Transmission Expansion Advisory Committee

March 15, 2012
Issues Tracking
• Open Issues
  – None

• New Issues
Generation Retirements
All Pending Generator Deactivations

Over 11,000 MW of Pending Deactivations (~8,500 MW since 11/2011)
# Deactivations received since 11/1/2011

<table>
<thead>
<tr>
<th>Units</th>
<th>Trans Zone</th>
<th>Requested Deactivation Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walter C Beckjord 1, 2, &amp; 3</td>
<td>DEOK</td>
<td>5/1/2012</td>
<td>Reliability Analysis complete - impacts identified - upgrades scheduled to be completed by May 1, 2012</td>
</tr>
<tr>
<td>Niles 1 &amp; 2</td>
<td>ATSI</td>
<td>6/1/2012</td>
<td>Reliability Analysis Underway</td>
</tr>
<tr>
<td>Elrama 1, 2, 3, &amp; 4</td>
<td>DUQ</td>
<td>6/1/2012</td>
<td>Reliability Analysis Underway</td>
</tr>
<tr>
<td>Armstrong 1, &amp; 2; Ashtabula 5; Bay Shore 2, 3, &amp; 4; Eastlake 1, 2, 3, 4, &amp; 5; Lake Shore 18; R Paul Smith 3 &amp; 4</td>
<td>ATSI</td>
<td>9/1/2012</td>
<td>Reliability analysis complete. Impacts identified and expected to be resolved by June 2016. Further refinement of the reliability analysis, required upgrades, and generator deactivation schedule continues.</td>
</tr>
<tr>
<td>Albright 1, 2, &amp; 3; Rivesville 5 &amp; 6; Willow Island 1 &amp; 2</td>
<td>APS</td>
<td>9/1/2012</td>
<td>Reliability Analysis complete - impacts identified - upgrades scheduled to be completed by May 2013</td>
</tr>
<tr>
<td>Chesapeake 1 &amp; 2; Yorktown 1</td>
<td>DOM</td>
<td>12/31/2014</td>
<td>Reliability Analysis complete. Impacts identified. Potential upgrades under review</td>
</tr>
<tr>
<td>Portland 1 &amp; 2</td>
<td>MetEd</td>
<td>1/7/2015</td>
<td>Reliability Analysis Underway</td>
</tr>
<tr>
<td>New Castle 3, 4, &amp; 5; New Castle Diesels A &amp; B</td>
<td>ATSI</td>
<td>4/16/2015</td>
<td>Reliability Analysis Underway</td>
</tr>
<tr>
<td>Titus 1, 2, 3</td>
<td>MetEd</td>
<td>4/16/2015</td>
<td>Reliability Analysis Underway</td>
</tr>
<tr>
<td>Shawville 1, 2, 3, &amp; 4</td>
<td>PenElec</td>
<td>4/16/2015</td>
<td>Reliability Analysis Underway</td>
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<tr>
<td>Walter C Beckjord 4, 5, &amp; 6</td>
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<td>5/1/2015</td>
<td>Reliability Analysis complete - impacts identified - upgrades scheduled to be completed by June 2014</td>
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<tbody>
<tr>
<td>Glen Gardner CT 1, 2, 3, 4, 5, 6, 7, &amp; 8</td>
<td>JCPL</td>
<td>5/1/2015</td>
<td>Reliability Analysis Underway</td>
</tr>
<tr>
<td>Bergen 3; Burlington 8; National Park 1; Mercer 3; Seawaren 6</td>
<td>PSEG</td>
<td>6/1/2015</td>
<td>Reliability Analysis Complete. Impacts identified and expected to be resolved in three - four years. Working with affected TO to finalize upgrade schedule.</td>
</tr>
<tr>
<td>Chesapeake 3 &amp; 4</td>
<td>DOM</td>
<td>12/31/2015</td>
<td>Reliability Analysis complete. Impacts identified. Potential upgrades under review</td>
</tr>
</tbody>
</table>
Bergen 3; Burlington 8; National Park 1; Mercer 3; Seawaren 6

Requested deactivation date: 6/1/2015

- Initial analysis identified potential issues
  - Advance b1588 to 2015 or if not feasible then Operating procedure or SPS in the interim
  - Replace short section of Croydon-Burlington line inside Croydon substation – Estimated IS date 6/1/2015
DOM (Dominion Resources) Deactivations

