Issues Tracking
• Open Issues
  – None

• New Issues
Backbone Transmission Project Status
Susquehanna to Roseland Project

- Required June 1, 2012 service date
- Due to delays the line is not expected until June 1, 2015.
- Updated analysis using the 2011 load forecast confirmed double circuit tower line (DCTL) violations beginning in summer 2012
- Near-term Solution: Operate to the DCTL violations in real-time operation. Adjust generation and implement DR as required to maintain the reliability of the grid.
- Updated studies show that Hudson 1 is not required to maintain reliability. Hudson 1 RMR will be released.
MAPP – Mid-Atlantic Power Pathway project

- This 2011 RTEP analysis which included various generation sensitivities, suggests the need for the line has moved several years into the future beyond 2015.

- Based on the 2011 RTEP analyses the PJM Board has decided to hold the project in abeyance in the RTEP with a 2019 – 2021 service date.

- PJM Board directed staff to perform additional analysis using the 2012 RTEP assumptions and incorporating the results of the RPM base residual auction that will be run in May 2012.
• 2011 RTEP analysis suggests the need for the line has moved several years into the future beyond 2015.

• Based on these analyses the PJM Board has decided to hold the project in abeyance in the RTEP and requested that the transmission owners suspend development activities.

• PJM Board directed staff to perform additional analysis using the 2012 RTEP assumptions and incorporating the results of the RPM base residual auction that will be run in May 2012.
2012 RTEP Assumptions
• Update of standard assumptions

• FYI Process
  – Scenario & Sensitivity analysis
  – TEAC input & feedback
• Load Flow Modeling

  – Power flow models for world load, capacity and topology will be based on the 2017 summer case from the 2011 ERAG MMWG series power flow base case

  – PJM topology will be based on the 2016 RTEP case that was used in the 2011 RTEP
    • Include all PJM Board approved upgrades through the December 6, 2011 PJM Board of Manager approvals

  – Duke Energy Ohio Kentucky (DEOK) included
• Firm Commitments

  – Long term firm transmission service will be consistent with operations

• Outage Rates

  – Generation outage rates will be based on the most recent Reserve Requirement Study performed by PJM

  – Generation outage rates for future PJM units will be estimated based on class average rates
• Peak Load
  – Load will be modeled consistent with the 2012 PJM Load Forecast Report
  – The load forecast data is expected to be available late December 2011

• Light Load
  – Modeled at 50% of the Peak Load forecast
  – The Light Load case will be modeled consistent with the procedure defined in M14B.

• Load Management, where applicable, will be modeled consistent with the 2012 Load Forecast Report
  – Used in LDA under study in load deliverability analysis
• All existing generation expected to be in service for the year being studied will be modeled.

• Future generation with a signed Interconnection Service Agreement will be modeled along with any associated upgrades.

• Generation with a signed ISA will contribute to and be allowed to back-off problems.

• Generation with an executed Facility Study Agreement (FSA) will be modeled along with any associated network upgrades.
• Generation with an FSA will be modeled consistent with the procedures noted in manual 14B

• Generation with an executed FSA will be modeled off-line but will be allowed to contribute to problems in the generation deliverability testing.

• Generation with an executed FSA will not be allowed to back-off problems.

• If the PJM load exceeds the sum of the available generation and generation with an executed ISA then queued generation that has an executed FSA will be turned on to meet firm interchange.

• Additional generation information (i.e. machine lists) will be posted to the TEAC page.
• All PJM bulk electric system facilities, all tie lines to neighboring systems and all lower voltage facilities operated by PJM will be monitored.

• Contingency analysis will include all bulk electric system facilities, all tie lines to neighboring systems and all lower voltage facilities operated by PJM.

• Thermal and voltage limits will be consistent with those used in operations.
• 2017 base case development started in December

• 2017 base case development in progress

• Initial focus on study year 2017 analyses
• Previous RTEP base case update will be coordinated with the Transmission Owners

• Retools will evaluate backbone and significant lower voltage transmission facilities

• Future TEAC and Subregional RTEP Committee meetings will be scheduled as analysis is completed
• As part of the 24-month RTEP cycle, a year 8 (2020) base case will be developed and evaluated as part of the 2012 RTEP

• Topology of year 8 case will be based on the year 5 (2017) case

• Identify and develop longer lead time transmission upgrades
Scenario Analysis – Recap of 2011 RTEP

• Renewable Portfolio Standards (RPS)
  – Study year: 2026
  – Sourcing assumptions
  – Offshore assumptions
  – Reliability Analysis
  – Security constrained optimal power flow (SCOPF)
  – Market Efficiency Analysis
  – Conceptual transmission overlay

• EMAAC At-Risk
  – Generation retirement variable
  – Generation addition variable
At Risk Generation - Considerations

• Regulatory
  – Cross State Air Pollution Rule (CSAPR)
  – New Jersey High Electric Demand Day (HEDD)
  – Considerations:
    • $/MW to Retrofit
    • Fuel Type & Size
    • Cost of New Entrant (CONE)

• RPM
  – Did not clear in previous RPM auctions

• Information
  – Units with limited availability
  – Press Release
  – Officially Requested Deactivation
• Assumptions review

• Scenarios review

• Email RTEP@pjm.com
PJM Baseline Reliability Update
• Generator Deliverability / Common Mode Violation

• The Waterford - Muskingum 345KV line is overloaded for various contingencies

• Perform a Sag study of 4 miles of the Waterford – Muskingum line (B1811.1) $16,000

• Rebuild 0.10 miles of Waterford – Muskingum 345kV with 1590 ACSR (B1811.2) $50,000

• Estimated Project Cost:
  – $0.016M (B1811.1)
  – $0.05M (B1811.2)

• Expected IS date: 6/1/2016
- Load Deliverability Violation

- The South Canton - Star 345kV line is overloaded for the loss of the Sammis - Star 345kV Line.

