#M14 Churchtown – Cumberland 100 MW
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 - 100 MW Capacity Injection

230 kV Option

Network Impacts

The **#M14** project was studied as a **100 MW Capacity Resource injection into the Churchtown – Cumberland 230kV line** to determine compliance with reliability criteria for summer peak conditions in 2008. A summary of the results is as follows:

Generator Deliverability

1. The Churchtown 230/69 kV transformer was overloaded for both interconnection points. The 230 kV interconnection resulted in a 108% overload and contributed 50 MW to the loading on this facility while the 138 kV interconnection resulted in a 100% overload and contributed 20 MW toward the loading on the facility.

Second Contingency (MAAC Criteria IIB)

No identified problems.

Multiple Facility Contingency – Tower Line Outages (MAAC Criteria IIC)

No identified problems.

Short Circuit Analysis

2. Deepwater 69 kV breakers 6602, 6604, 6606, 6612 and 6622 were overstressed in excess of 100% of nameplate interrupting rating and are required to be replaced.

3. Deepwater 69 kV breakers 6607, 6608, 6609, 6630, 6632, and 6683 were very close to 100% of nameplate interrupting rating and depending on the impedance of the generator(s), generator step-up transformer and the new Churchtown 230/69 kV transformer may need to be replaced. These must be studied in more detail during the Impact Study

New System Reinforcements

1. Replace the existing Churchtown 230/69 kV transformer with a new 300 MVA transformer: **$3,000,000**. Construction Time: **18 months.**

2. Replace Deepwater 69 kV breakers: 6602, 6604, 6606, 6612 and 6622, estimated cost: **$1,375,000** ($275,000 per breaker). Construction Time: **20 months.**

3. If Deepwater 69 kV breakers: 6607, 6608, 6609, 6630, 6632, and 6683 require replacement the estimated cost of their replacement is **$1,650,000** ($275,000 per breaker). Construction
. Time: **20 months.**

Contribution to Previously Identified System Reinforcements:

(Queue M14 may have a cost allocation responsibility for the following as a result of contributing to the Network Impact)

Queue M14 generation contributes 7 MW to an overload on Master – North Philadelphia 230 kV. The system upgrade required to alleviate this overload is to replace the existing 795 kcmil ACSR line conductor with a single 795 kcmil ACSS conductor. See Queue A27 Facilities Study on the PJM website for details concerning this upgrade. Estimated cost: **$4,000,000**. Time to construct: **18-24 months**.

Queue M14 generation contributes 5 MW to an overload on Grays Ferry – Parrish 230 kV. The system upgrade required to alleviate this overload is to to replace the existing 1590 kcmil ACSR line conductor with a single 1590 kcmil ACSS conductor. See Queue A27 Facilities Study on the PJM website for details concerning this upgrade. Estimated cost: **$3,000,000**. Time to Construct: **24-36 months**.

Note 2: Due to the recently announced generator retirements in Eastern PJM, there are a number of unresolved reliability problems identified in 2008. The solution to these problems may impact the results of the Feasibility Study. Generator retirements may also affect the short circuit study results.

138 kV Option

Network Impacts

The **#M14** project was studied as a **100 MW Capacity Resource injection into the Sherman Ave 138 kV substation** to determine compliance with reliability criteria for summer peak conditions in 2008. A summary of the results is as follows:

Generator Deliverability Network Impacts

1. The Churchtown 230/69 kV transformer was overloaded for both interconnection points. The 230 kV interconnection resulted in a 108% overload and contributed 50 MW to the loading on this facility while the 138 kV interconnection resulted in a 100% overload and contributed 20 MW toward the loading on the facility.

Generator Deliverability Local Impacts

2. Sherman transformer #1 (N/E rating = 68/78 MVA) was overloaded at 110% due to the outage of the Sherman transformer #2.

3. Sherman transformer #1 (N/E rating = 66/80 MVA) was overloaded at 104% due to the outage of the Sherman transformer #2.

Note 4: Impacts 2 and 3 above, and impact 6 below, may disappear if the Capacity Interconnection Rights (generator replacement, etc.) to retired VCLP generator are not used within the required time. Also see Note 2 information.

Second Contingency (MAAC Criteria IIB)

No identified problems.

Multiple Facility Contingency – Tower Line Outages (MAAC Criteria IIC)

No identified problems.

Short Circuit Analysis

4. Deepwater 69 kV breakers 6602, 6604, 6606, 6612 and 6622 were overstressed at 100.3 - 105.7% of nameplate interrupting rating and are required to be replaced.

5. Deepwater 69 kV breakers 6607, 6608, 6609, 6630, 6632, and 6683 were very close to 100% of nameplate interrupting rating and depending on the impedance of the generator(s), generator step-up transformer and the new Churchtown 230/69 kV transformer may need to be replaced. These must be studied in more detail during the Impact Study.

6. The replacement of the Sherman Ave transformers causes 69 kV breakers D & E to be overstressed at 102.7 -110.9 % of their name plate interrupting rating. Replacement of circuit breakers D & E will be required.

New System Reinforcements

1. Replace the existing Churchtown 230/69 kV transformer with a new 300 MVA transformer: **$3,000,000**. Construction Time: **18 months.**

2. Replace Deepwater 69 kV breakers: 6602, 6604, 6606, 6612 and 6622, estimated cost: **$1,375,000** ($275,000 per breaker). Construction Time: **20 months.**

3. If Deepwater 69 kV breakers: 6607, 6608, 6609, 6630, 6632, and 6683 require replacement. The estimated cost of their replacement is **$1,650,000** ($275,000 per breaker). Construction Time: **20 months.**

4. Replace Sherman Ave transformer T#1 with a new transformer having a nameplate of 100 MVA**: $1,875,000**; Construction Time: **18 months**

5. Replace Sherman Ave transformer T#3 with a new transformer having a nameplate of 100 MVA: **$1,875,000**; Construction Time: **18 months**

6. The replacement of the Sherman Ave transformers T1 and T3 causes 69 kV breakers D & E to be overstressed for short circuit current above their name plate interrupting capability and need to be replaced **$550,000** ($275,000 per breaker); Construction Time: **14 months.**

Contribution to Previously Identified System Reinforcements:

(Queue M14 may have a cost allocation responsibility for the following as a result of contributing to the Network Impact)

Queue M14 generation contributes 7 MW to an overload on Master – North Philadelphia 230 kV. The system upgrade required to alleviate this overload is to replace the existing 795 kcmil ACSR line conductor with a single 795 kcmil ACSS conductor. See Queue A27 Facilities Study on the PJM website for details concerning this upgrade. Estimated cost: **$4,000,000**. Time to construct: **18-24 months**.

Queue M14 generation contributes 5 MW to an overload on Grays Ferry – Parrish 230 kV. The system upgrade required to alleviate this overload is to to replace the existing 1590 kcmil ACSR line conductor with a single 1590 kcmil ACSS conductor. See Queue A27 Facilities Study on the PJM website for details concerning this upgrade. Estimated cost: **$3,000,000**. Time to Construct: **24-36 months**.

Note 2 repeated: Due to the recently announced generator retirements in Eastern PJM, there are a number of unresolved reliability problems identified in 2008. The solution to these problems may impact the results of the Feasibility Study. Generator retirements may also affect the short circuit study results.