

# First Energy (Penelec) Local Plan Submission for the 2020 RTEP

**Need Number:** PN-2019-037

**Process State:** Submission of Supplemental Project for inclusion in the Local Plan 3/20/2020

**Previously Presented:**

Need Meeting 10/21/2019

Solutions Meeting 11/18/2019

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

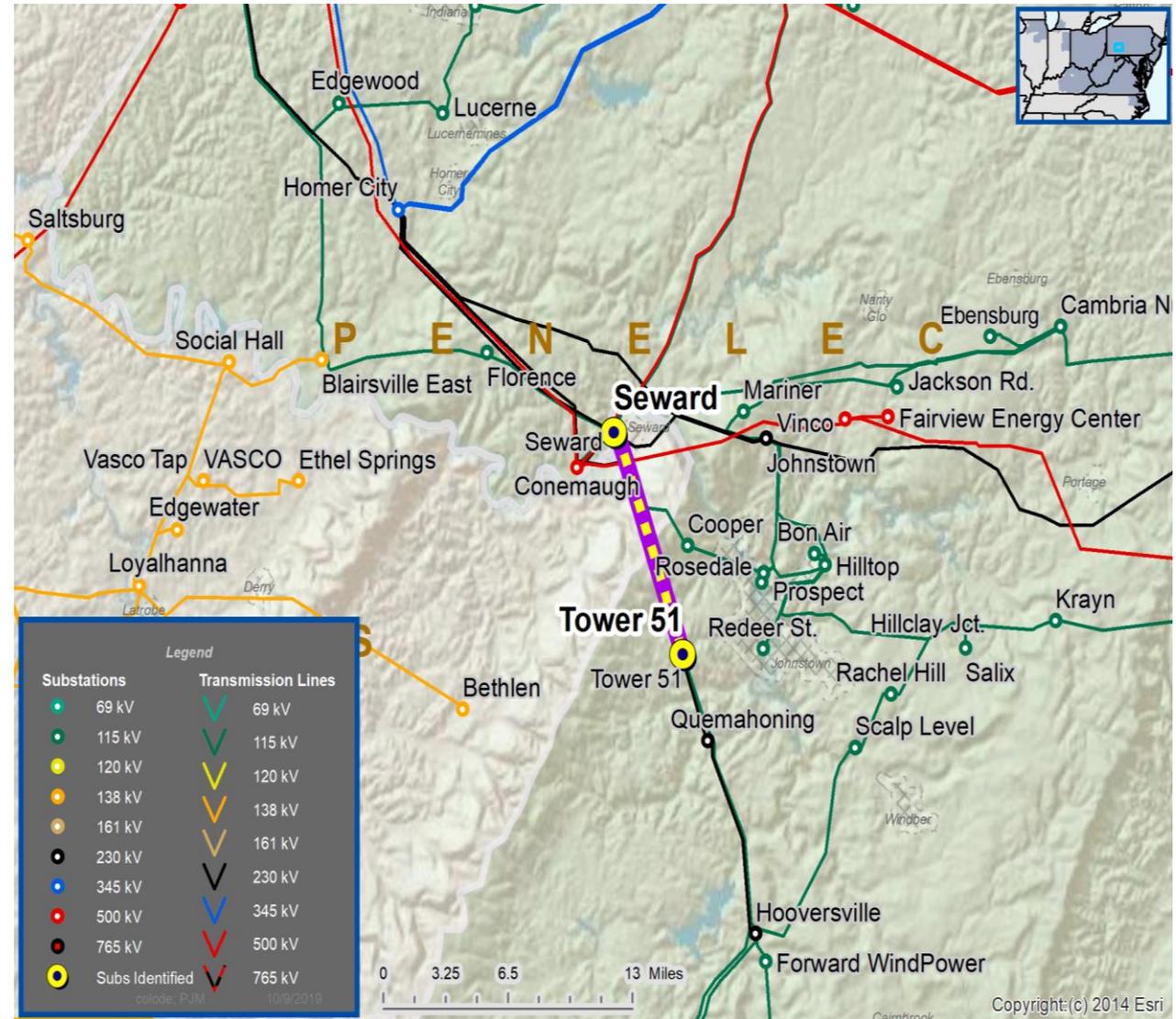
*Operational Flexibility and Efficiency*

**Specific Assumption Reference:**

System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits
- 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

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**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many cases the protection equipment cannot be repaired due to a lack of replacement part and available expertise in the outdated technology.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.

PN-2019-	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)	Limiting Terminal Equipment
037	Seward – Tower 51 115 kV Line	147/185	201/244	Circuit Breaker, Line Relaying, Line Trap, Substation Conductor

**Selected Solution:**

PN-2019-	Transmission Line / Substation Locations	Supplemental Project ID	New MVA Line Rating (SN / SE)	Scope of Work	Estimate Costs (\$ M)	Target ISD
037	Seward – Tower 51 115 kV Line	s2176, s2176.1, s2176.2	201/244	<ul style="list-style-type: none"> <li>Seward 115 kV Substation – Replace circuit breaker, line relaying, line trap, and substation conductor (s2176.1)</li> <li>Tower 51 115 kV Substation – Replace circuit breaker, line relaying, line trap, and substation conductor (s2176.2)</li> </ul>	\$1.4M	6/1/2020

No topology changes, no bubble diagram required.

