Market Efficiency Update

Transmission Expansion Advisory Committee
May 16, 2019
Nick Dumitriu, Market Simulation
2018/19 Market Efficiency Window
Summary of Received Proposals*

• 22 proposals addressing Hunterstown - Lincoln 115 kV
  – 19 Greenfields
    • $5M - $291M
  – 3 Upgrades
    • $7M - $137M

• 10 proposals on interregional congestion drivers
  – 5 Greenfields
    • $19M - $266M
  – 5 Upgrades
    • $0.1M - $36M

• 2 proposals not addressing PJM-identified congestion drivers
• 11 Proposing entities (including 1 joint proposal)
• 6 battery proposals and 1 Smart Wire proposal

* Updated on 5/10/2019 to reflect new proposals summary
<table>
<thead>
<tr>
<th>Analysis Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Data Validation (Completed) Mar-Apr 2019</td>
</tr>
<tr>
<td>• Post Mid-cycle base case (Completed) May 2019</td>
</tr>
<tr>
<td>• Independent review of cost and ability to build Apr-Nov 2019</td>
</tr>
<tr>
<td>• Analysis of proposed solutions* May-Oct 2019</td>
</tr>
<tr>
<td>• Review of Analysis with TEAC Jun-Nov 2019</td>
</tr>
<tr>
<td>• Determination of Final Projects Dec 2019</td>
</tr>
</tbody>
</table>

* Due to the need to coordinate with MISO, interregional proposals will be analyzed first.
• Completed Mid-cycle update of major assumptions
  – Demand Forecast
  – Generation Expansion
  – Fuel/Emission Prices
  – Topology Updates
  – Con/Mon Updates

• Posted updated Input Assumptions White Paper
  • https://www.pjm.com/committees-and-groups/committees/teac.aspx

• Posted Base Case mid-cycle update and Base Case congestion results
  • Note: No-FSA sensitivity case and congestion results will be posted in the following weeks
• PJM completed data validation for all proposals.
  – Individual description of proposals can be found in Appendix B

• For all proposals, PJM staff is currently performing preliminary N-1 contingency analysis to determine flowgates to monitor

• Currently finalizing the PROMOD models for interregional proposals
  – By June TEAC, expected to complete first round of simulations for interregional proposals

• Analysis of Hunterstown-Lincoln proposals to be performed after completing the interregional proposals analysis
Market Efficiency Project Selection Process

Start

Review proposals

Perform B/C

Does project pass B/C?

Yes

No

Not Recommended

Does project cause additional unacceptable congestion?

Yes

Further Analysis is required

No

Sensitivity Analysis Other Factors considered

No

May be Recommended

Yes

Does project reduce or fix congestion driver?

Yes

No

Not Recommended based on congestion driver, Hold for other consideration

Does project require additional upgrades?

Yes

No

Finish

Does Reliability and Constructability Analysis (if necessary) require additional changes?

Yes

No

Project Not Recommended

Project Recommended

Is the project competitive?
Appendix A
2018/19 Long Term Window
Proposals Received
### Proposal Statistics by Target Congestion Driver*

<table>
<thead>
<tr>
<th>Congestion Driver</th>
<th>Transmission Zone</th>
<th>Greenfield Proposals Count</th>
<th>Upgrade Proposals Count</th>
<th>Total Proposals Count</th>
<th>Cost Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunterstown - Lincoln 115 kV</td>
<td>METED</td>
<td>19</td>
<td>3</td>
<td>22</td>
<td>$5M - $291M</td>
</tr>
<tr>
<td>Bosserman - Trail Creek 138 kV</td>
<td>AEP-MISOE</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>$14M - $266M</td>
</tr>
<tr>
<td>Marblehead XFMR</td>
<td>MISOC</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>$36M</td>
</tr>
<tr>
<td>Monroe 1&amp;2 - Wayne 345 kV</td>
<td>MISOC</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>$0.1M - $0.5M</td>
</tr>
<tr>
<td>No PJM Driver</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>$2M - $14M</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>25</strong></td>
<td><strong>9</strong></td>
<td><strong>34</strong></td>
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</tr>
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</table>

