

S12 – Killen 345kV Generator Interconnection

Network Impacts

The Queue S12 project was studied as a 675 MW injection at Killen 345 kV substation. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

Direct Connection Cost:

The Killen substation is currently a ring bus unit. The connection of this generator will require the expansion of the substation with three 345kV breakers converting this to a breaker-and-a-half scheme. The estimated cost for this expansion and equipment is \$2,500,000.

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 133 MW further overloads to the Kemptown – N NWest 500 kV line from 158% to 163% of its emergency rating (2901 MVA) for the outage of Kemptown – Brighton 500 kV ckt 1 and 2 (Contingency ID: 19).

Other projects that contribute to this overload are:

R03, R16, R19, R22, R29, R30, R33, R35, R44, R49, R52, R54, R55, R59, R60, R61, R64, R65, R70, R76, R77, R78, R79, R80, R88, R96, S06

2. The Conastone – Peach Bottom CKT 1 500 kV line is overloaded from 110% to 115% of its emergency rating (2598MVA) for the outage of Conastone – Peach Bottom CKT 2 500 kV line (Cont Id PJM17_2). This project contributes approximately 132 MW to cause the thermal violation.

Other projects that contribute to this overload are:
R03, R15, R14, R16, R17, R29, R30, R33, R35, R44, R60, R61, R64, R78, R88, R96,

3. The Conastone – Peach Bottom CKT 2 500 kV line is overloaded from 110% to 115% of its emergency rating (2598MVA) for the outage of Conastone – Peach Bottom CKT 1 500 kV line(Cont Id PJM17). This project contributes approximately 132 MW to cause the thermal violation.

Other projects that contribute to this overload are:
R03, R15, R14, R16, R17, R29, R30, R33, R35, R44, R60, R61, R64, R78, R88, R96,

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)

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

Assumptions:

New 350 ft. wide R/W parallels existing Northwest to Mt Airy Tap R/W

Total R/W length = 28.3 miles

3 - bundle 1,590 kcm conductor

Kempton located 1/4 mile west of Mt Airy Tap

North Northwest located 4 miles north of Northwest

Substation Terminations (all in 2012 dollars):

NNW - Install a 3 breaker bay \$7.7M

Kempton - Install a 3 breaker bay \$7.7M

Reinforcement if they are able to acquire RIGHT OF WAY:

2. **Conastone – Peachbottom 500 kV Upgrade**

PECO Upgrade:

Substation work at Peach Bottom \$2.5M

Construct 6.25 miles of 500kV line \$10M

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

These estimates do not include the cost of new right of way.

It should be noted that IPP project P04 also requires widening of about two miles of this right of way and that installation, if it moves forward, may complicate right of way acquisition and double the substation costs at Peach Bottom.

BGE Upgrade:

1. Build new 500 kV line adjacent to circuit 5012 from Conastone to PA line – **\$48M ~ 7 yrs.**

Assumptions:

- Acquire 150 ft. wide R/W adjacent to existing R/W, mostly rural land at \$100,000 per acre
 - 2 - 3 year CPCN process prior to land acquisition
 - Length of line 9.6 miles
2. Install a 500kV breaker **\$1.5M**

Reinforcement if they are unable to acquire RIGHT OF WAY:

The line from Graceton to Peach Bottom is about 7.5 miles long and has a normal rating of 528MVA. Assuming that we could maintain this rating with a single 230 kV pipe type cable (and we may not be able to do this), the new underground installation would cost about \$30M plus another \$1M for terminal modifications. I assume 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.

Short Circuit

No problems were identified