**Model:** 2019 RTEP model for 2024 Summer (50/50)

**Need Number:** PN-2020-003

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 09/22/2020

**Previously Presented:**

Solution Meeting 06/02/2020  
Need Meeting 04/14/2020

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference:**

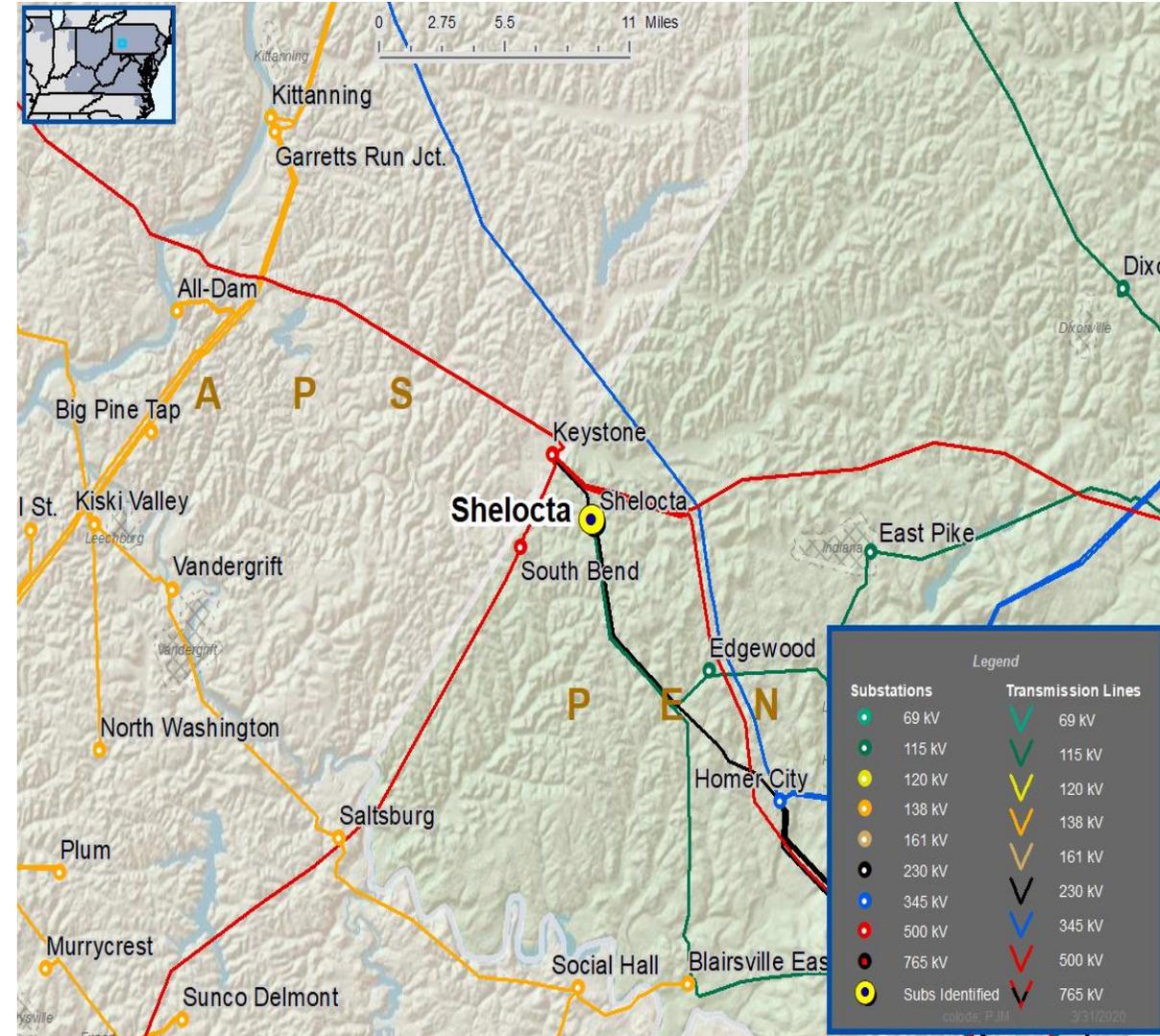
Add/Expand Bus Configuration

- Eliminate simultaneous outages to multiple networked elements

**Problem Statement:**

The Shelocta 230 kV bus is a three terminal line consisting of two 230 kV lines and a 230/115 kV transformer.

An N-1 outage results in the loss of all three networked elements.