Chesapeake 1 & 2; Yorktown 1
Requested deactivation date: 12/31/2014

Chesapeake 3 & 4
Requested deactivation date: 12/31/2015

• Initial analysis identified potential issues
  – Proposals for solutions received from LS Power and Dominion
ATSI (FES) Deactivations – Status and Next Steps

Armstrong 1, & 2; Ashtabula 5; Bay Shore 2, 3, & 4; Eastlake 1, 2, 3, 4, & 5; Lake Shore 18; R Paul Smith 3 & 4

Requested deactivation date: 9/1/2012

- Initial analysis identified potential issues (see posted material) for summer 2013
- Analysis of future years is in-progress
- Next steps will identify the solutions and the timing of the solutions including the need to retain some of the generation on RMR
ATSI / APS (FES) Deactivations – Initial Results
Beckjord 1, 2, & 3
Requested deactivation date: 5/1/2012
• Analysis completed with upgrades needed to uprate breakers and disconnect switches at Silver Grove as well as installing temporary cooling for Silver Grove 345/138kV transformer – Estimated IS date is 5/1/2012

Beckjord 4, 5, & 6
Requested deactivation date: 5/1/2015
• Upgrade currently underway to reconfigure Red Bank bus to ring bus configuration – Estimated IS date 6/1/2013
Albright 1, 2, & 3; Rivesville 5 & 6; Willow Island 1 & 2
Requested deactivation date: 9/1/2012

- Existing Project b1142 - Reconductor the Bartonville – Stephenson 138 kV; Stonewall - Stephenson 138 kV line
  - IS Date can be advanced to 6/1/2013
- Voltage issues may be resolved through either a revision to the Belmont SPS or installation of capacitors at Belmont 138 kV
2012 RTEP
Scenario and Sensitivity Analyses
2012 RTEP - Renewable Portfolio Standards Scenarios
Renewable Portfolio Standards

• Overall Assumptions
  – Model the latest Renewable Portfolio Standards (RPS) state targets
    • Assume production from renewable wind
    • Update target PJM installed renewable MW requirements
    • Update installed reserve calculation

  – 2012 PJM Load Forecast Report
    • 15 Year Load Forecast
    • Include Demand Response (DR) and Energy Efficiency (EE)

  – Incorporate findings from 2011 RTEP RPS scenario studies
RPS – Scenario #1

• Assumptions
  – Assume RPS supply from PJM resources
  – 7 GW Offshore
  – Study year: 2027

• Analysis
  – Reliability Analysis
    • Generator Deliverability (50/50 load level)
    • Common Mode Outage test (50/50 load level)
  – Market Efficiency Analysis
    • Security Constrained Optimal Power Flow (SCOPF)
    • Production cost simulation using PROMOD

• Result
  – Thermally overloaded facilities
  – Congestion $“s
  – Develop transmission overlay
• Assumptions
  – 0 GW Offshore
  – Otherwise, same as RPS – Scenario #1 but with a 0 GW offshore assumption
  – The remainder of the state target RPS will be sourced from inland PJM resources
RPS – Scenario #3

• Assumptions
  – **RPS Source from Neighboring Entities**
  – Otherwise, same as RPS – Scenario #2 (assume 0 offshore)
  – The remainder of the state target RPS will be sourced from inland PJM resources

• Neighboring Entities
  – Assume 40% of the PJM RPS supplied from renewable wind in the Midwest ISO (MISO)
    • Assume DC injection points from MISO to PJM
    • Injection points to PJM to be determined
2012 RTEP - High Load Growth Scenario
High Load Growth

• Overall Assumptions
  – 2012 PJM Load Forecast Report
    • 15 Year Load Forecast
    • Include Demand Response (DR) and Energy Efficiency (EE)
  – PJM Load Forecast based on Moody’s High Economic Growth Forecast
  – 2017 RTEP Base Case

• Analysis
  – Reliability Analysis
    • 15 Year Analysis

• Result
  – Thermally overloaded facilities with and without the high load growth forecast that demonstrate the relative impact of the alternate forecast
2012 RTEP - At Risk Generation Scenarios
• Purpose
  – Identify potential regional and local reliability concerns