* Updated on 5/10/2019 to reflect new proposals summary
<table>
<thead>
<tr>
<th>ID</th>
<th>Proposal Description</th>
<th>Greenfield/Upgrade</th>
<th>Project Cost (In-Service $M)</th>
<th>In-Service Year</th>
<th>Appendix B Slide #</th>
</tr>
</thead>
<tbody>
<tr>
<td>398</td>
<td>New Meadow Lake-Pike Creek 345kV line.</td>
<td>Greenfield</td>
<td>$266.44</td>
<td>2023</td>
<td>20</td>
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<tr>
<td>249</td>
<td>A 50 MW 4-hour battery at Trail Creek 138 kV station.</td>
<td>Greenfield</td>
<td>$45.40</td>
<td>2022</td>
<td>19</td>
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<tr>
<td>129</td>
<td>New Kuchar station cutting into Bosserman–Liquid Carbonics 138 kV line.</td>
<td>Greenfield</td>
<td>$27.62</td>
<td>2023</td>
<td>18</td>
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<tr>
<td>436</td>
<td>New Toto 345kV station interconnecting Olive-Reynolds #1, Olive-Reynolds #2, and Schahfer-Burr Oak 345kV lines.</td>
<td>Greenfield</td>
<td>$19.31</td>
<td>2023</td>
<td>21</td>
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<tr>
<td>481</td>
<td>Reconductor Michigan City-Trail Creek-Bosserman 138 kV and Maple-LNG 138 kV circuits.</td>
<td>Upgrade</td>
<td>$14.10</td>
<td>2023</td>
<td>22</td>
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</tbody>
</table>