**Need Number:** PN-2020-003

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan  
09/22/2020

**Selected Solution:**

Shelocta 230 kV Substation:

- Construct three breaker ring bus (s2279.1)

Keystone 230 kV Substation:

- Replace line trap (s2279.2)

Homer City 230 kV Substation:

- Replace line trap (s2279.3)

**Transmission Line Ratings:**

Keystone – Shelocta 230 kV Line

- Before Proposed Solution: 809 / 923 MVA (SN/SE)
- After Proposed Solution: 809 / 980 MVA (SN/SE)

Homer City – Shelocta 230 kV Line:

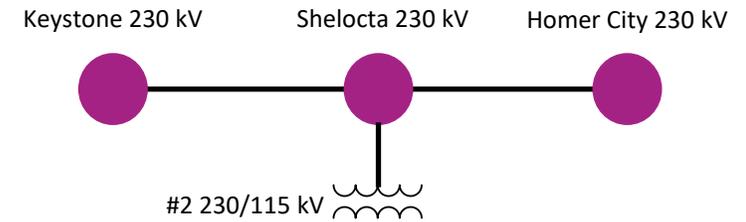
- Before Proposed Solution: 809 / 923 MVA (SN/SE)
- After Proposed Solution: 809 / 980 MVA (SN/SE)

**Estimated Cost:** \$6.7M

**Projected In-Service:** 6/1/2022

**Supplemental Project ID:** s2279.1, s2279.2, s2279.3

**Model:** 2020 RTEP model for 2025 Summer (50/50)



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

**Need Number:** PN-2020-001

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Previously Presented:**  
Need Meeting 05/12/2020  
Solution Meeting 07/07/2020

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference:**

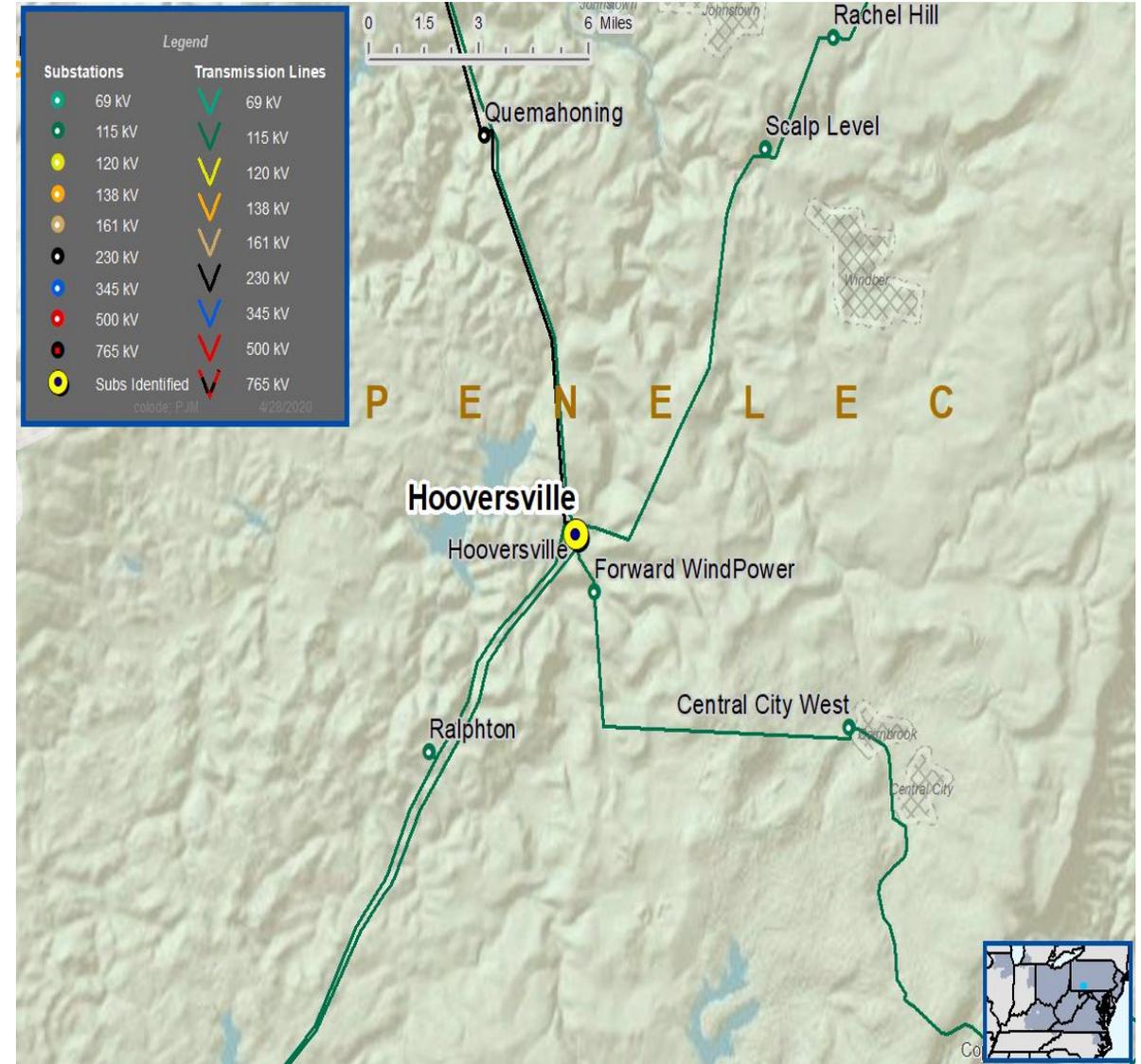
*Substation Condition Rebuild/Replacement*

