Inter-regional Planning Update

Transmission Expansion Advisory Committee

November 9, 2017
• Production Cost Database Assembly
  – Trial 5 results under review
  – Database renewal and potential next steps under discussion
• Responsibility for developing Eastern Interconnection frequency response case accepted
  – Working group assembled
  – Timeline and scope being developed
• EIPC-NERC Designated Entity Agreement is under development
  – Next meeting TBD

  – IPSAC December 11, 2017 – regional updates, NCSP scope, 2018 work plan

  – October 31 meeting was postponed, New date TBD

• SERTP- regional process: [www.southeasternrtp.com](http://www.southeasternrtp.com)
  – 4th Quarter meeting December 12, 2017
  – Next biennial review – Spring 2018
Targeted Market Efficiency Projects
TMEP Key Attributes

- 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 2 years of historical congestion (DA + Balancing/ECF)
- 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

DA = Day Ahead, ECF = Excess Congestion Fund (MISO) equivalent to Balancing (PJM)
• TMEP study was conducted throughout 2016
• Regular updates and stakeholder interaction though IPSAC
• Five TMEPs recommended for board approval as result of study
• FERC accepted TMEP process subject to conditions on October 3, 2017
  – Minor JOA compliance updates filed November 2
  – Expect projects to go to PJM and MISO December Board meetings for approval
50 M2M flowgates investigated
13 potential upgrades evaluated
5 projects recommended
- $59 Million in historical congestion (2014 + 2015)
- $99.6 Million TMEP Benefit
- $17.25 Million total Cost
- 5.8 average B/C ratio
Location of Recommended TMEPs
• NERC FG ID: 2286/2205
• Ownership: CE-NIPS
• Outages Impacting: None known
• Planned Upgrades Impacting: None known
• Current Rating: 1195/1195
• Upgrade: b2971 - Reconfigure Munster as ring bus (NIPSCO)
• Upgraded Rating: 1201/1441
• Upgrade ISD: 6/1/2020
• TMEP Cost: $7M
• TMEP Benefit: $32M
• Interregional Cost Split: 88% PJM / 12% MISO
Bayshore – Monroe 345kV

- NERC FG ID: 2647
- Ownership: ATSI – ITC
- Outages Impacting: None known
- Planned Upgrades Impacting: None known
- Current Rating: 1262/1494
- Upgrade: b2972 - Replace conductor on river-crossing span (FE)
- Upgraded Rating: 1486/1702
- Upgrade ISD: TBD (tentative Fall 2019)
- TMEP Cost: $1M
- TMEP Benefit: $11.3 M
- Interregional Cost Split: 89% PJM / 11% MISO
Michigan City – Bosserman 138kV

- NERC FG ID: 2427/2540
- Ownership: NIPS – AEP
- Outages Impacting: New Carlisle (~20%)
- Planned Upgrades Impacting: None known
- Current Rating: 156/156
- Upgrade: b2973 - Recondactor (NIPSCO)
- Upgraded Rating: 186/221
- Upgrade ISD: 2019
- TMEP Cost: $4.6 M
- TMEP Benefit: $29.6 M
- Interregional Cost Split: 90% PJM / 10% MISO
Reynolds – Magnetation 138kV

- NERC FG ID: 20729/2548/2685
- Ownership: NIPS
- Outages Impacting: None known
- Planned Upgrades Impacting: None known
- Current Rating: 287/287
- Upgrade: b2974 - Replace terminal equipment at Reynolds (NIPSCO)
- Upgraded Rating: 305/366
- Upgrade ISD: 6/1/2019
- TMEP Cost: $150 k
- TMEP Benefit: $14.5 M
- Interregional Cost Split: 41% PJM / 59% MISO
Roxana – Praxair 138kV

- NERC FG ID: 2577/2531
- Ownership: NIPS
- Outages Impacting: None known
- Planned Upgrades Impacting: None known
- Current Rating: 158/158
- Upgrade: b2975 - Reconductor (NIPSCO)
- Upgraded Rating: 434/525
- Upgrade ISD: 6/1/2020
- TMEP Cost: $4.5 M
- TMEP Benefit: $6.5 M
- Interregional Cost Split: 24% PJM / 76% MISO
Interregional Market Efficiency Projects
• FERC directed PJM and MISO to eliminate the joint model evaluation and use the regional ME processes to determine benefits (EL13-88)
• Common proposal window with regional MEPs
• Proposals evaluated in each regional process consistent with each RTO’s tariff
• An Interregional Market Efficiency Project must
  – Meet criteria as laid out in the JOA
  – Qualify as a Market Efficiency Project in PJM
  – Qualify as a Market Efficiency Project in MISO

• Final results were presented at October 20 IPSAC
Study Summary

• 8 projects received and evaluated consistent with Regional MEP proposals
• 6 targeted Olive – Bosserman 138kV
  – No proposal met the local AEP needs and passed the B/C test
  – AEP supplemental (s1279) is the best solution for local needs
  – No proposals passed B/C test incremental to supplemental project
• 1 targeted Tanners Creek – Miami Fort 345kV
  – Fails B/C criteria in both regions
• 1 targeted Paxton – Gifford 138kV
  – Passes B/C criteria in both regions
  – Fails JOA materiality (GLDF) test
    • GLDF was applied by PJM and MISO on their respective planning power flows since the joint power flow was not necessary in this study
  – Does not qualify as a regional MEP in PJM
<table>
<thead>
<tr>
<th>Project Details</th>
<th>Study Results</th>
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<tbody>
<tr>
<td></td>
<td>PJM</td>
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<tr>
<td>PJM</td>
<td>MISO</td>
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<tr>
<td>201617_1-1A</td>
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<tr>
<td>201617_1-9A</td>
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<td>201617_1-10B</td>
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<td>201617_1-13H</td>
<td>prj7</td>
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<tr>
<td>201617_1-18S</td>
<td>prj8</td>
</tr>
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</table>
Project ID: 201617_1-9B