• Overall Assumptions
  – 2016 RTEP Base Case
  – 2012 PJM Load Forecast Report
    • Include Demand Response (DR) and Energy Efficiency (EE)

• At-risk generation
  – Announced retirements
  – Coal Plant Size and Age
  – State agency feedback
  – Media publication
  – Other at-risk
At-Risk Generation – Scenario #1

• Assumptions
  – Same as 2012 RTEP base except “at-risk” generation

• Analysis
  – Reliability Analysis
    • Generator Deliverability (50/50 load level)
    • Common Mode Outage test (50/50 load level)
    • N-1-1 outage test (50/50 load level)
    • Load Deliverability (90/10 load level)

• Result
  – Thermal overloads & voltage violations
2012 RTEP Scenario Analysis – Status & Next Steps

• Data

• Assumptions

• Analysis

• Results
2012 PJM Baseline Reliability
ARR Analysis
Preliminary Stage 1A 10-Year ARR analysis

- Section 7.5 (b) of Schedule 1 of OA indicates:
  - On an annual basis PJM shall conduct a simultaneous feasibility analysis test for stage 1A ARRs which shall access the simultaneous feasibility for each year remaining in terms of the rights. This test shall be based on the ARRs required to meet zonal base load requirements. PJM shall apply a zonal load growth rate for the 10 year term of stage 1A ARRs.

- The preliminary 10-year analysis on 2012/13 Stage 1A ARRs resulted in infeasibility on the following facilities. Upgrades will need to be developed to address the infeasibilities

<table>
<thead>
<tr>
<th>Monitored Element</th>
<th>Contingency Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>122 Belvidere - 12205 Line 138 KV 12205 1</td>
<td>345L15616 Cherry Valley-Silver Lake 345 kV Line</td>
<td>Internal</td>
</tr>
<tr>
<td>138 Silver Lake - 156 Cherry Valley 345 KV 15616</td>
<td>345L15502 Nelson-Electric Jct 345 kV Line</td>
<td>Internal</td>
</tr>
<tr>
<td>Belmont 500 KV Tran 3</td>
<td>BELMONT 500/138 #1 &amp; #2 (APS)</td>
<td>Internal</td>
</tr>
<tr>
<td>Breed - Wheatland 345 KV BRE-WHE1</td>
<td>JEFFERSON ROCKPORT 765KV LINE</td>
<td>M2M Flowgate</td>
</tr>
<tr>
<td>Kenosha - Lakeview 138 KV 9341</td>
<td>Zion-Pleas PR (2221) 345 Line</td>
<td>M2M Flowgate</td>
</tr>
<tr>
<td>Oak Grove - Galesburg 161 KV OAK-GAL</td>
<td>345L15502 Nelson-Electric Jct 345 kV Line</td>
<td>M2M Flowgate</td>
</tr>
<tr>
<td>Pleasant Prairie - Zion 345 KV 2221</td>
<td>Cherry Valley-Silver Lake 345kV (15616 line)</td>
<td>M2M Flowgate</td>
</tr>
<tr>
<td>Lakeview - Zion 138 KV</td>
<td>Zion-Pleas PR (2221) 345 Line</td>
<td>M2M Flowgate</td>
</tr>
</tbody>
</table>

Note: Final 10-Year ARR analysis may identify additional facilities
ComEd Transmission Zone

- Light Load Voltage Violation

- High voltage at Kendall and R79 Tap 345kV buses for the loss of Kendall County – Lockport 345kV line (#10805)

- Install a 345 kV normally closed bus tie CB at Kendall County (B1886)

- Estimated Project Cost: $2.8M

- Expected IS date: 03/01/2014
• N-1-1 Thermal Violation

• The Electric Junction 345/138/34.5kV transformer #83 is overloaded for the loss of the Electric Junction – W407K – W407M – Lombard Red 345KV line (#11120) and the loss of W407K – Aurora “Red” 345 kV line (14419)

• Upgrade five 345 kV circuit breakers (L1223, L11124, L14321, BT2-3 and BT3-4 ) at Electric Junction (B1852.1)

• Modify reclosing on 138kV line (L11103) at TSS 111 Electric Junction (B1852.2)