**Problem Statement:**

Hooversville #3 230/115 kV Transformer

- Transformer has increased failure probability due to:
  - Transformer is 43 years old.
  - Type “U” bushings
  - High level heating gases and moisture
  - Obsolete parts
  - Nitrogen and oil leaks

Transformer circuit rating is the existing transformer rating of 245/306 MVA (SN/SE).



**Need Number:** PN-2020-001

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Selected Solution:**

*Replace Hooversville #3 230/115 kV Transformer*

- Replace the #3 230/115 kV transformer and associated equipment with a 180/240/300 MVA transformer

**Transformer Rating:**

Hooversville #3 230/115 kV Transformer

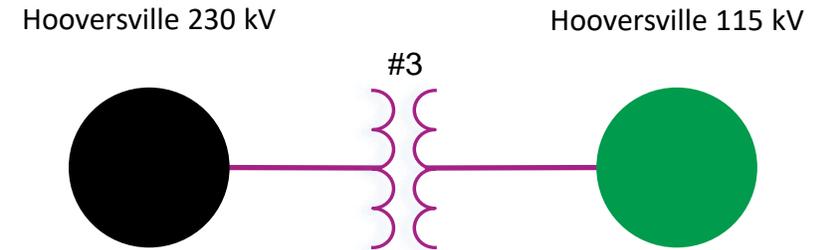
- Before Proposed Solution: 245 / 306 MVA (SN/SE)
- After Proposed Solution (anticipated): 375 / 438 MVA (SN/SE)

**Estimated Project Cost:** \$4.2M

**Projected In-Service:** 12/10/2021

**Supplemental Project ID:** s2304

**Model:** 2020 Series 2025 Summer RTEP 50/50



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

**Need Number:** PN-2020-002

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Previously Presented:**  
Need Meeting 5/12/2020  
Solution Meeting 07/07/2020

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference:**

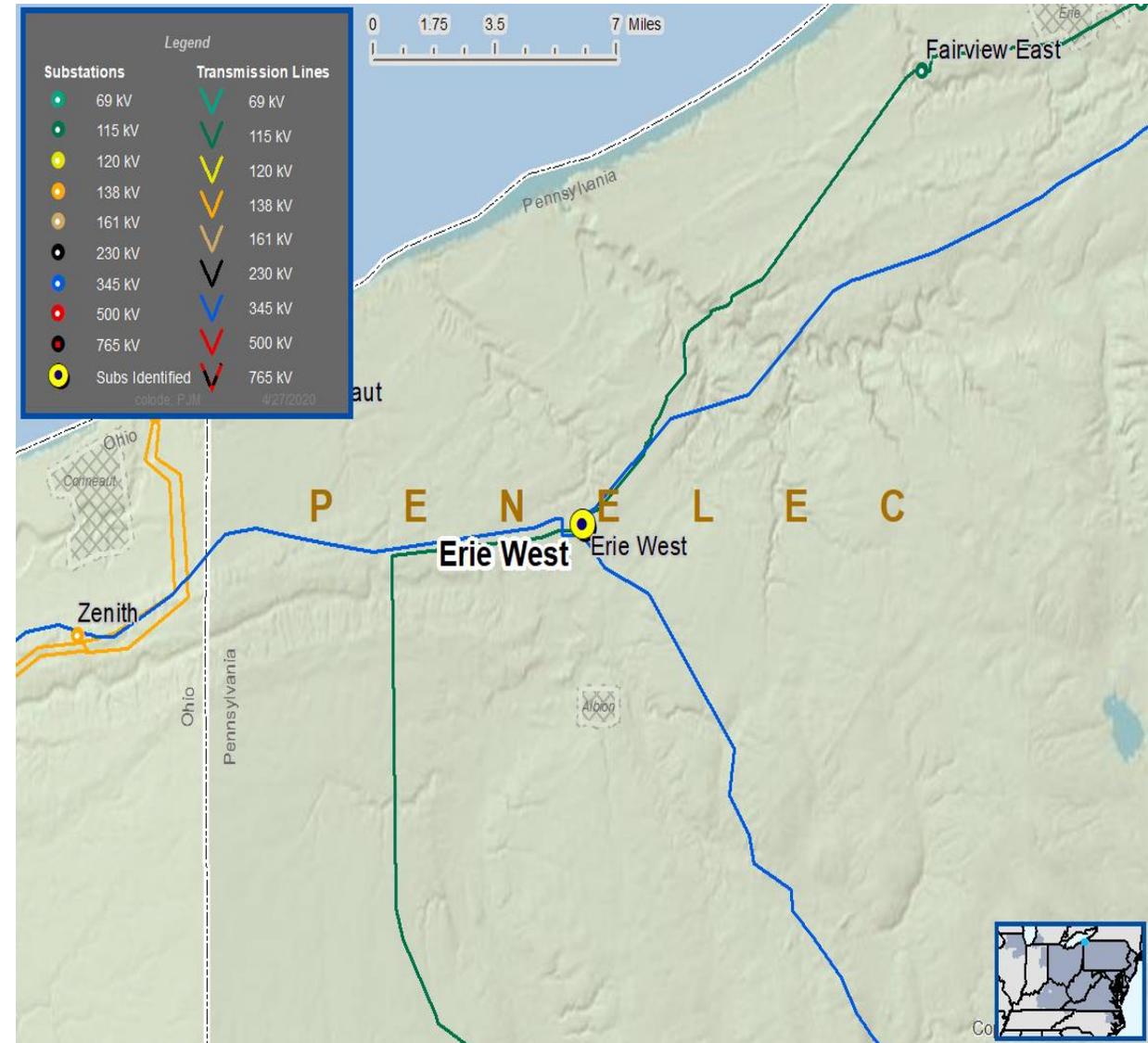
Substation Condition Rebuild/Replacement