Proposed by: NIPSCO
Proposed Solution: Greenfield
New NIPSCO line section between Thayer and Morrison 138kV substations.

kV Level: 138 kV
In-Service Cost ($M): $61.8
In-Service Date: 2022
Target Zone: AML COMED NIPSCO

ME Constraints:
PAXTON - GIFFORD 138 kV (for PJM)
GOODLAND – REYNOLDS 138 kV (for MISO)

<table>
<thead>
<tr>
<th>PJM Benefit ($M)</th>
<th>MISO Benefit ($M)</th>
<th>PJM B/C</th>
<th>MISO B/C</th>
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<tbody>
<tr>
<td>47.8</td>
<td>76.5</td>
<td>1.36</td>
<td>1.86</td>
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PJM Cost Allocation: 38.5%
MISO Cost Allocation: 61.5%

Passes B/C criteria in each RTO
• Proposed to address congestion on Paxton - Gifford 138 kV (AMIL) for PJM and Goodland – Reynolds 138kV (NIPSCO) for MISO
  – Neither of these constraints were PJM recommended congestion drivers
• Ameren provided update to the MTEP 16 ratings used by PJM, which relieved the constraint, removing the proposed congestion driver
• Moved congestion to Goodland – Reynolds (NIPSCO)
• Project effectively addresses this MISO flowgate
  – PROMOD identifies benefits to both RTOs from relieving this MISO constraint
• JOA 9.4.4.1.3 (iii) [IMEPs must meet the following criteria:]
  – “Addresses one or more constraints for which at least one dispatchable generator in the adjacent market has a GLDF of 5% or greater with respect to serving load in that adjacent market, as determined using the Coordinated System Plan power flow model.”
• RTOs did not develop the Coordinated System Plan power flow model as result of recent FERC ruling (EL13-88)
  – JOA has not yet been updated to fully reflect the impact of the ruling
• GLDF test conducted on each regional model (MTEP & RTEP)
  – Consistent results between PJM and MISO regional cases
• GLDF criteria is not met for binding Goodland – Remington contingency
## PJM and MISO Modeled Congestion Relief

<table>
<thead>
<tr>
<th>Monitored Facility</th>
<th>Contingency</th>
<th>Congestion Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodland 138/69kV XFMR (NIPS)</td>
<td>Goodland – Reynolds 138kV (NIPS)</td>
<td>$750,801</td>
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<tr>
<td>Graceton – Bagley 230kV (BGE)</td>
<td>Graceton – Bagley 230kV (BGE)</td>
<td>$340,939</td>
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<tr>
<td>Goodland – Reynolds 138kV (NIPS)</td>
<td>Goodland – Remington 69kV (NIPS)</td>
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<tr>
<td>Glen Arm – Windy Edge 115kV (BGE)</td>
<td>Glen Arm – Windy Edge 115kV (BGE)</td>
<td>$115,821</td>
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<tr>
<td>Ashburn – Pleasant View 230kV (DOM)</td>
<td>Shellhorn – Enterprise 230kV (DOM)</td>
<td>$75,032</td>
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<tr>
<td>Central Interface (PJM)</td>
<td>Base Case</td>
<td>$59,457</td>
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<tr>
<td>AP South (PJM)</td>
<td>Bedington – Black Oak 500kV (AP)</td>
<td>$50,795</td>
</tr>
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</table>

*Congestion Savings is the average annual congestion savings based on the four modeled study years*
The two NIPSCO constraints are not M2M flowgates
  - PJM does not dispatch off cost for these constraints
  - In Market Operations PJM would not see benefits of relieving these constraints

Graceton – Bagley
  - Only significant PJM congestion beneficiary
  - Many other proposals will more efficiently resolve this constraint
Interregional Market Efficiency Projects must resolve regional congestion issue

Model shows congestion occurs on MISO flowgate Goodland – Reynolds for loss of Goodland - Remington

- This flowgate is not a M2M coordinated flowgate
- PJM does not operate off cost for this flowgate
- This proposal is not eligible as an interregional project in the absence of targeted PJM market congestion and material impacts on PJM generators
Interregional MEP Criteria

• JOA Criteria
  – Project does not meet GLDF test

• MISO Regional Process
  – Project meets criteria in MISO regional process
    • May require additional cost allocation work

• PJM Regional Process
  – Project lacks benefits due to PJM congestion drivers
Next Steps

• Interregional MEP analysis is complete
• No projects meet criteria to be recommended as an IMEP
• MISO may pursue Thayer – Morrison project in MISO Regional process
• IPSAC to discuss potential JOA updates/changes
  – EL13-88 (NIPSCO Order) compliance
  – Experience of recent IMEP study
• Next Interregional MEP proposal window: November 2018 – February 2019
• V1 – 11/3/2017 – Original Version Posted to PJM.com
• V2 – 11/6/2017
  – Added ‘Upgraded Rating’ to slides 11-13
  – Added baseline IDs to slides 9-13