

# Transmission Expansion Advisory Committee FirstEnergy Supplemental Projects

March 5, 2024

# Needs

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

**Need Numbers:** APS-2024-005, APS-2024-006

**Process Stage:** Need Meeting 03/05/2024

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference:**

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits

System Condition Projects

- Substation Condition Rebuild/Replacement

Upgrade Relay Schemes

- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades

**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cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

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## APS Transmission Zone M-3 Process Misoperation Relay Projects

Need #	Transmission Line / Substation Locations	Existing Line Rating (SN / SE / WN / WE)	Existing Conductor Rating (SN / SE / WN / WE)
APS-2024-005	Harrison – Wylie Ridge 500 kV	3464 / 3464 / 3464 / 3464	3573 / 4378 / 4050 / 5194
APS-2024-006	Mt Storm (Dom) – Pruntytown 500 kV	3204 / 3860 / 3944 / 4409	3573 / 4378 / 4050 / 5194

**Need Numbers:** APS-2024-027

**Process Stage:** Need Meeting 03/05/2024

**Project Driver:**

*Equipment Material Condition, Performance and Risk  
Operational Flexibility and Efficiency*

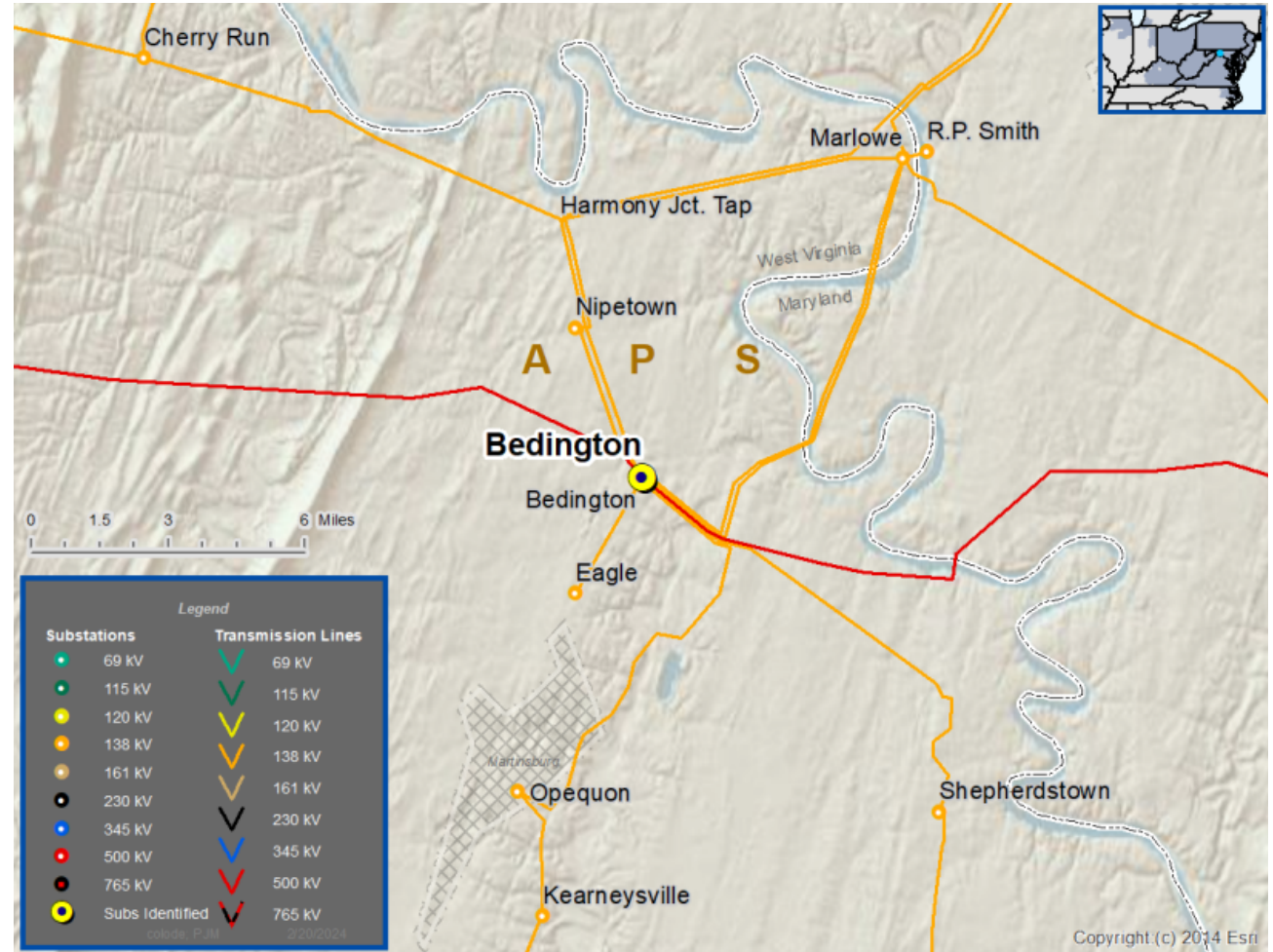
**Specific Assumption Reference:**

System Performance Projects Global Factors

- System Reliability and Performance
- Add/Replace Transformers

**Problem Statement:**

- The Bedington No. 3 500/138 kV transformer is approximately 47 years old and approaching end of life.
- The transformer is exhibiting multiple maintenance issues including:
  - History of nitrogen and oil leaks indicating moisture in oil due to paper breakdown.
  - Equipment degradation and obsolete replacement parts.
- Existing transformer ratings:
  - 486 / 620 / 570 / 655 MVA (SN / SE / WN / WE)



# 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

**Need Numbers:** APS-2023-060, APS-2023-061, APS-2023-062

**Process Stage:** Solution Meeting 03/05/2024

**Previously Presented:** Need Meeting 10/31/2023

**Project Driver:**

*Equipment Material Condition, Performance and Risk  
Operational Flexibility and Efficiency*

**Specific Assumption Reference:**

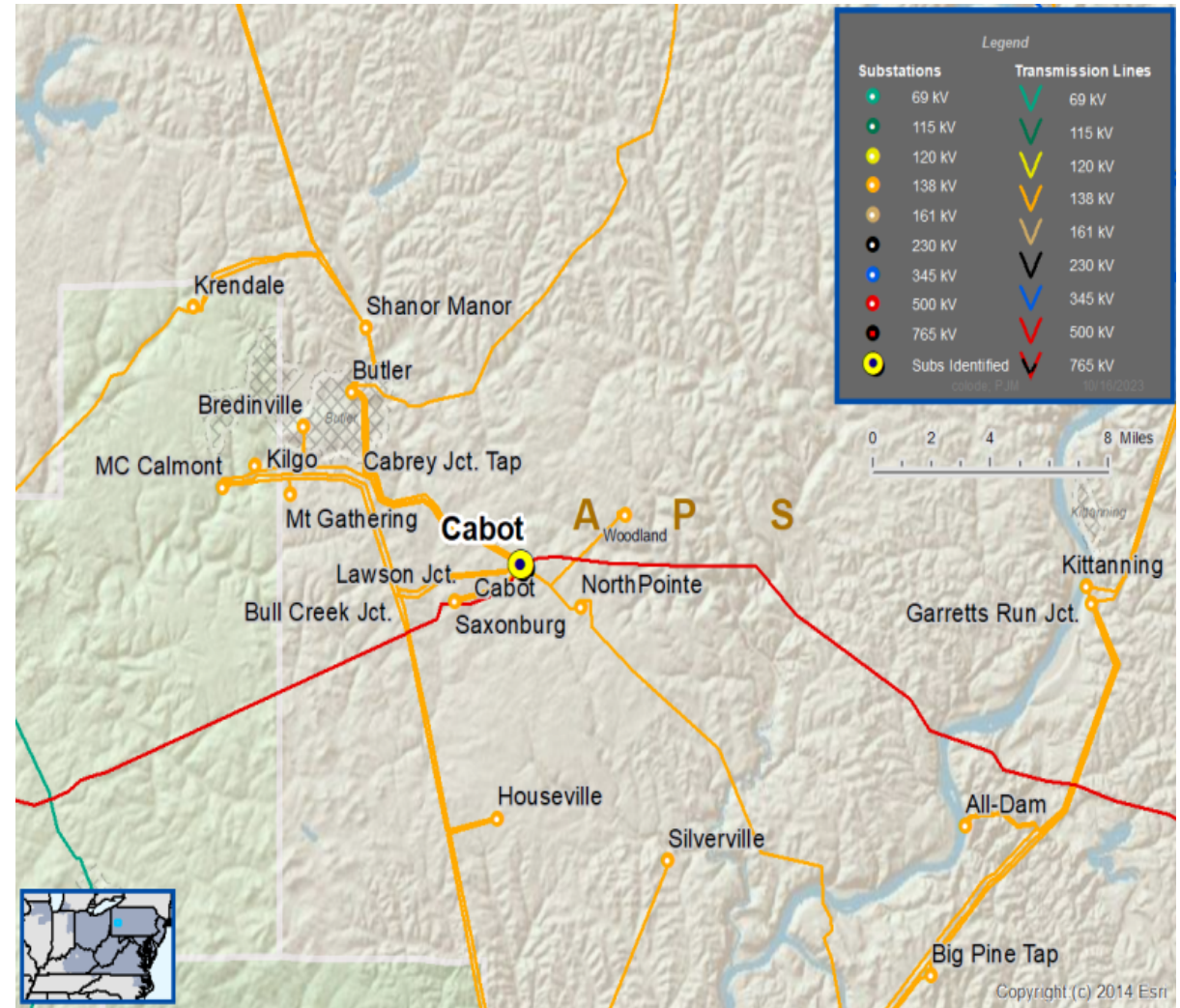
System Performance Projects Global Factors