- Reconductor the AEP portion of South Canton – Star 345kV with 954 ACSR and upgrade terminal equipment at South Canton. (B1812)

- Estimated Project Cost: $0.8M

- Expected IS date: 6/1/2016
• Stability violation at Oyster Creek
• Proposed Solution:
  – Install a PSS at Oyster Creek generating station.
• Estimated Project Cost: $2.5 M
• Expected IS Date: 1Q 2013
• B1155 Scope Change
• Old Scope:
Build a new 230 kV circuit from Branchburg to Middlesex Sw. Rack.
Build a new 230 kV substation at Middlesex by connecting the new and the existing circuits from Branchburg, plus the two 230 kV parallel circuits from Raritan River to Gillette (I-1023 and W-1037).
• New Scope:
Build a new 230 kV circuit from Branchburg – Bridgewater and reconfigure the Bridgewater 230 kV substation to breaker and half configuration.
• Estimated Cost:
$125 M
• Expected IS Date:
6/1/2014
• Stability violation at Susquehanna
• Proposed Solution:
  – Install power system stabilizer at Susquehanna units 1 and 2
  – AVR and rectifier bank replacement
• Estimated Project Cost and IS Date:
  Total $12.49 M
• Expected In-Service Date:
  – 1Q 2012 to complete all PSS retrofits
  – 1Q 2015 to complete all AVR and rectifier bank replacement work
N-1-1 Reactive Upgrades
<table>
<thead>
<tr>
<th>Location</th>
<th>Reinforcement Recommended to PJM Board – December 2011</th>
<th>PJM Board Status – December 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altoona 230 kV</td>
<td>250 MVAR SVC</td>
<td></td>
</tr>
<tr>
<td>Doubs 500 kV</td>
<td>300 MVAR switched shunt and an increase (~50 MVAR) in size of existing switched shunt</td>
<td>Approved for inclusion in the RTEP</td>
</tr>
<tr>
<td>Loudoun 500 kV</td>
<td>450 MVAR SVC and 300 MVAR switched shunt</td>
<td></td>
</tr>
<tr>
<td>Pleasant View 500 kV</td>
<td>150 MVAR switched shunt</td>
<td></td>
</tr>
<tr>
<td>Mansfield 345 kV</td>
<td>100 MVAR FSS and two 100 MVAR switched shunt</td>
<td></td>
</tr>
<tr>
<td>Hunterstown 500 kV</td>
<td>500 MVAR SVC</td>
<td>Decision Deferred Until Next PJM Board Meeting in February 2012</td>
</tr>
<tr>
<td>Meadow Brook 500 kV</td>
<td>600 MVAR SVC</td>
<td></td>
</tr>
<tr>
<td>Mt. Storm - Valley 500 kV</td>
<td>250 MVAR SVC</td>
<td></td>
</tr>
</tbody>
</table>
• Previous evaluation & PJM Board recommendation

• Mt. Storm SVC location performance compared to Mt. Storm – Valley SVC location
  – Performance was better at Mt. Storm - Valley

• Mt. Storm voltage regulation set point sensitivity and additional evaluation
Mt. Storm – Valley SVC Evaluation

- Mt. Storm – Valley SVC
  - Previous evaluation assumed the current Mt. Storm generation voltage schedule of 1.04 P.U.
  - Sensitivity analysis to adjust Mt. Storm generation voltage schedule to 1.05 P.U.

Table 1: SVC Utilization evaluation of Mt. Storm SVC location and Mt. Storm Valley SVC location with Mt. Storm generation at 1.05 P.U.
• Ongoing evaluation

• Next steps
• Previous evaluation & PJM Board recommendation
  – Drivers for SVC

• Stakeholder suggestion to evaluate implementation of fast switched shunt and capacitors

• Next Steps
  – Consider alternate suggestions and evaluate for additional contingencies & criteria
Short Circuit Upgrades
• The Pumphrey 115 kV breakers '110524 DR' is overstressed
• Proposed Solution: Revise the reclosing for Pumphrey 115 kV breakers '110524 DR' (b1789)
• Expected IS Date: 06/1/2016
• The Brandon Shores 230kV breakers need to be replaced due to aging infrastructure.
• Proposed Solution: Replace the Brandon Shores 230kV breakers’ (s0382)
• Estimated Project Cost: $7.5 M
• Expected IS Date: 12/1/2017
• The Wagner 115 kV breakers are overstressed
• Proposed Solution: Rebuild Wagner 115kV substation to 80kA breakers (b1806)
• Estimated Project Cost: $5.8 M
• Expected IS Date: 12/1/2016
Market Efficiency Update
• 2011 Market Efficiency results do not reflect the following changes:
  ▪ Delay in Jacks Mountain Project
  ▪ Added Light Load and Reactive Upgrades
  ▪ Updated future generation modeling

• 2012 Input Assumptions will incorporate all above changes including following:
  – Updated Load Forecast and Demand Response
  – Updated Fuel and Emission Prices
  – Updated RTEP Model

• 2012 Analysis will include updated results for several projects
  – MEP-A-10
    • Install two 500/345 kV transformers at Bath County station and construct 345 kV line from Kanawha River station to Bath County station.
  – MEP-B-14 (New Project)
    • Install a new 230 kV line from Lexington to West Staunton
  – Combination of MEP-A-10 and MEP-B-14
  – MEP-A-6
    • Liberty East: New Hunterstown 500 kV Tx, New single circuit Hunterstown-Conewago 230 kV line, New Conewago 230 kV substation connecting the Jackson - Three Mile Island 230 kV and West Shore - Brunner Island 230 kV transmission lines near their intersection in York County
Questions?

Email: RTEP@pjm.com