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<tbody>
<tr>
<td>506</td>
<td>Rebuild Palmyra-Marblehead 161 kV and Marblehead-Herleman 138 kV lines. New Maywood-Palmyra 345 kV line.</td>
<td>Greenfield</td>
<td>$36.02</td>
<td>2023</td>
<td>24</td>
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<td>322</td>
<td>Rebuild Palmyra-Marblehead 161 kV and Marblehead-Herleman 138 kV lines. New 345 kV ring bus at the Palmyra substation.</td>
<td>Upgrade</td>
<td>$35.95</td>
<td>2023</td>
<td>23</td>
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<tr>
<td>ID</td>
<td>Proposal Description</td>
<td>Greenfield/Upgrade</td>
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<tr>
<td>782</td>
<td>Upgrade Monroe-Wayne 345 kV line rating by replacing switches at the 345kV Wayne station.</td>
<td>Upgrade</td>
<td>$0.46</td>
<td>2023</td>
<td>27</td>
</tr>
<tr>
<td>078</td>
<td>Modify the Monroe-Wayne 345 kV line impedance to significantly reduce line flows.</td>
<td>Upgrade</td>
<td>$0.10</td>
<td>2023</td>
<td>25</td>
</tr>
<tr>
<td>775</td>
<td>Reconfigure the Monroe-Coventry 345 kV line that runs adjacent to the Monroe-Wayne line on common structures.</td>
<td>Upgrade</td>
<td>$0.10</td>
<td>2023</td>
<td>26</td>
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<tbody>
<tr>
<td>616</td>
<td>Build a new Wentz-Carroll 230 kV line and a new Peach Bottom-Graceton 230 kV line. Increase ratings of Carroll-Mt. Airy 230 kV line.</td>
<td>Greenfield</td>
<td>$290.95</td>
<td>2024</td>
<td>42</td>
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<tr>
<td>593</td>
<td>Build a new Littlestown-Germantown 115 kV line and a new Peach Bottom-Graceton 230 kV line.</td>
<td>Greenfield</td>
<td>$183.69</td>
<td>2024</td>
<td>41</td>
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<tr>
<td>387</td>
<td>Build a new Wentz-Carroll 230 kV line. Increase ratings of Carroll-Mt. Airy 230 kV line.</td>
<td>Greenfield</td>
<td>$152.18</td>
<td>2024</td>
<td>34</td>
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<td>389</td>
<td>Rebuild Hunterstown-Lincoln 115 kV line. Build a new Peach Bottom-Graceton 230 kV line.</td>
<td>Greenfield</td>
<td>$147.64</td>
<td>2024</td>
<td>35</td>
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<tr>
<td>034</td>
<td>Rebuild the Hunterstown-Lincoln-Germantown 115 kV and Germantown-Carrol 138 kV corridors as a new Hunterstown-Carroll 230 kV circuit.</td>
<td>Upgrade</td>
<td>$136.64</td>
<td>2023</td>
<td>30</td>
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<td>868</td>
<td>Build a new Delta Tap-Conastone 500 kV line. Build a new 115 kV ring bus at the Lincoln tap connecting Orrtanna, Hunterstown and Lincoln 115 kV buses. Replace Face Rock 115/69 kV transformers.</td>
<td>Greenfield</td>
<td>$122.08</td>
<td>2023</td>
<td>47</td>
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<tr>
<td>ID</td>
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<td>In-Service Date</td>
<td>Appendix B Slide #</td>
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<tr>
<td>511</td>
<td>Build a new 115 kV ring bus at the Lincoln tap connecting Orrtanna, Hunterstown and Lincoln 115 kV buses. Build a new Otter Creek 500/230 kV substation connecting to the existing Otter Creek 230 kV switchyard. Upgrade the existing Otter Creek-Conastone 230 kV line. Replace Face Rock 115/69 kV transformers. Reconductor Manor-Graceton 230 kV.</td>
<td>Greenfield</td>
<td>$95.47</td>
<td>2023</td>
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<td>847</td>
<td>Build a new Robinson Run-Graceton 230 kV line. Rebuild of Cooper-Graceton 230 kV line. Reconductor Hunterstown-Lincoln 115 kV line.</td>
<td>Greenfield</td>
<td>$56.00</td>
<td>2023</td>
<td>46</td>
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<tr>
<td>ID</td>
<td>Proposal Description</td>
<td>Greenfield/Upgrade</td>
<td>Project Cost (In-Service $M)</td>
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<tr>
<td>647</td>
<td>Build a new 115 kV ring bus at the Lincoln tap connecting Orrtanna, Hunterstown and Lincoln 115 kV buses. Build a new Otter Creek 500/230 kV substation connecting to the existing Otter Creek 230 kV switchyard. Replace Face Rock 115/69 kV transformers. Reconduct 230 kV line.</td>
<td>Greenfield</td>
<td>$55.12</td>
<td>2023</td>
<td>44</td>
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<tr>
<td>021</td>
<td>Rebuild Hunterstown-Lincoln 115 kV. Build a new Peach Bottom-Graceton 230 kV circuit. Upgrade Face Rock 115/69 kV transformers.</td>
<td>Upgrade</td>
<td>$54.74</td>
<td>2023</td>
<td>29</td>
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<tr>
<td>830</td>
<td>Build a new Littlestown-Germantown 115 kV line.</td>
<td>Greenfield</td>
<td>$44.92</td>
<td>2024</td>
<td>45</td>
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<td>892</td>
<td>Install a 50 MW 2-hour battery at Lincoln 115 kV substation.</td>
<td>Greenfield</td>
<td>$28.98</td>
<td>2021</td>
<td>48</td>
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<tr>
<td>453</td>
<td>Install a 25 MW 4-hour battery at Lincoln 115 kV substation.</td>
<td>Greenfield</td>
<td>$26.69</td>
<td>2021</td>
<td>38</td>
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<tr>
<td>402</td>
<td>Build a new Hunterstown-Lincoln 115 kV line. Install a 25 MW 2-hour battery at Lincoln 115 kV substation.</td>
<td>Greenfield</td>
<td>$25.81</td>
<td>2021</td>
<td>36</td>
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<tr>
<td>ID</td>
<td>Proposal Description</td>
<td>Greenfield /Upgrade</td>
<td>Project Cost (In-Service $M)</td>
<td>In-Service Date</td>
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<tr>
<td>413</td>
<td>Build a new Hunterstown-Lincoln 115 kV line. Install a 10 MW 2-hour battery at Lincoln 115 kV substation.</td>
<td>Greenfield</td>
<td>$19.22</td>
<td>2021</td>
<td>37</td>
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<tr>
<td>201</td>
<td>Install a 25 MW 2-hour battery at Lincoln 115 kV station.</td>
<td>Greenfield</td>
<td>$17.36</td>
<td>2021</td>
<td>31</td>
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<tr>
<td>960</td>
<td>Build a new Hunterstown-Lincoln 115 kV line.</td>
<td>Greenfield</td>
<td>$10.13</td>
<td>2021</td>
<td>49</td>
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<tr>
<td>293</td>
<td>Build a new Meade 115 kV substation with outgoing lines to Orrtanna, Hunterstown, and Lincoln substations.</td>
<td>Greenfield</td>
<td>$8.95</td>
<td>2023</td>
<td>32</td>
</tr>
<tr>
<td>007</td>
<td>Build a new 115 kV ring bus at the Lincoln tap connecting Orrtanna, Hunterstown and Lincoln 115 kV buses.</td>
<td>Greenfield</td>
<td>$7.58</td>
<td>2023</td>
<td>28</td>
</tr>
<tr>
<td>622</td>
<td>Rebuild the Hunterstown-Lincoln 115 kV line.</td>
<td>Upgrade</td>
<td>$7.21</td>
<td>2023</td>
<td>43</td>
</tr>
<tr>
<td>469</td>
<td>Install a Smart Wire with 5% of series reactance along the Lincoln Tap-Hunterstown 115 kV line.</td>
<td>Greenfield</td>
<td>$4.65</td>
<td>2022</td>
<td>39</td>
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</tbody>
</table>
Appendix B
2018/19 Long Term Window
Individual Proposal Descriptions
Project ID: 201819_BT_129