**Problem Statement:**

Erie West #1 345/115 kV Transformer

- Transformer has increased failure probability due to:
  - Transformer is 47 years old.
  - High level heating gases and moisture
  - HV bushings have significant deterioration
  - Obsolete parts
  - Nitrogen and oil leaks

Transformer circuit rating is the existing transformer rating of 266/333 MVA (SN/SE).



**Need Number:** PN-2020-002

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Selected Solution:**

*Replace Erie West #1 345/115 kV Transformer*

- Replace the #1 345/115 kV transformer and associated equipment with a 168/224 MVA transformer

**Transformer Rating:**

Erie West #1 345/115 kV Transformer

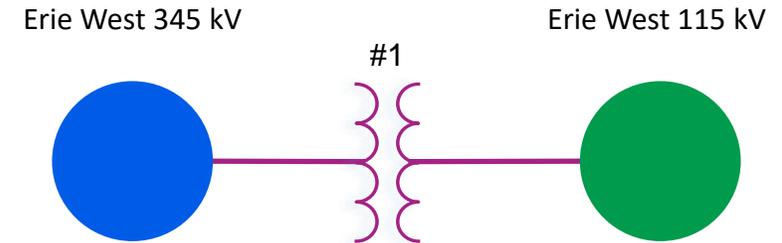
- Before Proposed Solution: 266 / 333 MVA (SN/SE)
- After Proposed Solution (anticipated): 280 / 341 MVA (SN/SE)