- System Reliability and Performance
- Substation/line equipment limits
- Add/Replace Transformers
- Upgrade Relay Schemes

**Problem Statement:**

- The Cabot No. 1, No. 2, and No. 4 500/138 kV transformers are approximately 50 years old and are approaching end of life.
- The transformers are exhibiting multiple maintenance issues including:
  - Elevated methane and ethane gas levels compared with IEEE Standards.
  - Equipment degradation and obsolete replacement parts.

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## APS Transmission Zone M-3 Process Cabot 500/138 kV Transformers

Need #	Transmission Line / Substation Locations	Existing Transformer Circuit Ratings (SN / SE / WN / WE)	Existing Transformer Rating (SN / SE / WN / WE)
APS-2023-060	Cabot No. 2 500/138 kV Transformer	458 / 600 / 540 / 642	458 / 601 / 540 / 642
APS-2023-061	Cabot No. 4 500/138 kV Transformer	467 / 585 / 549 / 623	467 / 585 / 549 / 623
APS-2023-062	Cabot No. 1 500/138 kV Transformer	390 / 525 / 542 / 629	390 / 587 / 542 / 629



**Proposed Solution:**

Need #	Transmission Line / Substation Locations	New Transformer Circuit Rating (SN / SE / WN / WE )	Scope of Work	Estimated Cost	Target ISD
APS-2023-060	Cabot No. 2 500/138 kV Transformer	514 / 594 / 618 / 704	<ul style="list-style-type: none"> <li>Replace 200 MVA 500/138 kV Transformer with a new 224 MVA 500/138 kV transformer</li> <li>Replace 138 kV circuit breaker, surge arresters, disconnect switches, substation conductor and relaying</li> </ul>	\$8.2 M	12/31/2027
APS-2023-061	Cabot No. 4 500/138 kV Transformer	514 / 594 / 618 / 704	<ul style="list-style-type: none"> <li>Replace 200 MVA 500/138 kV Transformer with a new 224 MVA 500/138 kV transformer</li> <li>Replace 138 kV circuit breaker, surge arresters, disconnect switches, substation conductor and relaying</li> </ul>	\$8.2 M	04/01/2028
APS-2023-062	Cabot No. 1 500/138 kV Transformer	514 / 594 / 618 / 704	<ul style="list-style-type: none"> <li>Replace 200 MVA 500/138 kV Transformer with a new 224 MVA 500/138 kV transformer</li> <li>Replace 138 kV circuit breaker, surge arresters, disconnect switches, substation conductor and relaying</li> </ul>	\$8.2 M	06/30/2028

**Alternatives Considered:** Maintain equipment in existing condition with increased risk of failure.

**Project Status:** Pre-Engineering

**Model:** 2023 RTEP model for 2028 Summer (50/50)

# Appendix

# High Level M-3 Meeting Schedule

Assumptions	Activity	Timing
	Posting of TO Assumptions Meeting information	20 days before Assumptions Meeting
	Stakeholder comments	10 days after Assumptions Meeting
Needs	Activity	Timing
	TOs and Stakeholders Post Needs Meeting slides	10 days before Needs Meeting
	Stakeholder comments	10 days after Needs Meeting
Solutions	Activity	Timing
	TOs and Stakeholders Post Solutions Meeting slides	10 days before Solutions Meeting
	Stakeholder comments	10 days after Solutions Meeting
Submission of Supplemental Projects & Local Plan	Activity	Timing
	Do No Harm (DNH) analysis for selected solution	Prior to posting selected solution
	Post selected solution(s)	Following completion of DNH analysis
	Stakeholder comments	10 days prior to Local Plan Submission for integration into RTEP
	Local Plan submitted to PJM for integration into RTEP	Following review and consideration of comments received after posting of selected solutions

# Revision History

2/22/2024– V1 – Original version posted to pjm.com

3/5/2024 – V2 – Updated costs for APS-2023-060, APS-2023-061 and APS-2023-062.