Proposed Solution:

kV Level: 138 kV
In-Service Cost ($M): $27.62
In-Service Year: 2023
Target Zone: AEP/MISOE
ME Constraints: Bosserman - Trail Creek 138kV

Notes:
### Project ID: 201819_BT_249

**Proposed Solution:**
Build a 50 MW 4-hour Warnke Battery Energy Storage System (BESS) to be connected to Trail Creek 138 kV station. Upgrade Trail Creek 138 kV station.

<table>
<thead>
<tr>
<th>KV Level: 138 kV</th>
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<tbody>
<tr>
<td>In-Service Cost ($M): $45.40</td>
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<tr>
<td>In-Service Year: 2022</td>
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<tr>
<td>Target Zone: AEP/MISOE</td>
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<tr>
<td>ME Constraints: Bosserman - Trail Creek 138kV</td>
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<tr>
<td>Notes:</td>
</tr>
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</table>

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![Map showing Project BT_249 location](attachment:image.png)
Project ID: 201819_BT_398

Proposed Solution:
Establish a new 345 kV Pike Creek station near the intersection of the 345 kV Bloom-Davis Creek and the 345 kV Burnham-Davis Creek lines. Build a new Meadow Lake-Pike Creek 345kV line. Upgrade Meadow Lake 345 kV station.

- kV Level: 345 kV
- In-Service Cost ($M): $266.44
- In-Service Year: 2023
- Target Zone: AEP/MISOE
- ME Constraints: Bosserman - Trail Creek 138kV
- Notes:
Proposed Solution: Build a new Toto 345kV station, interconnecting the existing Olive-Reynolds #1, Olive-Reynolds #2, and Schahfer-Burr Oak 345kV transmission lines with a new 345kV switching station.

- **kV Level:** 345 kV
- **In-Service Cost ($M):** $19.31
- **In-Service Year:** 2023
- **Target Zone:** AEP/MISOE
- **ME Constraints:** Bosserman - Trail Creek 138kV
- **Notes:** PJM TEAC – 05/16/2019
**Project ID: 201819_BT_481**

**Proposed Solution:**

**KV Level:** 138 kV

**In-Service Cost ($M):** $14.10

**In-Service Year:** 2023

**Target Zone:** AEP/MISOE

**ME Constraints:**
Bosserman - Trail Creek 138kV

**Notes:**

![Map of Michigan City, Trail Creek, Bosserman, Maple, and LNG terminals with identified reinforcement and transmission system enhancement](image-url)
Project ID: 201819_MH_322

Proposed Solution:
Rebuild Palmyra-Marblehead 161 kV as a 345 kV/161 kV double circuit line, and Marblehead-Herleman 138 kV as a 345 kV/138 kV double circuit line. Upgrade Herleman substation. Construct a 345 kV ring bus at the Palmyra substation.

kV Level: 345 kV
In-Service Cost ($M): $35.95
In-Service Year: 2023
Target Zone: MISOC
ME Constraints:
Marblehead Transformer
Notes:

PJM TEAC – 05/16/2019
### Project ID: 201819_MH_506

**Proposed Solution:**
Rebuild Palmyra-Marblehead 161 kV as a 345 kV/161 kV double circuit line, and Marblehead-Herleman 138 kV as a 345 kV/138 kV double circuit line. Construct Maywood-Palmyra 345 kV line. Upgrade Herleman and Maywood substations.