**Estimated Project Cost:** \$3.3M

**Projected IS Date:** 12/31/2021

**Supplemental Project ID:** s2305

**Model:** 2020 Series 2025 Summer RTEP 50/50



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

**Need Number:** PN-2020-007

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Previously Presented:**

Need Meeting 05/12/2020  
Solution Meeting 07/07/2020

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference:**

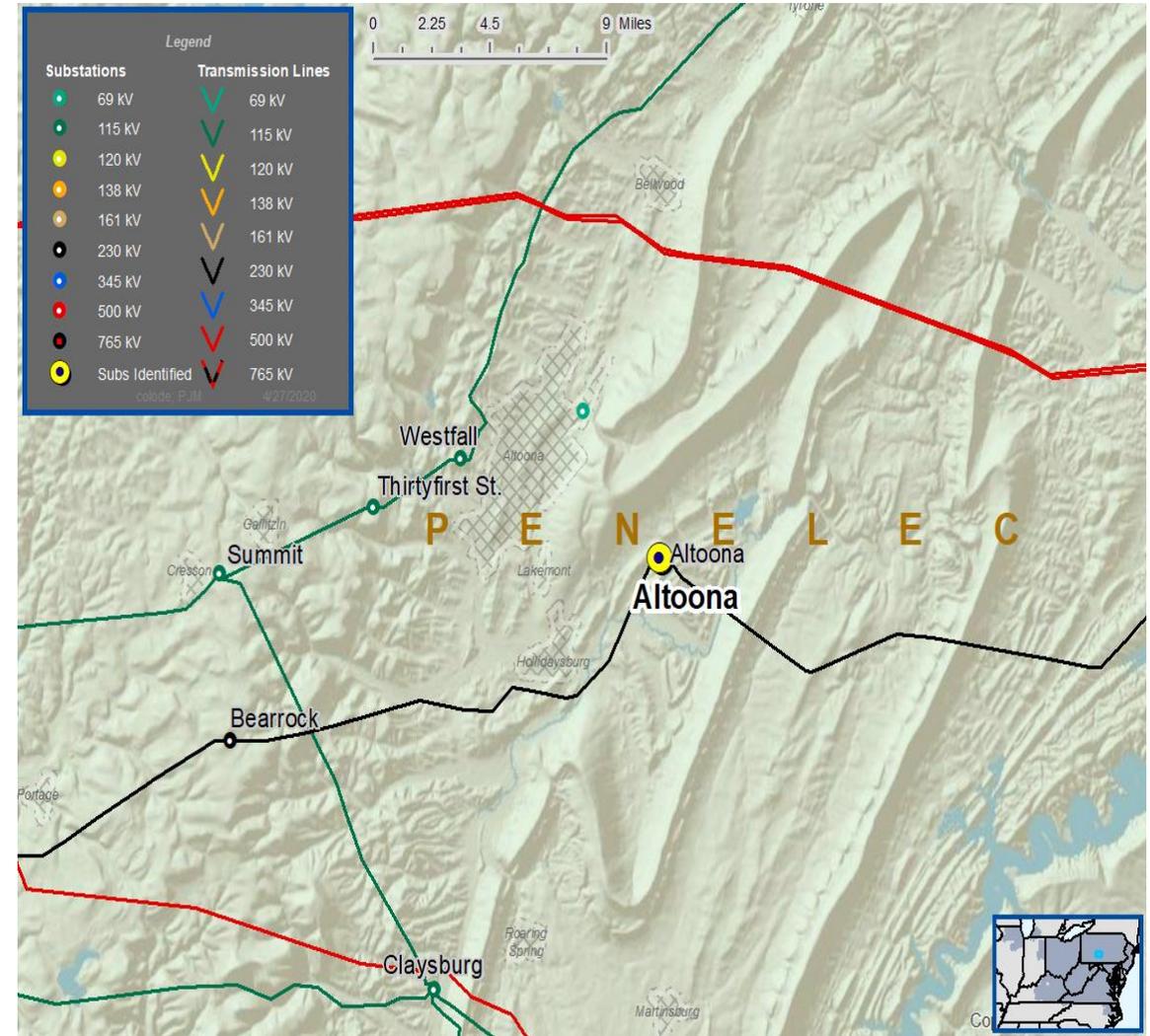
Substation Condition Rebuild/Replacement  
System Performance Projects Global Factors

**Problem Statement:**

Altoona #1 230-46 kV Transformer

- Transformer has increased failure probability due to:
  - Transformer is 55 years old
  - Poor oil quality in LTC
  - Nitrogen leaks in tank
  - Bushing H3 oil leaks

Transformer circuit rating is 89/97 MVA (SN/SE) and the existing transformer rating is 90/97 MVA (SN/SE).  
(substation conductor)



**Need Number:** PN-2020-007

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Selected Solution:**

*Replace Altoona #1 230-46 kV Transformer*

- Replace the #1 230-46 kV transformer and associated equipment with a 60/80/100 MVA transformer

**Transformer Rating:**

Altoona #1 230-46 kV Transformer

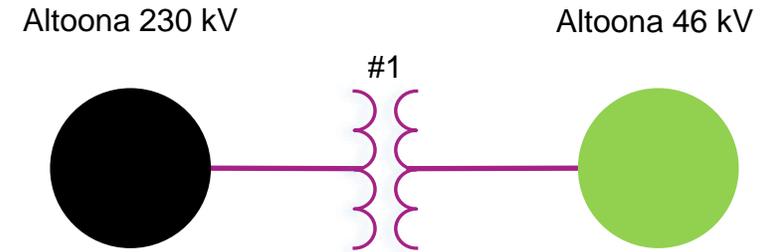
- Before Proposed Solution: 89 / 97 MVA (SN/SE)
- After Proposed Solution (anticipated): 120 / 129 MVA (SN/SE)

