zion 345kV Generation Interconnection

## Network Impacts

The Queue Project #S55 was studied as a 780 MW (Capacity) injection at the Zion Energy Center TSS 974 345kV substation in the ComEd area. Project #S55 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

### **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. Line with Failed Breaker and Bus Fault contingencies will be performed for the Impact Study)*

No problems were identified

### **Short Circuit**

*(Summary of impacted circuit breakers)*

Will be determined during System Impact Study

### **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. The Kempton to North Northwest 500 kV line loads from 182.85% to 186.20% (DC power flow) of its normal rating (2078MVA) for non-contingency condition. This project contributes approximately 69.6 MW towards the overload.
2. The Kempton to North Northwest 500 kV line loads from 176.67% to 179.05% (DC power flow) of its emergency rating (2901 MVA) for the tower outage of the #220-06&07 Peach Bottom transformer (PE500). This project contributes approximately 69.1 MW towards the overload.
3. The Conastone – Peach Bottom 500 kV CKT#1 loads from 147.70% to 150.66% (DC power flow) of its emergency rating (2598MVA) for the outage of Conastone – Peachbottom 500 kV ckt#2 (PJM17\_2). This project contributes approximately 76.9 MW towards the overload.
4. The Conastone – Peach Bottom 500 kV CKT#2 loads from 147.70% to 150.66% (DC power flow) of its emergency rating (2598 MVA) for the outage of Conastone – Peachbottom 500 kV ckt#1 (PJM17). This project contributes approximately 76.9 MW towards the overload.

### **Steady-State Voltage Requirements**

*(Summary of VAR requirements based upon the results of the steady-state voltage studies.)*

To be determined in the System Impact Study

**New System Reinforcements**

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

None

**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)*

*(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)*

1. Kempton to North Northwest 500 kV line - 2 new single circuit lines at an estimated cost of \$279 million and estimated time of 10 yrs.

*Note: This upgrade suffices the overload #2 also.*

2. Conastone – Peach Bottom 500 kV Upgrade: To mitigate the overload of the Conastone – Peach Bottom 500 kV circuit a second circuit will need to be built.

**If RIGHT OF WAY can be acquired following is the Reinforcement and Cost Estimates:**

PECO portion of the Conastone – Peach Bottom line:

|                                    |                     |
|------------------------------------|---------------------|
| Substation work at Peach Bottom    | \$ 2,500,000        |
| Construct 6.25 miles of 500kV line | <u>\$10,000,000</u> |
|                                    | <b>\$12,500,000</b> |

This estimate does not include the cost of new right of way.

Construction of the new line will take approximately **30 months** after the right of way is acquired.

**Note:** It should be noted that PJM Queue P04 project also requires widening of about two miles of this right of way for their direct connection line and would use the last remaining terminal position that exists at Peach Bottom substation. If Queue P04 proceeds with their project it may complicate right of way acquisition and double the substation costs at Peach Bottom.

BGE portion of the Conastone – Peach Bottom line:

Build new 500 kV line adjacent to existing circuit 5012 from Conastone to Pennsylvania State Line at an estimated cost of **\$48,000,000** and a construction time of approximately **84 months**.

Assumptions:

- Acquire 150 ft. wide R/W adjacent to existing R/W, mostly rural land at \$100,000 per acre
- 2 to 3 year CPCN process prior to land acquisition
- Length of line 9.6 miles

Install one 500kV breaker at Conastone **\$1,500,000**. Breaker installation can be completed concurrently with the line construction.

**If RIGHT OF WAY cannot be acquired following is the Reinforcement and Cost Estimates:**

The line from Graceton to Peach Bottom is about 7.5 miles long and has a normal rating of 528MVA. Assuming that this rating is achievable with a single 230 kV pipe type cable (and it may not be), the new underground installation would cost about \$30M plus another \$1M for terminal modifications. Also assumed is that the underground line will not have to cross any rivers or large creeks. If a cable rating of 450 MVA is insufficient, it will cost an additional \$30M.

Removal of the existing 230 kV tower line is about \$1.5M.

Construction of a double circuit 500kV line from Conastone to Peach Bottom would be about \$3.5M per mile. The line is 16.5 miles long. Total cost \$58M.

Substation additions and modifications at Peach Bottom would cost about \$10M.

**Note: Future work is being done by the TOs to come up with reinforcements to further mitigate the overload.**

*Note: This upgrade suffices the overload #4 also.*

### **Potential Issues**

**Impacts on the MISO member transmission systems are not included in this analysis, but they will be included in the System Impact Study, which may reveal upgrades needed in the MISO system not identified in this Feasibility Study.**

### **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:*

No problems were identified