<table>
<thead>
<tr>
<th>kV Level: 345 kV</th>
<th>In-Service Cost ($M): $36.02</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Service Year: 2023</td>
<td>Target Zone: MISOC</td>
</tr>
<tr>
<td>ME Constraints: Marblehead Transformer</td>
<td>Notes:</td>
</tr>
</tbody>
</table>

![Map showing the proposed solution](image)
**Project ID: 201819_MW_078**

**Proposed Solution:**
Modify the Monroe-Wayne 345 kV line impedance to significantly reduce line flows.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>kV Level</td>
<td>345 kV</td>
</tr>
<tr>
<td>In-Service Cost ($M)</td>
<td>$0.10</td>
</tr>
<tr>
<td>In-Service Year</td>
<td>2023</td>
</tr>
<tr>
<td>Target Zone</td>
<td>MISOE</td>
</tr>
<tr>
<td>ME Constraints</td>
<td>Monroe 1&amp;2 - Wayne 345 kV</td>
</tr>
</tbody>
</table>

**Notes:**
PJM TEAC – 05/16/2019
Proposed Solution:
Reconfigure the Monroe-Coventry 345 kV line that runs adjacent to the Monroe-Wayne line on common structures.

- **kV Level**: 345 kV
- **In-Service Cost ($M)**: $0.10
- **In-Service Year**: 2023
- **Target Zone**: MISOE
- **ME Constraints**: Monroe 1&2 - Wayne 345 kV

Notes:
Proposed Solution:
Upgrade Monroe-Wayne 345 kV line rating by replacing switches at the 345kV Wayne station.

- **kV Level:** 345 kV
- **In-Service Cost ($M):** $0.46
- **In-Service Year:** 2023
- **Target Zone:** MISOE
- **ME Constraints:** Monroe 1&2 - Wayne 345 kV
- **Notes:**
Project ID: 201819_HL_007

Proposed Solution:
Install a new 115 kV ring bus at the Orrtanna tap point of the METED Hunterstown-Orrtanna-Lincoln 115 kV 963 line.

- **kV Level:** 115 kV
- **In-Service Cost ($M):** $7.58
- **In-Service Year:** 2023
- **Target Zone:** METED
- **ME Constraints:**
  - Huntertown - Lincoln 115 kV
- **Notes:**
Project ID: 201819_HL_021

Proposed Solution:
Rebuild the Hunterstown-Lincoln 115 kV line. Create a new Peach Bottom-Graceton 230 kV circuit, with a series reactor at Graceton. Upgrade/Replace the existing Face Rock 115/69 kV transformers. Upgrade Rice and Ringgold 230 kV stations.

KV Level: 230 kV
In-Service Cost ($M): $54.74
In-Service Year: 2023
Target Zone: METED

ME Constraints:
Huntertown - Lincoln 115 kV

Notes:
Project ID: 201819_HL_034

Proposed Solution:

kV Level: 230 kV
In-Service Cost ($M): $136.64
In-Service Year: 2023
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV

Notes:
Project ID: 201819_HL_201

Proposed Solution:
Build a 25 MW 2-hour battery to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV station.

kV Level: 115 kV
In-Service Cost ($M): $17.36
In-Service Year: 2021
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV

Notes:
Project ID: 201819_HL_293

Proposed Solution:
Construct a new 115 kV Meade ring bus at Lincoln Tap substation, including outgoing lines to Orrtanna, Hunterstown, and Lincoln substations.

- kV Level: 115 kV
- In-Service Cost ($M): $8.95
- In-Service Year: 2023
- Target Zone: METED
- ME Constraints: Huntertown - Lincoln 115 kV

Notes:

PJM TEAC – 05/16/2019
### Proposed Solution:

**KV Level:** 230 kV  
**In-Service Cost ($M):** $91.35  
**In-Service Year:** 2023  
**Target Zone:** METED

### ME Constraints:
- Huntertown - Lincoln 115 kV

### Notes:
- PJM TEAC – 05/16/2019
Project ID: 201819_HL_387

Proposed Solution:
Add a new Wentz 500 kV substation on Hunterstown-Conastone 500 kV line and a 500/230 kV transformer at Wentz substation. Add a new Wentz-Carroll 230 kV line. Increase ratings of Carroll-Mt. Airy 230 kV line.

kV Level: 500 kV
In-Service Cost ($M): $152.18
In-Service Year: 2024
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV
Notes:
Project ID: 201819_HL_389