**Estimated Project Cost:** \$3.5M

**Projected IS Date:** 06/01/2022

**Supplemental Project ID:** s2306

**Model:** 2020 Series 2025 Summer RTEP 50/50



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

**Need Number:** PN-2020-008

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Previously Presented:**

Need Meeting 05/12/2020  
Solution Meeting 07/07/2020

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference:**

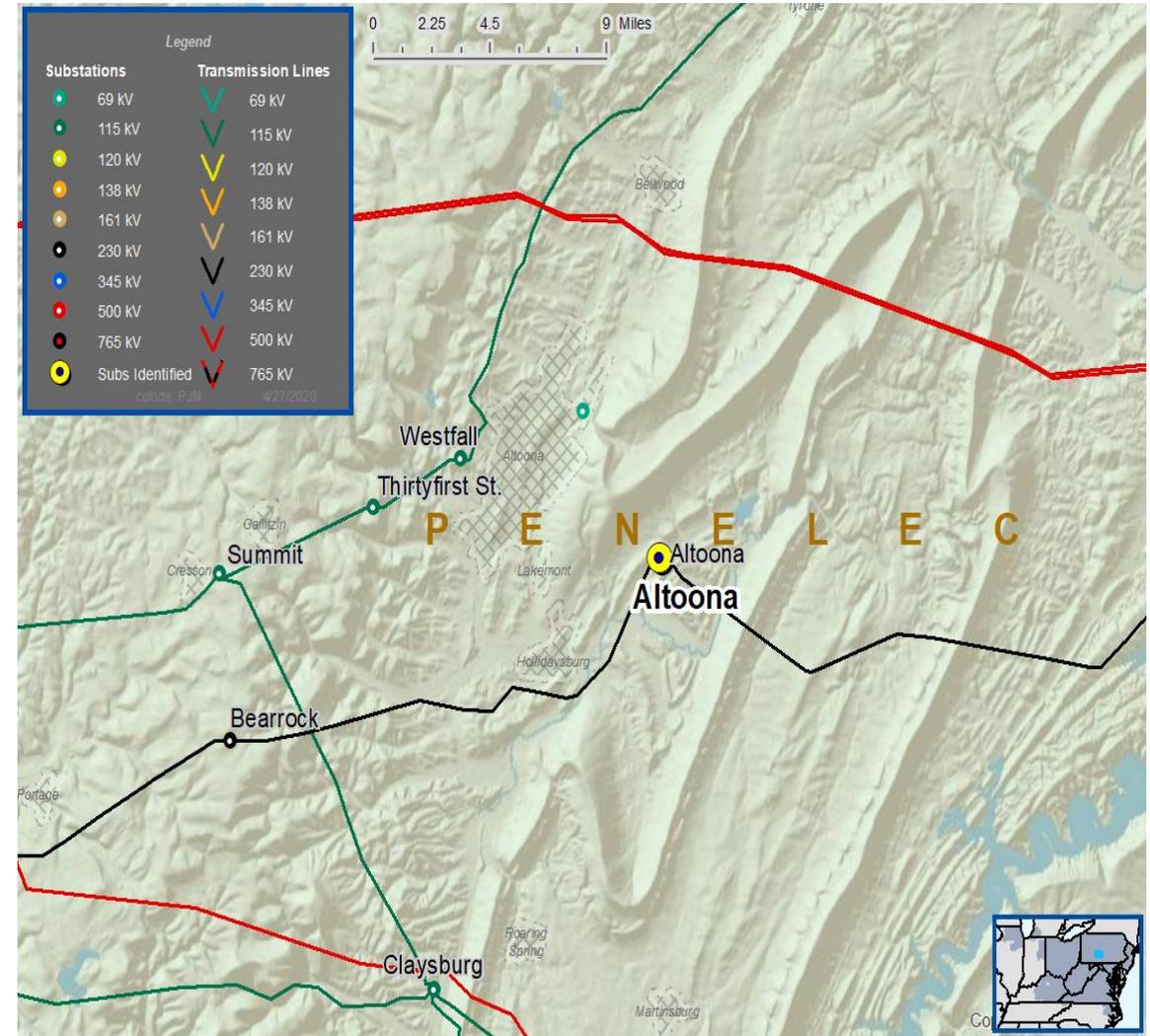
Substation Condition Rebuild/Replacement  
System Performance Projects Global Factors

**Problem Statement:**

Altoona #2 230-46 kV Transformer

- Transformer has increased failure probability due to:
  - Transformer is 47 years old
  - Nitrogen leak in tank
  - LTC oil leak
  - Pump flanges are leaking
  - SCADA alarms are not functional

Transformer circuit rating is 89/97 MVA (SN/SE) and the existing transformer rating is 91/97 MVA (SN/SE).  
(substation conductor)



**Need Number:** PN-2020-008

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Selected Solution:**

*Replace Altoona #2 Transformer 230-46 kV Unit*

- Replace the #2 230-46 kV transformer and associated equipment with a 60/80/100 MVA transformer

**Transformer Rating:**

Altoona #2 230-46 kV Transformer

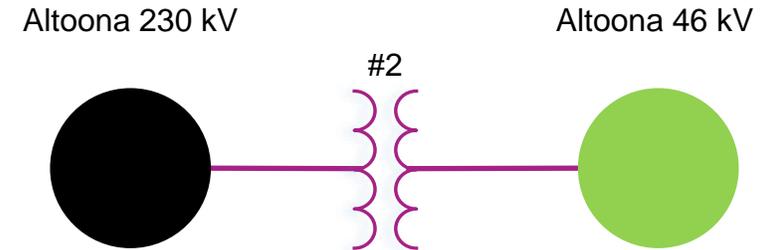
- Before Proposed Solution: 89 / 97 MVA (SN/SE)
- After Proposed Solution (anticipated): 120 / 129 MVA (SN/SE)

