Transmission Expansion Advisory Committee
Stage 1A 10-Year ARR Analysis

September 15, 2016
Overview

• Purpose:
  – Update stakeholders on PJM’s Stage 1A 10-Year Auction Revenue Rights (ARR) analysis

• Key Takeaways
  – PJM completed its 2016 Stage 1A 10-Year ARR analysis
  – PJM observed internal and external (M2M) infeasible facilities
  – All infeasible facilities are mitigated through expected:
    ✓ Planning Upgrades or
    ✓ Market design enhancements
Background

- ARRs are transmission network entitlements awarded to firm network and point-to-point customers because they fund embedded transmission costs.

- On an annual basis:
  - PJM Awards ARRs through a multi stage process (Stage 1A, 1B and 2).
  - PJM Examines the feasibility of stage 1A ARRs for a 10-year period.

- Results of 10-year analysis on 2016/17 Stage 1A ARRs:

<table>
<thead>
<tr>
<th>Violation Type</th>
<th>Mitigation Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>PJM Upgrades</td>
</tr>
<tr>
<td>External M2M</td>
<td>PJM, MISO Upgrades and M2M Design Changes</td>
</tr>
</tbody>
</table>
## Area Summary

<table>
<thead>
<tr>
<th>Area</th>
<th>Reference</th>
<th>Solution(s)</th>
<th>Expected in-service date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ComEd</td>
<td>Appendix I</td>
<td>Byron-Wayne 345KV</td>
<td>2017</td>
</tr>
<tr>
<td>PSEG</td>
<td>Appendix II</td>
<td>Bergen – Athenia 230KV</td>
<td>2016-2018</td>
</tr>
<tr>
<td>MISO M2M</td>
<td>Appendix III &amp; IV</td>
<td>1) RTEP, MTEP and IPSAC 2) M2M FFE Redesign</td>
<td>2017-2024</td>
</tr>
</tbody>
</table>
## Appendix I: 2016/2017 Stage 1A 10-Year ComEd ARR Results

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Facility Type</th>
<th>Upgrade expected to fix infeasibility</th>
<th>Expected in-service date</th>
</tr>
</thead>
</table>
## Appendix II: 2016/2017 Final Stage 1A 10-Year PSEG ARR Results

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Facility Type</th>
<th>Upgrade expected to fix infeasibility</th>
<th>Expected in-service date</th>
</tr>
</thead>
</table>
### Appendix III: 2016/2017 Final Stage 1A 10-Year MISO M2M ARR Results

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Facility Type</th>
<th>Upgrade expected to fix infeasibility</th>
<th>Expected in-service date</th>
</tr>
</thead>
<tbody>
<tr>
<td>0404 Quad Cities-H471 I/O 15503 Cordova-Nelson 345 kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>0621 Byron-Cherry Valley 345 kV I/O 0622 Byron-Cherry Valley 345 kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>0622 Byron-Cherry Valley 345 kV I/O 0621 Byron-Cherry Valley 345 kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>12205-151 Woodstock 138 kV I/O Cherry Valley-Silver Lake 345 kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>124 Maryland-11902 138kV I/O Byron-LeeCo 345kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>15623 Belvidere 138 kV I/O Cherry Valley-Silver Lake 345</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Albany-Garden Plain 138 kV I/O Quad Cities-H471 345</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Belvidere-12205-138 kV I/O Cherry Valley-Silver Lake 345</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Byron-Wempetown 0624 345 kV I/O Byron-Cherry Valley 0621 345 kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Cherry Valley TR83 345/138 I/O Cherry Valley-Silver Lake 345</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Cordova-Nelson 345 (fio) Quad Cities-H471 345</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Garden Plain-15518 138kV I/O Nelson TR84 345/138kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>MarengoToPilsnValley(12204-21)138kV I/O ChryVly SilverLake(15616)345kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Mercer IP-Galesburg 161kV I/O Nelson-Electric Junction 345kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Oak Grove-Mercer 161 kV I/O Byron-LeeCo 345 kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Quad Cities-Cordova 0402 345 I/O Quad Cities-Cordova 0403 345</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Quad Cities-Rock Creek 345/MEC Cordova-Sub 39</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
<tr>
<td>Quad Cities-Sub 91 345 kV FLO Cordova-Sub 39 345kV &amp; Sub 39 TR1 345/181 kV</td>
<td>Flowgate</td>
<td>PJM RTEP B2141: New Byron-Wayne 345 kV circuit</td>
<td>2017</td>
</tr>
</tbody>
</table>
## Appendix III: 2016/2017 Final Stage 1A 10-Year MISO M2M ARR Results

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Facility Type</th>
<th>Upgrade expected to fix infeasibility</th>
<th>Expected in-service date</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEP01N16_BRED_BRED-GSYW-1_1</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMI13125_HENNEPIN_IP-1512_1</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMI34022_LAS_LAS-VINC-1_1</td>
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<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMI34002_LOUS_LOUS-OLNN_1_A</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMI34002_NEWTON2_LOUS-NWTY-1_A</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMI34012_WFRK_WFRE-WFREK-1_A</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMI34023_BALDWIN_TX01_TR1</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMI34023_TURKY_HL_TX00_TR1</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMIAEPO2_LAS_LAS-VINC-1_1</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMICEK03_SHRAM_TP_IP-1466_2</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>AMO34027_LABADIE_L_GRAY_2_A</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>BASE_GBCS_GBCS_PAXE_1_B</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>BROKAW_CNBLT_138_flo_BROKAW_NLEROY_WEEDMN_138</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
<td></td>
</tr>
<tr>
<td>Combelt_Brokel_GBCS_1-2_138Kv_flo_Vermilion_4N_Champgnw_138Kv</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
<td></td>
</tr>
<tr>
<td>Gibson_GIBSOPETER34_1_1_345Kv_flo_Gibson_Francisco_345Kv</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>Rossyville_Ross_Verm_1305_A_138Kv_flo_Rantoul_Sidney1+Rantoul_RantoulJ+PxtonE_Raj</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
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<tr>
<td>VERMILION_TILTONEC_138_flo_BUNSONVL_CASEY_345</td>
<td>Flowgate</td>
<td>Pseudo Tie Flowgate, FFE need to be determined</td>
<td></td>
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</tbody>
</table>