Inter-regional Planning Update

Transmission Expansion Advisory Committee

October 11, 2018
– Assumptions, models, schedules – January TEAC

– Reliability analysis, results, proposal windows – 2018/2019

– Longer-term reliability and market efficiency window November 1, 2018

– Longer-term proposal analysis 2019
Interregional Process

- [http://www.pjm.com/planning/interregional-planning.aspx](http://www.pjm.com/planning/interregional-planning.aspx)
  - Data exchanges
  - Reviews of regional needs and solutions
  - Determination of any more efficient or cost effective interregional transmission
  - Ongoing queue request coordination
  - Stakeholder reviews and input
    - PJM TEAC/PC
    - MISO IPSAC
    - NE Protocol IPSAC
    - Respective external neighbor regional processes
  
  • October 5, 2018 IPSAC
    
    • Interregional 2016/17 congestion TMEP study results
    • Interregional MEP study – 2018/19
      
      – Regional studies in progress and on schedule
      – November 1 finalize PJM models, open for proposals (regional and interregional)
    
    • Cleanup revisions to JOA §9.3 and §9.4 posted with September PC materials
  – IPSAC completed regional issues and solutions review May 18, 2018 – NCSP posted
  – Preparation for December 10, 2018 IPSAC Agenda
    • Review interregional process
    • Review regional plans and solutions
    • Review interconnection project coordination
    • Stakeholder input

• SERTP- regional process: [www.southeasternrtp.com](http://www.southeasternrtp.com)
  – Biennial interregional review completed May 8, 2018 – Atlanta
  – Next biennial interregional review – spring 2020
• TVA – LGE/KU JRCA update
  – PJM and TVA have exchanged update suggestions including
    • Coordinated planning provisions consistent with the Order No. 1000 interregional process
    • Add more detail to existing coordinated planning provisions
    • Expand or clarify existing processes for coordination of Long Term Firm Transmission Service and Balancing Authority integrations

• IESO study of MISO and NYISO interfaces
  – In person meeting October 24, 2018
  – PJM monitoring and providing input as needed
  – Target completion Q4 2019
  – PJM objective is knowledge of projected interconnected operations
• EIPC support for NERC EI frequency response review is complete
• State of the Eastern Interconnection released by EC (posted with meeting materials)
• Production Cost Eastern Interconnection model
  – Consultant (ABB) nearing completion of engagement to resolve remaining modeling issues and complete EI-model
• NERC discussions for potential Agreement to establish EIPC as “designee” under reliability standard MOD-032-1
  – NERC notified EIPC further discussions on hold until 2019
Interregional Targeted Market Efficiency Projects

Study Results
• Developed by the PJM/MISO IPSAC in 2016
• FERC accepted in October, 2017
• Five TMEPs approved by PJM & MISO Boards December 2017
• PJM & MISO conducted a second iteration in 2018
  – Full results discussed at October 5 PJM/MISO IPSAC
TMEP Criteria

- Limited to historically binding M2M flowgates
- Projects must be in service by 3rd summer peak
- Projects over $20 million not eligible (must go through MEP process)
- Benefits based on relieving average of past 2 years of historical congestion (Day Ahead + Balancing)
- Four years worth of benefits must completely cover project’s installed capital cost
- Discount/inflation rate not necessary as all projects are near term
- Interregional cost allocation based on congestion relief in each RTO
  - Adjusted by M2M payments
TMEP Study Timeline

Q1: Identify significant historical congestion

June - July: Identify impacting outages, upgrades

August: Identify potential upgrades

September: Test upgrades, Resolve congestion?

September: Test upgrades, Meet TMEP criteria?

