PJM’s MISO Interface Definition Changes

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Reason for Interface Definition Change

- PJM and MISO’s current interface definitions may be too far into the other neighboring RTO
  - Provides correct incentive for transactions but overvalues the effect of the interchange on the coordinated congestion relief
- PJM believes a single common Interface definition will resolve overcharging of congestion for PJM/MISO transactions
  - Interface defined at the boarder
  - Ideally, both RTOs Interface definition would consist of the same generator pnodes and weightings
• MISO’s PJMC interface definition and PJM’s MISO interface definition would share the same generator pnodes and weightings
  – In PJM’s analysis, generator pnodes were selected based on the following procedure:
    • PJM ran several annual PROMOD simulations to capture the hourly flows on all PJM-MISO ties
    • Over 80% of tie line flows in each simulation were represented by the same ten tie lines composed of MISO and PJM monitored facilities.
    • Definition for the new MISO interface was derived from generators electrically close to the ten tie lines
      – PJM generators used for MISO monitored tie lines
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• Performed “what-if” analysis on the MISO Interface under multiple configurations to determine pricing impacts
  – LMPs from January through December 2013 were utilized
  – New MISO LMP was calculated under an equally weighted factor definition
  – MISO LMP was also calculated absent external M2M congestion (i.e. Dr. Patton’s solution)
  – New MISO LMPs were compared to the originally calculated values
    • Compared the congestion component of the LMP for all 3 definitions
    • Monthly results are available in the Appendix
• The magnitude of the Congestion LMP is generally smaller with the new MISO definition than the existing definition
  – Congestion impact on transactions is therefore reduced compared to the current definition
  – There is not a substantial difference between the congestion component associated with the “Patton LMP” and the new MISO LMP

• PJM also recreated the Potomac Economics analysis to determine the ECF using the new MISO Interface definition
  – This analysis showed that moving the interface closer to the border resulted in a substantial decrease in the impact as determined through this analysis
<table>
<thead>
<tr>
<th>Generator Pnode</th>
<th>Equal Factor</th>
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<tbody>
<tr>
<td>ROCKPOR2 26 KV RP1</td>
<td>0.1</td>
</tr>
<tr>
<td>18 WILL 18 KV WC-3</td>
<td>0.1</td>
</tr>
<tr>
<td>3 POWERT 24 KV PO-5</td>
<td>0.1</td>
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<tr>
<td>16 WAUKE 138 KV WA31</td>
<td>0.1</td>
</tr>
<tr>
<td>EBEND 20 KV G2</td>
<td>0.1</td>
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<tr>
<td>BVR CH 6 20 KV RCH52GUN</td>
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<tr>
<td>SCHAHFER 345 KV SH18</td>
<td>0.1</td>
</tr>
<tr>
<td>CAYUGA2 345 KV CAY2</td>
<td>0.1</td>
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<tr>
<td>MICHIGA2 345 KV MC12</td>
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<tr>
<td>MONROE 26 KV MON1</td>
<td>0.1</td>
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• PJM is still evaluating whether to adopt Dr. Patton’s solution as a longer term solution
  – Additional analysis is required to ensure there are no unintended consequences of removing congestion from the Interface LMP
  – PJM will continue to exchange and evaluate analyses with MISO as part of this evaluation
APPENDIX – LMP ANALYSIS
Appendix – January 2013 LMP Analysis

Jan 2013 Hourly Congestion LMPs

$/MWh

Original Cong  Revised Cong  Patton Cong
Feb 2013 Hourly Congestion LMPs

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

$/MWh

Original Cong  Revised Cong  Patton Cong
May 2013 Hourly Congestion LMPs
July 2013 Hourly Congestion LMPs

- Original Cong
- Revised Cong
- Patton Cong
August 2013 Hourly Congestion LMPs

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

$/MWh

Original Cong Revised Cong Patton Cong
December 2013 Hourly Congestion LMPs

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
$/MWh

Original Cong  Revised Cong  Patton Cong