#S60 – Essex 230kV

Generation 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 Queue S60 project was studied as a 55 MW (Capacity) injection at Essex 26 kV substation. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

RESULTS WITHOUT Q75

(PJM has performed this evaluation without the Q75 merchant project connecting between Bergen and New York City modeled because the upgrades required for the Q75 project have not been completely identified and modeled. When the Q75 upgrades are modeled they should not have a significant impact upon what is stated in this report.)

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

Short Circuit

The Essex 230kV - 22H breaker was over-stressed by the S04 project and needs to be replaced. The S60 project contributes to the problem.

The S60 project increases the overdutied condition of the following breakers in the Hudson 230kV substation: 1HA, 1HB, 1HC, 2HA, 2HB, and 2HC and will have a cost allocation to their upgrade.

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 43 MW further overloads the Essex – Hudson 230 kV line from 135% to 140% of its emergency rating (826 MVA) for the outage of Athenia – Cook Rd – NJT Kingsland – NJT Meadows 230 kV line (Cont Id PS20).

2. Contribution of 24 MW further overloads the Linden – North Ave 138 kV line from 152% to 160% of its emergency rating (308 MVA) for the **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27PS).

3. Contribution of 21 MW further overloads the Bayonne – B-M Reactor 138 kV line from 135% to 142% of its emergency rating (311 MVA) for the **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27PS).

4. Contribution of 21 MW further overloads the B-M Reactor – Marion 138 kV line from 135% to 142% of its emergency rating (311 MVA) for the **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27PS).

5. Contribution of 24 MW further overloads the Passaic Valley SC – Bayonne 138 kV line from 130% to 138% of its emergency rating (299 MVA) **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27PS).

6. Contribution of 29 MW further overloads the Essex PAR – Stanley Terrace 230 kV line from 123% to 129% of its emergency rating (550 MVA) **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27 PS).

7. Contribution of 29 MW further overloads the Stanley Terrace – Aldene 230 kV line from 121% to 126% of its emergency rating (550 MVA) **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27PS).

8. Contribution of 15 MW further overloads the ECRRF – Foundry St. 138 kV line is from 121% to 125% of its emergency rating (350 MVA) **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27PS).

9. Contribution of 5 MW further overloads the Hudson – South Waterfront 230 kV line from 124% to 126% of its normal rating (404 MVA).

10. Contribution of 24 MW further overloads the North Ave – Pleasant Valley SC 230 kV line from 112% to 118% of its emergency rating (372 MVA) **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27PS).

11. Contribution of 36 MW further overloads the Kearny – NJT Meadows 230 kV line from 114% to 118% of its emergency rating (826 MVA) for the outage of Essex – Hudson 230 kV line (Cont Id. PS72).
12. Contribution of 36 MW further overloads the NJT Meadows – Kingsland 230 kV line from 112% to 116% of its emergency rating (826 MVA) for the outage of Essex – Hudson 230 kV line (Cont Id. PS72).

13. Contribution of 36 MW further overloads the Cook Rd – Athenia 230 kV line from 108% to 112% of its emergency rating (752 MVA) for the outage of Essex – Hudson 230 kV line (Cont Id. PS72).

14. Contribution of 11 MW further overloads the Bergen – Leonia Tap ckt#2 230 kV line from 118% to 119% of its emergency rating (557 MVA) for the outage of Bergen – Leonia T ckt#1 230 kV line (Cont Id. PS45).

15. Contribution of 29 MW further overloads the Essex – Hudson 230 kV line from 108% to 112% of its normal rating (716 MVA).

16. Contribution of 8 MW further overloads the Hudson – South Waterfront 230 kV line from 110% to 112% of its emergency rating (622 MVA) for the **tower** outage of Hudson – Penhorn 230 kV DCTL (Cont Id. 24PS).

17. Contribution of 10 MW further overloads the Bergen – Leonia Tap ckt #1 230 kV line is overloaded from 112% to 114% of its emergency rating (557 MVA) for the outage of Bergen – Leonia Tap –Milford 230 kV line (Cont Id. PS45B).

18. Contribution of 6 MW further overloads the Bergen – Leonia Tap ckt #1 230 kV line is overloaded from 111% to 113% of its normal rating (375 MVA).

19. Contribution of 6 MW further overloads the South Waterfront – Newport 230 kV line from 112% to 114% of its normal rating (315 MVA).

20. Contribution of 36 MW further overloads the Kingsland - Cook Rd 230 kV line from 105% to 109% of its emergency rating (845 MVA) for the outage of Essex – Hudson 230 kV line (Cont Id. PS72).

21. Contribution of 11 MW further overloads the South Waterfront – Newport 230 kV line from 104% to 107% of its emergency rating (490 MVA) for the **tower** outage of Hudson-Belleville 230 kV & Roseland-Kearny D 138 kV DCTL (Cont Id. 30PS).

22. Contribution of 15 MW further overloads the Foundry St – Newark 138 kV line from 101% to 105% of its emergency rating (367 MVA) **tower** outage of Hudson – Essex 230 kV line and NJT Meadows – Athenia 230 kV line (Cont Id 27 PS).

Potential Overloads

1. The Parlin – Williams 230 kV line is overloaded from 99.2% to 99.6% of its emergency rating (805 MVA) for the outage of Atlantic - South River 230 kV line (Cont. JC17). This project contributes approximately 3 MW to cause the thermal violation.
2. The Williams - Freneau 230 kV line is overloaded from 98.6% to 99% of its emergency rating (805 MVA) for the outage of Atlantic - South River 230 kV line (Cont. JC17). This project contributes approximately 3 MW to cause the thermal violation.

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. Essex – Hudson 230 kV Upgrade – Reconductor the existing Essex – Hudson 230 kV line with 1590 ACSS (6.25 miles) at an estimated cost of **$25 M** and an estimated time of 1-2 years. *(Note: This upgrade sufficesto mitigate overload 15 also).*

2. Install a new circuit between Essex and Hudson 230 kV stations (1590 ACSS) at an estimated cost of **$10 M** and an estimated time of 2-3 years. *(Note: This upgrade suffices to mitigate overloads 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 20 and 22 also).*

9. Hudson – South Waterfront 230 kV upgrade – Construct a 230 kV GIS station at 49th Street Rack at an estimated cost of **$50 M** and an estimated time of 2-3 years. *(Note: This upgrade sufficesto mitigate overloads 16, 19 and 21also).*

14. Bergen – Leonia Tap ckt#2 230 kV upgrade – Install parallel 230 kV circuit between Bergen and Leonia 230 kV substations (3 miles) at an estimated cost of **$20 M** and an estimated time of 3 years. *(Note: This upgrade suffices to mitigate overloads 17 and 18 also).*