October: JRPC recommends passing projects

December: Recommend to Boards

Today

www.pjm.com
Facilities Count

- **61** • M2M facilities with >$1 million congestion (2016 + 2017)
- **33** • Addressed by planned system upgrade/changes
- **16** • Outage driven
- **10** • Don’t meet TMEP Criteria
- **2** • Recommended TMEPs

* See October 5 IPSAC for full details: [https://pjm.com/committees-and-groups/stakeholder-meetings/ipsac-midwest.aspx](https://pjm.com/committees-and-groups/stakeholder-meetings/ipsac-midwest.aspx)
2016/2017 Congestion Cost

- **Approved TMEP Resolves**
- **Planned Sys Change Resolves**
- **Outage Driven**
- **No Persistent Congestion**
- **Does Not Meet B/C Ratio**
- **TMEP Effectiveness Uncertain**
- **TMEP Upgrade Unknown**
- **TMEP Recommended**

<table>
<thead>
<tr>
<th>Cost</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>$213 mil</td>
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<tr>
<td>$201 mil</td>
<td>38%</td>
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<tr>
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<tr>
<td>$3.5 mil</td>
<td>0.7%</td>
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<tr>
<td>$2.7 mil</td>
<td>0.5%</td>
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</table>
Flowgate ID(s): 23418
Historical Congestion: $15.5 million
Ownership: AMIL
Outages Impacting: None Identified
Planned Upgrades: None Identified
Current Rating: 280/287/287/287
Upgrade Type: Terminal equipment
Upgrade Cost: $175 k
Upgraded Rating: 300/300/300/300
Marblehead 161/138 kV Effectiveness Test

<table>
<thead>
<tr>
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<th>Base Case</th>
<th>Project Case</th>
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<td>PROMOD Congestion</td>
<td>$ 2.0 million</td>
<td>$ 1.2 million</td>
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Congestion Moved to Downstream Flowgates: None identified

Analysis Results: Upgrade relieves 40% of congestion

TMEP Cost: $ 175 k

TMEP Benefit: $ 7.75 * 4 years * 40% = $ 12.4 million

Conclusion: TMEP upgrade recommended
## Marblehead 161/138 kV Interregional Benefit Split

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<td>$15,498,782</td>
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<td>M2M Payment</td>
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<td>Benefit</td>
<td>$0</td>
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<tr>
<td>Benefit Share</td>
<td>0%</td>
<td>100%</td>
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Gibson - Petersburg 345 kV

Flowgate ID(s): 2047, 21530, 22613
Historical Congestion: $ 9.8 Million
Ownership: DEI – IPL tie
Outages Impacting: None Identified
Planned Upgrades: None Identified
Current Rating: 1195/1195/1195/1195
Upgrade Type: Substation equipment
Upgrade Cost: $4.3 million
Upgraded Rating: 1374/1374/1798/1798 MVA
### Gibson - Petersburg 345 kV Effectiveness Test

| Congestion Moved to Downstream Flowgates: | None identified |
| Analysis Results: | Upgrade resolves congestion |
| TMEP Cost: | $ 4.3 million |
| TMEP Benefit: | $ 19.5 million |
| Conclusion: | TMEP upgrade recommended |

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<td>PROMOD Congestion</td>
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### Gibson - Petersburg 345 kV Interregional Benefit Split

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<td>Congestion</td>
<td>$283,099</td>
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<td>M2M Payment</td>
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<td>Benefit</td>
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<td>Benefit Share</td>
<td>7%</td>
<td>93%</td>
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## Summary of Recommended TMEPs

<table>
<thead>
<tr>
<th>Facility</th>
<th>Transmission Owner</th>
<th>TMEP Cost (Million $)</th>
<th>TMEP Benefit (Million $)</th>
<th>Benefit Allocation (%PJM/% MISO)</th>
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<tbody>
<tr>
<td>Marblehead 161/138 kV</td>
<td>AMIL</td>
<td>0.175</td>
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<td>Gibson – Petersburg 345 kV</td>
<td>DEI - IPL</td>
<td>4.3</td>
<td>19.5</td>
<td>7 / 93</td>
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• V1 – 10/08/2018 – Original Version Posted to PJM.com