• Estimated Project Cost: $2.5M

• Expected IS date: 06/01/2016
• Cancel Baseline Project

• Cancel B1266: Normally close 345 kV BT 2-3 at TSS 103 Lisle, replace one 345 kV circuit breaker on BT 1-2 at TSS 103 Lisle

• Advance the Expected IS date of B1844 and B1845 to 06/01/2015

✓ Reconductor 2.4 miles of 138 kV line 10302 from TSS 103 Lisle to York Tap with ACSS(B1845)
✓ Reconductor 2.1 miles of 138 kV line 10301 from TSS 103 Lisle to York Tap with ACSS(B1844)
• Project Cost Change for B1661: Install a 765 kV circuit breaker at Wyoming station
• Old Cost estimate: $2M
• New Cost estimate: $5M
• Expected IS date: 6/1/2015
AEP Transmission Zone

- Common Mode Violation

- The East Lima 345/138KV transformer #2 is overloaded for the loss of the East Lima – Fostoria Central 345kV line with stuck break at East Lima 345KV

- Switch the breaker position of transformer #1 and SW Lima at East Lima 345kV bus (B1883)

- Estimated Project Cost: $1.0M

- Expected IS date: 06/01/2016
• Project Replacement

• Cancel Project b0676.2:
  ✓ Reconductor Doubs - Lime Kiln (#231) 230kV
  ✓ Estimated Project Cost: $3.1M
  ✓ Expected IS Date: 06/01/2013

• Replaced by B1833:
  ✓ Replace the 1200 A line side and bus side disconnect switches with 1600 A switches, replace bus side, line side, and disconnect leads at Lime Kiln SS on the Doubs-Lime Kiln 2 (231) 230 kV line terminal.
  ✓ Estimated Project Cost: $0.12M
  ✓ Expected IS date: 06/01/2016
• Project Replacement

• Cancel Project b0676.1:
  ✓ Reconductor Doubs - Lime Kiln (#207) 230kV
  ✓ Estimated Project Cost: $3.5M
  ✓ Expected IS Date: 06/01/2013

• Replaced by B1832:
  ✓ Replace the 1200 A line side and bus side disconnect switches with 1600 A switches, replace bus side, line side, and disconnect leads at Lime Kiln SS on the Doubs-Lime Kiln 1 (207) 230 kV line terminal..
  ✓ Estimated Project Cost: $0.12M
  ✓ Expected IS date: 06/01/2016
• Project Withdrawal

• Cancel Project b1171.3:
  ✓ Install four 500 kV breakers and remove BOL1 500 kV breaker at Black Oak
  ✓ Estimated Project Cost: $9.17M
  ✓ Expected IS Date: 06/01/2013

• Project no longer required due to updated thermal facility rating

LEGEND
- Subs Identified

Substations
- 115kV
- 138kV
- 230kV
- 345kV
- 500kV
- 765kV

Transmission Lines
- 115
- 138
- 230
- 345
- 500
- 765
- 69
Duke Energy Ohio Kentucky
The DEOK zone was considered part of PJM for the 2011 RTEP and current

Baseline reliability upgrades identified

Given the integration of the DEOK zone on January 1, 2012 approval of these upgrades will be sought from the PJM Board of Managers

Cost allocation for all DEOK upgrades eligible for PJM Board of Managers approval for inclusion in the RTEP is 100% to the DEOK zone with the exception of the following upgrade:

- b1707.1 Add a 138/69 kV transformer at Newtown substation
- b1707.2 Add a new 69 kV line Newtown - Mt. Washington
- b1707.3 Add a new 69 kV line Newtown - Berkshire
- b1707.4 Reconfigure the 69 kV loop
  - B1707.1, B1707.2, B1707.3, and B1707.4 are allocated 98.26% to DEOK and 1.74% to Dayton

The following slides detail the Duke Energy Ohio Kentucky (DEOK) baseline upgrades that will be reviewed with the PJM Board at their April 2012 meeting
Duke Energy Ohio Kentucky Transmission Zone

- Common Mode Violation
- Todhunter 345/138KV transformers 15 & 17 are overloaded for breaker failure operation of the Todhunter 345kV Breaker 1385 or Breaker 1387.

