Transmission Expansion Advisory Committee
FirstEnergy Supplemental Projects

August 8, 2019
Solutions

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process

**Process Stage:** Solutions Meeting 8/8/2019

**Previously Presented:**
Need Meeting 7/11/2019

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

*Operational Flexibility and Efficiency*

**Specific Assumption Reference:**

- System reliability and performance
- Substation/line equipment limits

**Upgrade Relay Schemes**

- Relay schemes that have a history of misoperation
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades
- Bus protection schemes

Continued on next slide…

**APS/Penelec Transmission Zone M-3 Process**

**Multiple Misoperation Relay Projects**

**Geographic Map:**
Include all facilities mentioned on slide, small locator map

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*Transmission Expansion Advisory Committee – FirstEnergy Supplemental 8/8/2019*
Problem Statement:

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement part and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

<table>
<thead>
<tr>
<th>Need Number</th>
<th>Transmission Line / Substation Locations</th>
<th>Existing Line Rating (SN / SE)</th>
<th>Existing Conductor Rating (SN / SE)</th>
<th>Limiting Terminal Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>APS-2019-011</td>
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<tr>
<td>APS-2019-010</td>
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**Process Stage:** Solutions Meeting 8/8/2019

**Proposed Solution:**

<table>
<thead>
<tr>
<th>Need Number</th>
<th>Transmission Line / Substation Locations</th>
<th>New MVA Line Rating (SN / SE)</th>
<th>Scope of Work</th>
<th>Estimated Costs ($ M)</th>
<th>Projected In-Service</th>
</tr>
</thead>
</table>
• Shingletown 230 kV Substation – Replace line relaying, line trap, and substation conductor | $0.9M | 12/1/2020 |
• Shawville 230 kV Substation – Replace line relaying and line trap | $1.3M | 6/15/2020 |

**Alternatives Considered:**

- Maintain existing condition and elevated risk of failure

No topology changes, no bubble diagram required.

**Project Status:** All projects are in the Conceptual phase.

**Model:** 2018 Series 2023 Summer RTEP 50/50
**Penelec Transmission Zone M-3 Process**

**Homer City North 345/230-23 kV Transformer Replacement**

**Need Number:** PN-2019-032  
**Process State:** Solutions Meeting 8/8/2019  
**Previously Presented:**  
Need Meeting 7/11/2019  

**Project Driver:**  
*Equipment Material Condition, Performance and Risk*  
- Power transformers and load tap changers (LTCs)  
- Station system protection and controls  

**Specific Assumption Reference:**  
Substation Condition Rebuild/Replacement

**Problem Statement:**

Homer City North 345/230-23 kV Transformer  
- Transformer has increased failure probability due to:  
  - Type “U” bushings  
  - High level heating gases and moisture  
  - Deteriorated control cabinet components  
  - Obsolete parts  
  - Leaks  
  - Transformer is 51 years old.

Transformer circuit rating is the existing transformer rating of 653/697 MVA (SN/SE).
**Need Number:** PN-2019-032

**Process Stage:** Solutions Meeting 8/8/2019

**Proposed Solution:**

*Replace Homer City North 345/230-23 kV Transformer*

- Replace the North 345/230-23 kV transformer and associated equipment with 345/230-23 kV 336/448/560 MVA transformer

**Estimated Cost:** $6.6M

**Transformer Rating:**

Homer City North 345/230-23 kV Transformer

- Before Proposed Solution: 653/817 MVA (SN/SE)
- After Proposed Solution: 691/854 MVA (SN/SE)

**Alternatives Considered:**

1. Maintain existing condition and elevated risk of failure

**Projected In-Service:** 12/31/2021

**Project Status:** Conceptual

**Model:** 2018 Series 2023 Summer RTEP 50/50
Need Number: PN-2019-033
Process State: Solutions Meeting 8/8/2019
Previously Presented:
Need Meeting 7/11/2019
Project Driver:
Equipment Material Condition, Performance and Risk
Specific Assumption Reference:
- Age/condition of wood pole transmission line structures
Problem Statement:
The Armstrong – Homer City 345 kV line is exhibiting deterioration resulting in increased maintenance. The structures are approaching end of life. The line was originally constructed in 1967.
- Total line distance is approximately 34.5 miles
- 167 out of 204 structures failed inspection (82% failure rate)
- Failure reasons include age, woodpecker damage, top rot, bayonet top, and weatherization.
Need Number: PN-2019-033
Process Stage: Solutions Meeting 8/8/2019

Proposed Solution:
Armstrong – Homer City 345 kV Line Rebuild
- Rebuild and reconductor approximately 33.0 miles of wood pole construction

Estimated Cost: $138M
Transmission Line Rating:
Armstrong – Homer City 345 kV Line
- Before Proposed Solution: 1269/1566 MVA (SN/SE)
- After Proposed Solution: 1269/1566 MVA (SN/SE)

Alternatives Considered:
1. Maintain existing condition with elevated risk of failure

Projected In-Service: 12/31/2023
Project Status: Conceptual
Model: 2018 Series 2023 Summer RTEP 50/50
Questions?
## High level M-3 Meeting Schedule

### Assumptions

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timing</th>
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</thead>
<tbody>
<tr>
<td>Posting of TO Assumptions Meeting information</td>
<td>20 days before Assumptions Meeting</td>
</tr>
<tr>
<td>Stakeholder comments</td>
<td>10 days after Assumptions Meeting</td>
</tr>
</tbody>
</table>

### Needs

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<th>Activity</th>
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<tr>
<td>TOs and Stakeholders Post Needs Meeting slides</td>
<td>10 days before Needs Meeting</td>
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<tr>
<td>Stakeholder comments</td>
<td>10 days after Needs Meeting</td>
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</table>

### Solutions

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### Submission of Supplemental Projects & Local Plan

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<th>Timing</th>
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<tbody>
<tr>
<td>Do No Harm (DNH) analysis for selected solution</td>
<td>Prior to posting selected solution</td>
</tr>
<tr>
<td>Post selected solution(s)</td>
<td>Following completion of DNH analysis</td>
</tr>
<tr>
<td>Stakeholder comments</td>
<td>10 days prior to Local Plan Submission for integration into RTEP</td>
</tr>
<tr>
<td>Local Plan submitted to PJM for integration into RTEP</td>
<td>Following review and consideration of comments received after posting of selected solutions</td>
</tr>
</tbody>
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Revision History
7/29/2019 – V1 – Original version posted to pjm.com