Proposed Solution:
Rebuild Hunterstown-Lincoln 115 kV line. Add a Peach Bottom 500/230 kV transformer. Add a Peach Bottom-Graceton 230 kV line and reconfigure the 230 kV connections at Peach Bottom into a new switching station.

kV Level: 500 kV
In-Service Cost ($M): $147.64
In-Service Year: 2024
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV
Notes:
Project ID: 201819_HL_402

Proposed Solution:
Build a new Hunterstown-Lincoln 115 kV line. Construct a 25 MW 2-hour battery storage facility to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV and Hunterstown 115 kV substations.

kV Level: 115 kV
In-Service Cost ($M): $25.81
In-Service Year: 2021
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV
Notes:
Proposed Solution:
Build a new Hunterstown-Lincoln 115 kV line. Construct a 10 MW 2-hour battery storage facility to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV and Hunterstown 115 kV substations.

kV Level: 115 kV
In-Service Cost ($M): $19.22
In-Service Year: 2021
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV
Notes:
Project ID: 201819_HL_453

Proposed Solution:
Build a 25 MW 4-hour battery to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV substation.

kV Level: 115 kV
In-Service Cost ($M): $26.69
In-Service Year: 2021
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV
Notes:

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Project ID: 201819_HL_469

Proposed Solution:
Smart Wire with 5% of series reactance along the Lincoln Tap-Hunterstown 115 kV line.

kV Level: 115 kV
In-Service Cost ($M): $4.65
In-Service Year: 2022
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV

Notes:
Proposed Solution:
Install a new 115 kV ring bus at the Orrtanna tap point of Hunterstown-Orrtanna-Lincoln 115 kV 963 line and tap into Hunterstown-Lincoln 115 kV 963 line. Construct a new Otter Creek 500/230 kV substation and tap into TMIS-Furnace Run 500 kV line. Connect the new Otter Creek 500/230 kV substation to the existing Otter Creek 230 kV station. Upgrade the existing Otter Creek 230 kV switchyard and Otter Creek - Conastone 230 kV line. Replace Face Rock 115/69 kV T1 and T2 transformers. Reconduct/rebuild 1.3 miles of Manor-Graceton 230 kV line. Upgrade Peach Bottom North station.

- **KV Level:** 500 kV
- **In-Service Cost ($M):** $95.47
- **In-Service Year:** 2023
- **Target Zone:** METED
- **ME Constraints:**
  - Huntertown - Lincoln 115 kV
- **Notes:**
Project ID: 201819_HL_593

Proposed Solution:
Add a new Littlestown 500 kV substation on Hunterstown-Conastone 500 kV line and a 500/115 kV transformer at Littlestown substation. Add a new Littlestown-Germantown 115 kV line. Add a Peach Bottom 500/230 kV transformer, add a Peach Bottom-Graceton 230 kV line and reconfigure the 230 kV connections at Peach Bottom into a new switching station.

kV Level: 500 kV

In-Service Cost ($M): $183.69

In-Service Year: 2024

Target Zone: METED

ME Constraints:
Huntertown - Lincoln 115 kV

Notes:
Project ID: 201819_HL_616

Proposed Solution:
Add a new Wentz 500 kV substation on Hunterstown-Conastone 500 kV line and a 500/230 kV transformer at Wentz substation. Add a new Wentz-Carroll 230 kV line. Add a Peach Bottom 500/230 kV transformer, add a Peach Bottom-Graceton 230 kV line and add 230 kV switching station at Peach Bottom. Increase ratings of Carroll-Mt. Airy 230 kV line.

kV Level: 500 kV

In-Service Cost ($M): $290.95

In-Service Year: 2024

Target Zone: METED

ME Constraints:
Huntertown - Lincoln 115 kV

Notes:
Project ID: 201819_HL_622

Proposed Solution:
Rebuild the Hunterstown-Lincoln 115 kV 962 line. Upgrade limiting terminal equipment at Hunterstown 115 kV and Lincoln 115 kV substations.

kV Level: 115 kV
In-Service Cost ($M): $7.21
In-Service Year: 2023
Target Zone: METED
ME Constraints:
Huntertown - Lincoln 115 kV
Notes:
**Project ID: 201819_HL_647**

**Proposed Solution:**
Install a new 115 kV ring bus at the Orrtanna tap point of Hunterstown-Orrtanna-Lincoln 115 kV 963 line and tap into Hunterstown-Lincoln 115 kV 963 line. Construct a new Otter Creek 500/230 kV substation and tap into TMIS-Furnace Run 500 kV line. Connect the new Otter Creek 500/230 kV substation to the existing Otter Creek 230 kV station.
Upgrade the existing Otter Creek 230 kV switchyard. Replace Face Rock 115/69 kV T1 and T2 transformers. 
Reconduct/rebuild 1.3 miles of Manor-Graceton 230 kV line. 
Upgrade Peach Bottom North station.