- Recommended Solution:
  - Reconfigure the Todhunter 345KV ring bus (B1573)

- Estimated Project Cost: $1.325M

- Expected IS date: 06/01/2014
• Common Mode Violation

• The Port Union - Dimmick 138kV circuit (#5483) and Dimmick – Cornell Tap 138KV circuit are overloaded for several multiple facility contingencies at Foster 138kV bus.

• Recommended Solution:
  • Re-conductor the circuits for 6 miles with 556 ACSS conductor and replace a wavetrap. (B1574)

• Estimated Project Cost: $1.85M

• Expected IS date: 06/01/2014
Duke Energy Ohio Kentucky Transmission Zone

- Common Mode Violation
- The Todhunter - Trenton 138kV circuit (#3284) is overloaded for several multiple facility contingencies.
  - Recommended Solution:
  - Re-conductor the 5 miles circuit with the 556ACSS conductor (B1576)
  - Estimated Project Cost: $1.05M
  - Expected IS date: 06/01/2013
The following breakers are overstressed:

- Terminal 138 kV breaker “906”
- Terminal 138 kV breaker “913”
- Terminal 138 kV breaker “914”
- Terminal 138 kV breaker “919”
- Terminal 138 kV breaker “903”
- Terminal 138 kV breaker “910”

Proposed Solution:

- Replace the Terminal 138 kV breaker “906” with 63 kA (b1550)
- Replace the Terminal 138 kV breaker “913” with 63 kA (b1551)
- Replace the Terminal 138 kV breaker “914” with 63 kA (b1552)
- Replace the Terminal 138 kV breaker “919” with 63 kA (b1553)
• Proposed Solution (cont’d):
  – Revise the reclosing on the Terminal 138 kV breaker “903” to 15 seconds (b1554)
  – Revise the reclosing on the Terminal 138 kV breaker “910” to 15 seconds (b1555)

• Estimated Project Cost:
  – $250 K for each new breaker
  – $0 to revise the reclosing

• Expected IS Date:
  – 12/31/2011 – for breakers 903 and 910
  – 12/31/2012 – for breakers 914 and 919
  – 12/31/2014 – for breakers 913 and 906
Duke Energy Ohio Kentucky Transmission Zone

- The following breakers are overstressed:
  - Miami Fort 138 kV breaker “804”
  - Miami Fort 138 kV breaker “806”
  - Miami Fort 138 kV breaker “904”
  - Miami Fort 138 kV breaker “928”
  - Miami Fort 138 kV breaker “927”

- Proposed Solution:
  - Replace the Miami Fort 138 kV breaker "804" with 63 kA (b1557)
  - Replace the Miami Fort 138 kV breaker "806" with 63 kA (b1558)
  - Replace the Miami Fort 138 kV breaker "904" with 63 kA (b1559)
  - Replace the Miami Fort 138 kV breaker "928" with 63 kA (b1560)
  - Revise the reclosing on the Miami Fort 138 kV breaker "927" to 15 seconds (b1561)

- Estimated Project Cost:
  - $250 K for each new breaker
  - $0 to revise the reclosing
Duke Energy Ohio Kentucky Transmission Zone

- Expected IS Date:
  - 12/31/2011 – for breaker 927
  - 12/31/2012 – for breakers 806 and 928
  - 12/31/2014 – for breakers 804 and 904
Duke Energy Ohio Kentucky Transmission Zone

- The following breakers are overstressed:
  - Todhunter 138 kV breaker "917"
  - Todhunter 138 kV breaker "919"
  - Todhunter 138 kV breaker "923"
  - Todhunter 138 kV breaker "927"
  - Todhunter 138 kV breaker "929"
  - Todhunter 138 kV breaker "931"
  - Todhunter 138 kV breaker "937"
  - Todhunter 138 kV breaker "911"

- Proposed Solution:
  - Replace the Todhunter 138 kV breaker "917" with 63 kA (b1562)
  - Replace the Todhunter 138 kV breaker "919" with 63 kA (b1563)
  - Replace the Todhunter 138 kV breaker "923" with 63 kA (b1564)
  - Replace the Todhunter 138 kV breaker "927" with 63 kA (b1565)
  - Replace the Todhunter 138 kV breaker "929" with 63 kA (b1566)
  - Replace the Todhunter 138 kV breaker "931" with 63 kA (b1567)
  - Replace the Todhunter 138 kV breaker "937" with 63 kA (b1568)
Duke Energy Ohio Kentucky Transmission Zone

