W4-038 Hudson 230kV Feasibility Study Report
Generation Interconnection

This analysis was completed to assess the reliability impact for the new generation interconnecting to the PJM System as a capacity resource.

Network Impacts
Queue project W4-038 was studied as a(n) 60.0 MW (60.0 MW of which was Capacity) injection into PSEG's system at the Hudson 230 kV substation. Project W4-038 was evaluated for compliance with reliability criteria for summer peak conditions in 2014.

Potential transmission network impacts are as follows:

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

No violations identified.

Multiple Facility Contingency
(Double Circuit Tower Line contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No violations 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. (PSEG) The Hudson 7-12-Penhornt 230 kV line (from bus 217001 to bus 217069 ckt 1) loads from 103.00% to 106.09% (DC power flow) of its emergency rating (822 MVA) for the tower contingency '27PS'. This project contributes approximately 25.40 MW to the thermal violation.

```
CONTINGENCY '27PS'    /* HUD-ESSX 230KV & NJT MEADOWS-ATHENIA 230KV DCTL
  TRIP LINE FROM BUS 216900 TO BUS 216920
  TRIP LINE FROM BUS 216920 TO BUS 217055
  TRIP LINE FROM BUS 217055 TO BUS 216943
  TRIP LINE FROM BUS 217079 TO BUS 217000
  MOVE 100 PERCENT LOAD FROM BUS 216934 TO BUS 216936     /* COOK RD T1 T2
  MOVE 100 PERCENT LOAD FROM BUS 216935 TO BUS 216937     /* COOK RD T3 T4
  MOVE 100 PERCENT LOAD FROM BUS 216978 TO BUS 216979     /* KINGSLAND T1 T2
  MOVE 100 PERCENT LOAD FROM BUS 216961 TO BUS 216960     /* NJT MEADOWS WEST EAST
END
```

2. (PSEG) The Hoboken R-Bergen 230 kV line (from bus 217073 to bus 217100 ckt 1) loads from 108.71% to 110.78% (DC power flow) of its emergency rating (581 MVA) for the single contingency 'PS50'. This project contributes approximately 12.04 MW to the thermal violation.

```
CONTINGENCY 'PS50'
  DISCONNECT BRANCH FROM BUS 217069 TO BUS 217084 CKT 1    /* PENHORNT KNGLND G 230 230
  DISCONNECT BRANCH FROM BUS 217084 TO BUS 216909 CKT 1    /* KNGLND G BELLVILLE 230 230
```

```
  DISCONNECT BRANCH FROM BUS 216909 TO BUS 217098 CKT 1     /* BELLVILLE 220-2 220-1
  DISCONNECT BRANCH FROM BUS 217069 TO BUS 217001 CKT 1     /* PENHORNT HDSN7-12 230 230
  MOVE 100 PERCENT LOAD FROM BUS 216979 TO BUS 216978       /* KNGLND T2 T1
END
```

3. (PSEG) The South Waterfront-Newport R 230 kV line (from bus 217117 to bus 217075 ckt 1) loads from 141.33% to 143.78% (DC power flow) of its emergency rating (490 MVA) for the single contingency 'PS50'. This project contributes approximately 12.04 MW to the thermal violation.

```
CONTINGENCY 'PS50'
  DISCONNECT BRANCH FROM BUS 217069 TO BUS 217084 CKT 1     /* PENHORNT KNGLND G 230 230
  DISCONNECT BRANCH FROM BUS 217084 TO BUS 216909 CKT 1     /* KNGLND G BELLVILLE 230 230
  DISCONNECT BRANCH FROM BUS 216909 TO BUS 217098 CKT 1     /* BELLVILLE 220-2 220-1
  DISCONNECT BRANCH FROM BUS 217069 TO BUS 217001 CKT 1     /* PENHORNT HDSN7-12 230 230
  MOVE 100 PERCENT LOAD FROM BUS 216979 TO BUS 216978       /* KNGLND T2 T1
END
```

4. (PSEG) The Newport R-Hoboken R 230 kV line (from bus 217075 to bus 217073 ckt 1) loads from 126.94% to 129.26% (DC power flow) of its emergency rating (521 MVA) for the single contingency 'PS50'. This project contributes approximately 12.04 MW to the thermal violation.

```
CONTINGENCY 'PS50'
  DISCONNECT BRANCH FROM BUS 217069 TO BUS 217084 CKT 1     /* PENHORNT KNGLND G 230 230
  DISCONNECT BRANCH FROM BUS 217084 TO BUS 216909 CKT 1     /* KNGLND G BELLVILLE 230 230
  DISCONNECT BRANCH FROM BUS 216909 TO BUS 217098 CKT 1     /* BELLVILLE 220-2 220-1
  DISCONNECT BRANCH FROM BUS 217069 TO BUS 217001 CKT 1     /* PENHORNT HDSN7-12 230 230
  MOVE 100 PERCENT LOAD FROM BUS 216979 TO BUS 216978       /* KNGLND T2 T1
END
```

New System Reinforcements

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

None required.

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. BRH-4 Reinforcement is Branchburg-Roseland-Hudson Option 4 project. It's estimated in service date is 2015 but needs to be expedited in order to mitigate the overloads caused by this project. Estimated cost $907M.
2. Hudson - S. Waterfront Reinforcement includes building a new underground line between Hudson 230kV and South Waterfront 230kV. Estimated cost: $27M. (Reference PJM baseline reliability #b1304.4 required date 6/01/2015)

Short Circuit
(Report over-dutied breakers.)

None required.

Energy Portion of Interconnection Request
PJM also studied the delivery of the energy portion of the surrounding generation. Any potential 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 Transmission Interconnection request.
Note: *Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified*.

No violations identified.