**kV Level:** 500 kV

**In-Service Cost ($M):** $55.12

**In-Service Year:** 2023

**Target Zone:** METED

**ME Constraints:**
Huntertown - Lincoln 115 kV

**Notes:**

![Map Image](image-url)
**Project ID: 201819_HL_830**

**Proposed Solution:**
Add a new Littlestown 500 kV substation on Hunterstown-Conastone 500 kV line and a 500/115 kV transformer at Littlestown substation. Add a new Littlestown-Germantown 115 kV line.

**kV Level:** 500 kV

**In-Service Cost ($M):** $44.92

**In-Service Year:** 2024

**Target Zone:** METED

**ME Constraints:**
Huntertown - Lincoln 115 kV

**Notes:**
### Project ID: 201819_HL_847

** Proposed Solution:**

- **kV Level:** 230 kV
- **In-Service Cost ($M):** $56.00
- **In-Service Year:** 2023
- **Target Zone:** METED

**ME Constraints:**
Huntertown - Lincoln 115 kV

**Notes:**
Project ID: 201819_HL_868

Proposed Solution:
Build a new Delta 500 kV switchyard and tap into Peach Bottom-Delta 500 kV (5034) line. Construct a new Delta Tap Switchyard-Conastone 500 kV line. Install a new 115 kV ring bus at the Orrtanna tap point of Hunterstown-Orrtanna-Lincoln 115 kV 963 line. Replace Face Rock 115/69 kV T1 and T2 transformers.

- **kV Level:** 500 kV
- **In-Service Cost ($M):** $122.08
- **In-Service Year:** 2023
- **Target Zone:** METED

ME Constraints:
Huntertown - Lincoln 115 kV

Notes:
PJM TEAC – 05/16/2019
**Project ID: 201819_HL_892**

**Proposed Solution:**
Build a 50 MW 2-hour battery to be connected to Lincoln 115 kV station. Upgrade Lincoln 115 kV substation.

**kV Level:** 115 kV

**In-Service Cost ($M):** $28.98

**In-Service Year:** 2021

**Target Zone:** METED

**ME Constraints:**
Huntertown - Lincoln 115 kV

**Notes:**

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Legend:
- **Identified Reinforcement**
- **Transmission System Enhancement**
  - Subs >= 345 kV
  - Trans Lines >= 345 kV
  - Subs < 345 kV
  - Trans Lines < 345 kV
Proposed Solution:
Construct a new Hunterstown-Lincoln 115 kV line. Upgrade Hunterstown 115 kV and Lincoln 115 kV substations.

kV Level: 115 kV
In-Service Cost ($M): $10.13
In-Service Year: 2021
Target Zone: METED
ME Constraints: Huntertown - Lincoln 115 kV
Notes:
**Project ID:** 201819_931

**Proposed Solution:**
Build a new Second Creek 345kV switching station interconnecting Tanners Creek-East Bend and Miami Fort-Terminal 345kV lines.

**kV Level:** 345 kV

**In-Service Cost ($M):** $13.76

**In-Service Year:** 2023

**Target Zone:** MISOC

**ME Constraints:**
Hubble-Batesville 138 kV

**Notes:** Not a PJM congestion driver
### Project ID: 201819_067

**Proposed Solution:**
Fix identified Locations of Concern from sag studies performed on AEP section of Dumont-Stillwell 345 kV line.

<table>
<thead>
<tr>
<th>kV Level</th>
<th>In-Service Cost ($M)</th>
<th>In-Service Year</th>
<th>Target Zone</th>
<th>ME Constraints</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>345 kV</td>
<td>$1.89</td>
<td>2021</td>
<td>AEP</td>
<td>Dumont-Stillwell 345 kV</td>
<td>Unspecified congestion driver</td>
</tr>
</tbody>
</table>

![Map showing locations of interest](image-url)
Revision History

5/13/2019 – V1 – Original version posted to pjm.com