Issues Tracking
• Open Issues
  – None

• New Issues
2013 RTEP Scenario Analysis
2013 RTEP Scenario Analysis - At Risk Generation
• Analysis was retooled, assuming some amount of the FSA generation will move forward and go into service
  ✓ Modeled 56% of the following FSA generation
  ✓ FSA generators in PJM → 13,000+ MW
  ✓ FSA generators in MAAC → 9,000+ MW

• Also, original analysis allowed at-risk generation to contribute to but not back off issues
  ✓ Updated analysis completely removed at-risk generation
At-Risk Generation

- Approximately 6,000 MW of At-Risk generation
- Known deactivation notifications not included
• Next Steps
PJM RPS Scenario Analysis Update
Updates since December TEAC – Inputs

• Since December TEAC, reran all RPS Scenarios with the following input updates:
  • Nukes set to 100% in all scenarios
  • RPS3 expansion plan updated to be consistent with RPS1 and RPS2 (previously consistent with the Queue Expansion Scenario; expansion RPS 3 modified to be consistent with RPS 1 and 2)

<table>
<thead>
<tr>
<th></th>
<th>RPS 3 Old</th>
<th>RPS 3 New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Cycle</td>
<td>35,893</td>
<td>40,663</td>
</tr>
<tr>
<td>CT GAS</td>
<td>35,072</td>
<td>25,792</td>
</tr>
<tr>
<td>Solar</td>
<td>3,348</td>
<td>7,435</td>
</tr>
</tbody>
</table>
Updates since December TEAC - Results

- Updated results since December TEAC:
  - Wind Curtailment
    - Slight increase in wind curtailment due to higher nuclear units capacity (change in curtailment less than 1%). Most noticeable: DPL, AEP, COMED.
  - PJM Load Payments ~4% lower:
    - RPS1 Base Scenario: load payments from $74 bill down to $71 bill.
    - RPS1 small change in DC differential to base scenario.
    - RPS2 decrease from base scenario now 1.1% (previously 4.4%).
    - RPS3 decrease from base scenario now 1.2% (previously 3.0%).
    - As a result of the rerun, the RPS3 is now slightly more attractive than previously, now comparable with RPS2.
  - PJM Congestion increased ~7%:
    - RPS1 Base Scenario: total PJM congestion increased from $650 mil up to $700 mil.
    - RPS1 no change in DC differential to base scenario.
    - RPS2 increase from base scenario now $450 mil (previously $500 mil).
    - RPS3 increase from base scenario now $450 mil (previously $570 mil).
    - As a result of the rerun, RPS2 and RPS3 yield comparable total PJM congestion.
  - Small LMP changes similar to the load cost changes.
Transmission Overlay Drivers
Transmission Overlay Driver – Wind Curtailment

The chart illustrates the curtailment of wind power for different transmission overlays. The x-axis represents various companies (AECO, DPL, APS, AEP, COMED, DOM, FE-ATSI), and the y-axis shows the curtailment as a percentage of available capacity.

- **No Overlay** indicates the highest curtailment percentage among the options shown.

Legend:
- RPS1 - w/ DC - No Overlay
- RPS1 - w/ DC - w/ Overlay
- RPS1 - No DC - w/ Overlay
- RPS2 - No Overlay
- RPS2 - w/ Overlay
- RPS3 - No Overlay
- RPS3 - w/ Overlay
Transmission Overlay Driver - Load Payments

2027 Nominal Dollars

No Overlay

With Overlay

- Non RPS Queue Based Expansion
- RPS1 - w/ DC - No Overlay
- RPS1 - w/ DC - w/ Overlay
- RPS1 - No DC - w/ Overlay
- RPS2 - No Overlay
- RPS2 - w/ Overlay
- RPS3 - No Overlay
- RPS3 - w/ Overlay

EMAAC
Rest of MAAC
Rest of PJM
Scenario Comparisons
Scenario Comparison – *Base* and Incremental Load Cost

2027 Nominal Dollars

<table>
<thead>
<tr>
<th>Annual Load Cost Differences Compared to RPS1 Base Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>$71 Billion</td>
</tr>
<tr>
<td>0.35% Increase</td>
</tr>
</tbody>
</table>
Scenario Comparison – Incremental Load Cost

Load Payments Relative to RPS1 – w/ DC – w/ Overlay
Base Cost: $71B

2027 Nominal Dollars
## Scenario Comparison – Base and Incremental Congestion

**2027 Nominal Dollars**

| Congestion Differences Compared to RPS1 Base Cost |  |
|-----------------------------------------------|  |
| **Base Cost:** RPS1 – w/ DC – w/ Overlay | **Cost Difference:** RPS1 - No DC – w/ Overlay | **Cost Difference:** RPS2 - w/ Overlay | **Cost Difference:** RPS3 – w/ Overlay |
| $700 Million | + $150 Million | + $450 Million | + $450 Million |
| 22% Increase | 65% Increase | 65% Increase |  |

### Cost:
- RPS1 – w/ DC – w/ Overlay: $700 Million
- RPS1 - No DC – w/ Overlay: + $150 Million
- RPS2 - w/ Overlay: + $450 Million
- RPS3 – w/ Overlay: + $450 Million

### Percentage Increases:
- RPS1: 22% Increase
- RPS2: 65% Increase
- RPS3: 65% Increase
Scenario Comparison – Incremental Congestion