- **Proposed Solution (cont’d):**
  - Revise the reclosing on the Todhunter 138 kV breaker "911" to 15 seconds (b1569)
- **Estimated Project Cost:**
  - $250 K for each new breaker
  - $0 to revise the reclosing
- **Expected IS Date:**
  - 12/31/2011 – for breaker 911
  - 12/31/2012 – for breakers 927, 929, and 937
  - 12/31/2013 – for breakers 931, 919, 917, and 923
The following breakers are overstressed:
- Oakley 138 kV breaker "805"

Proposed Solution:
- Replace the Oakley 138 kV breaker "805" with 63 kA (b1556)

Estimated Project Cost:
- $250 K

Expected IS Date:
12/31/2014
Duke Energy Ohio Kentucky Transmission Zone

- Common Mode Violation
- The Circuit 4515 Miami Fort - Terminal 345kV circuit is overloaded for the tower contingency of losing both circuit #4561 and circuit #4562
- Recommended Solution:
  - Replace wavetrap and line switch (B1704)
- Estimated Project Cost: $0.104M
- Expected IS date: 06/01/2013
Duke Energy Ohio Kentucky Transmission Zone

- Generator Deliverability Violation

- The circuit 4561 Woodsdale - Todhunter 345kV circuit is overloaded for the loss of circuit #4562

- Recommended Solution:
  - Replace wavetraps and line switches (B1705)

- Estimated Project Cost: $0.21M

- Expected IS date: 06/01/2013
Duke Energy Ohio Kentucky Transmission Zone

- Generator Deliverability Violation

- The circuit 4562 Woodsdale - Todhunter 345kV circuit is overloaded for the loss of circuit #4561

- Recommended Solution:
  - Replace wavetraps and line switches (B1706)

- Estimated Project Cost: $0.21M

- Expected IS date: 06/01/2013
Duke Energy Ohio Kentucky Transmission Zone

- Common Mode Violation

- The Berjord - Tobasco 138kV circuit (#1885) is overloaded for several multiple facility contingencies;
- The Red Bank - Oakley 138kV circuit (#885) is overloaded for several multiple facility contingencies.

- Recommended Solution:
  - Add a 138/69kV transformer at Newtown substation (B1707.1)
  - Add a new 69kV line Newtown – Mt. Washington B1707.2
  - Add a new 69kV line Newtown – Berkshire (B1707.3)
  - Reconfigure the 69kV loop (B1707.4)

- Estimated Project Cost: $8M
- Expected IS date: 06/01/2014
Duke Energy Ohio Kentucky Transmission Zone

- N-1-1 Thermal Violation
- Port Union – Hall – Fairfield 138kV line is overload for the loss of circuit 1689 and circuit 3889.
- Create a ring at Fairfield 138kV substation (B1726)
- Split Circuit 3886 (Willey – Mulhauser 138kV) and land both ends in Fairfield (B1726.1)
- Close circuit 9787 (Willey – Mapleknoll - Mt Healthy – Finneytown – Terminal 138kV), which runs normally open at Mt Healthy (B1726.2)
- Estimated Project Cost: $4M
- Expected IS Date: 6/1/2016
Duke Energy Ohio Kentucky Transmission Zone

• The Charles 138kV breakers „921„ „905„ and „917“ are overstressed
• Proposed Solution: Replace Charles 138kV breakers „921„ „905„ and „917“ (b1641-b1643)
• Estimated Project Cost: $250 K per breaker
• Expected IS Date: 6/1/2013
Duke Energy Ohio Kentucky Transmission Zone

- The Todhunter 138kV breaker „925“ is overstressed
- Proposed Solution: Revise the reclosing for Todhunter 138kV breaker „925“ (b1644)
- Expected IS Date: 6/1/2016
Short Circuit
• Problem: Simulated fault duty exceeding 80 kV near the PSEG / ConEd interface