Congestion Cost Relative to RPS1 – w/ DC – w/ Overlay
Base Cost: $700M

2027 Nominal Dollars

20
Scenario Comparison – On Peak LMP

2027 Nominal Dollars

- RPS1 - w/ DC - w/ Overlay
- RPS1 - No DC - w/ Overlay
- RPS2 - w/ Overlay
- RPS3 - w/ Overlay
Scenario Comparison - Full Year, Off-Peak Load Weighted LMP
Scenario Comparison – Full Year, On Peak Load Weighted LMP

RPS1 w/ DC

RPS1 No DC

RPS2

RPS3

2027 Nominal Dollars

- 70
- 71.7
- 73.3
- 75
- 76.7
- 78.3
- 80
- 81.7
- 83.3
- 85
- 86.7
- 88.3
- 90
- 91.7
- 93.3
- 95
Demand Response Buyback Scenario
• Consider a scenario that models less Demand Response than has cleared in the RPM Base Residual Auction

• In response to recent RPM Incremental Auction activity as highlighted by the PJM Market Monitor
Generation Deactivation Notification (Retirements) Update
Generation Deactivation Notifications – As of 12/10/2012

- **BL England Diesel**
  - England DS 1-4
  - 8 MW total
  - AE Transmission Zone
  - Notification received 1/7/2013
  - Anticipated deactivation date 9/30/2015
  - Reliability Analysis underway. Capacity Interconnection rights to be re-used in interconnection project Y1-001
Reliability Analysis Update
BGE Upgrades Update
Conastone – Graceton – Bagley – Raphael Road

<table>
<thead>
<tr>
<th>Project ID</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>b0497</td>
<td>Install a second Conastone - Graceton 230 kV circuit and replace Conastone 230 kV breaker 2323/2302</td>
<td>$47.8 M</td>
</tr>
<tr>
<td>b1016</td>
<td>Rebuild Graceton - Bagley 230 kV as double circuit line using 1590 ACSR. Terminate new line at Graceton with a new circuit breaker.</td>
<td>$42.6 M</td>
</tr>
<tr>
<td>b1251</td>
<td>Rebuild the existing Bagley - Raphael Rd. 230 kV line to double circuit 230 kV line</td>
<td>$21 M</td>
</tr>
<tr>
<td>b1251.1</td>
<td>Reconfigure Raphael Rd. to terminate new circuit</td>
<td>$10.6 M</td>
</tr>
</tbody>
</table>
• Conastone – Graceton – Bagley – Raphael Road
  – Thermal violations in 2020
• Wagner Retirement Scenario
  – Assume Wagner 1&4 retired (525 MW in BGE)

  – Conastone – Graceton – Bagley – Raphael Road and Hanover Pike are needed as early as Summer 2013 assuming Wagner 1&4 retired
Wagner Sensitivity Study

- Prevailing North to South flow
- Wagner retirement increases flow on Conastone – Graceton – Bagley – Raphael Road
- Also negatively impacts voltage performance
Summary

• Baseline Criteria Violations
  – Conastone – Graceton – Bagley – Raphael Road area upgrades needed due to thermal overloads in 2020

• Scenario Analysis
  – Wagner retirement scenario in 2013

• Considering the baseline results and Wagner sensitivity analysis, PJM staff will recommend to the PJM Board in February 2013 that the Conastone – Graceton – Bagley – Raphael Road project continue with a 6/1/2017 in-service date
AEP Transmission Zone

- **Generator Deliverability Violation/Light Load Violation**

- The Cloverdale - Lexington 500 kV line is overloaded for a Loss of Mt. Storm - Valley 500 kV or Bath - Valley 500kV or North Anna unit #1 or North Anna unit #2

- Reconductor the AEP portion of the Cloverdale – Lexington 500kV line with 2-1780 kcmil ACSS. (B1797.1)

- Estimate Cost: $40M

- Expected IS Date: 6/1/2015
• **Project Scope Change**

• B1816.1

• Old Scope: Replace relaying at the Mt. Airy substation on the Carroll - Mt. Airy 230 kV line

• New Scope: Replace 50FD Fault Detector relay at Carroll substation on the Carroll-Mt Airy 230 kV Line and change the CT ratio at Mt. Airy

• Estimated Project Cost: $0.1M

• Projected IS Date: 6/1/2013
Supplemental Projects
DEOK Transmission Zone

- **Supplemental Project Change**
  - S0446
  - Old Scope: Remove the 138kV Cedarville cap from service. Split into 22&28 MVAR banks. Move the 22 MVAR section & equipment to Willey 138KV.
  - New Scope: Remove the 138kV Cedarville cap from service. Move the equipment to Willey substation and connect the capacitor at 43.2 MVAR.
  - Estimated Project Cost: $0.38M
  - Projected IS Date: 12/31/2013
2013 Load Forecast
SUMMER PEAK DEMAND FOR PJM MID-ATLANTIC GEOGRAPHIC ZONE

YEAR

LOAD(MW)


Unrestricted Peak
Weather Normalized Peak
2012 Forecast
2013 Forecast
SUMMER PEAK DEMAND FOR SOUTHERN MID-ATLANTIC GEOGRAPHIC ZONE

LOAD(MW)

YEAR


Unrestricted Peak  Weather Normalized Peak  2012 Forecast  2013 Forecast
Next Steps

• Continue 2013 RTEP Scenario Analysis development

• Brattle Recommendations

• Continue 2018 RTEP base case development

• Finalize High Voltage in PJM Operations recommendations
Questions?

Email: RTEP@pjm.com