• Potential solution for consideration:
  – Reduce short-circuit levels at Hudson by 15kA by converting the PSE&G to ConEd interconnection from AC to DC
    ✓ Alternative 1: Back-to-Back DC Conversion
    ✓ Alternative 2: Simplified DC Conversion
Alternative 1: B-3402 & C-3403 would remain AC  
Estimated Project Cost: $300 M

Benefits:
1) Resolves short-circuit problems at Hudson and ConEd  
2) Provides more controllability
Alternative 2: Two HVDC circuits would replace B-3402 & C-3403
Estimated Project Cost: $510 M

Benefits:
1) Resolves short-circuit problems at Hudson and ConEd
2) Provides much better controllability on the B&C circuits
Supplemental Projects
JCP&L Transmission Zone

- To improve reliability.
- Proposed Solution: Windsor Sub - Replace substation conductor and CTs on E. Windsor (F2006) 230kV Line Terminal (S0394).
- Estimated Project Cost: $0.1186 M
- Expected IS Date: 6/1/2012
• PSE&G Reliability:
• To improve reliability due to failure of the Waldwick Phase Angle Regulator (E-2257).
• Replace the Waldwick Phase Angle Regulator (E-2257) (S0383).
• Estimated Project Cost: $30 M
• Expected IS Date: 2012 -2013
PSE&G Reliability:
Static Wire Replacement is an on-going program that entails replacing aged tower static wires with a new approach, installing static wire with Optical Guide Wire (OPGW). This provides strength, lightning protection and a potential communications path for high speed relaying.

Replace static wire at the following location
Sewaren – Linden 230 kV corridor (S0384).

Estimated Project Cost: $ 3 M

Expected IS Date: 10/1/2013
• PSE&G Reliability:
  Static Wire Replacement is an on-going program that entails replacing aged tower static wires with a new approach, installing static wire with Optical Guide Wire (OPGW). This provides strength, lightning protection and a potential communications path for high speed relaying.

• Replace static wire at the following locations
  New Freedom - Silver Lake (AE) - Cox"s Corner - Mount Laurel - Camden – Burlington (S0392.1).
  New Freedom – Beaver Brook – Gloucester (S0392.2).

• Estimated Project Cost:
  $ 2.5 M
  $ 2.1 M

• Expected IS Date:
  6/1/2013
  6/1/2014
• PSE&G Reliability:
  To improve reliability, productivity, accessibility and eliminate shared facility.

• Separate the transmission and generation by re-locating the Mercer Control House onto PSE&G property and replacing relays (S0393).

• Estimated Project Cost: $15 M

• Expected IS Date: 2013-2014
AEP Transmission Zone

- Supplemental Project
- Replace the Cook 765/345 kV transformer #4 and connect it in between CB K and K1. Establish a new 345 kV string O by installing two 345 kV breaker O and O1. Attach the Cook plant unit #1 in between O and O1. Install a CB J and J2 on the high side of the 345/34.5 kV transformer #5 and 5B respectively. Retire 345 kV CB L2. Retire 765 kV CB B2 and replace the 765 kV CB A2. (S0409)
- Estimated Project Cost: $37M
- Expected IS date: 1/1/2013
• Supplemental Project Withdrawal

• Cancel Project S0194: Replace the BDL-1, BDL-2 and BDL-3 500 kV breakers at Bedington

• Previous Expected IS date: 1/1/2013
- Supplemental Project Withdrawal
- Cancel Project S0195: Replace the BOL-1, BOL-2 and BOL-3 500 kV breakers at Black Oak
- Previous Expected IS date: 1/1/2013
- Supplemental Project Withdrawal

- Cancel Project S0196: Replace the DL-50 500 kV breaker at Doubs

- Previous Expected IS date: 1/1/2013
• Supplemental Project Withdrawal

• Cancel Project S0184: Replace the WK-1, WK-2, WK-3, WK-4, WK-5 and WK-6 345 kV breakers at Wylie Ridge

• Previous Expected IS date: 1/1/2013
• Supplemental Project Withdrawal

• Cancel Project S0202: Reconducto approximately 24.93 miles of Doubs - Monocacy 230kV with 1622 ACSS TW; upgrade terminal equipment at Doubs and Monocacy

• Previous Expected IS date: 1/1/2013
Questions?

Email: RTEP@pjm.com