**Estimated Project Cost:** \$3.6M

**Projected IS Date:** 12/31/2022

**Supplemental Project ID:** s2307

**Model:** 2020 Series 2025 Summer RTEP 50/50



Legend	
500 kV	
345 kV	
230 kV	
138 kV	
115 kV	
69 kV	
46 kV	
34.5 kV	
23 kV	
New	

**Need Number:** PN-2020-010

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Previously Presented:**

Need Meeting 5/21/2020  
Solution Meeting 07/16/2020

**Project Driver:**

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

**Specific Assumption Reference:**

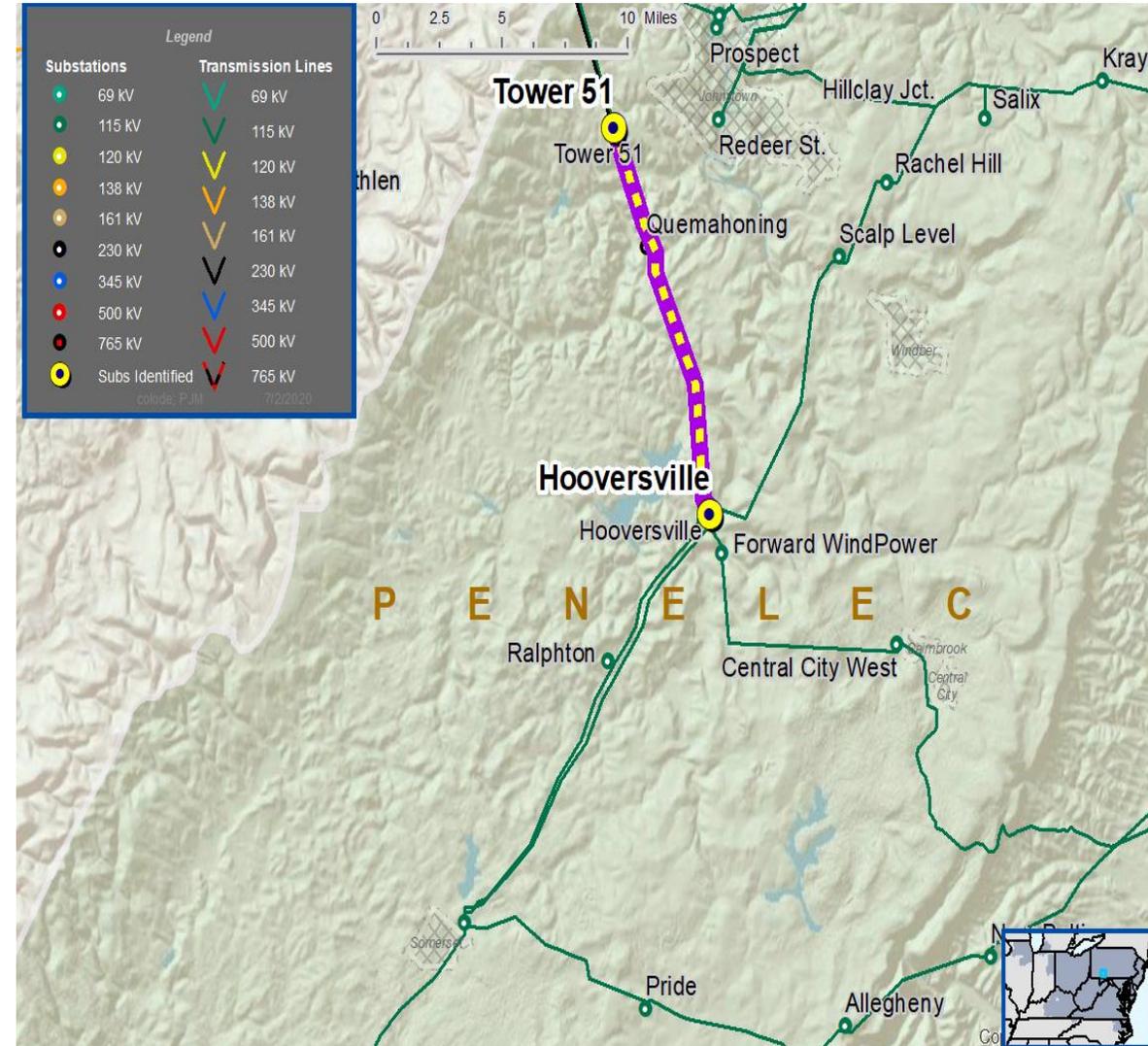
System Performance Projects Global Factors

- System reliability and performance
- Substation/line equipment limits
- 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 slide 10&11...**

# Penelec Transmission Zone M-3 Process

## Hooversville - Tower 51 115 kV Line



**Need Number:** PN-2020-012

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Previously Presented:**

Need Meeting 5/21/2020  
 Solution Meeting 07/16/2020

**Project Driver:**

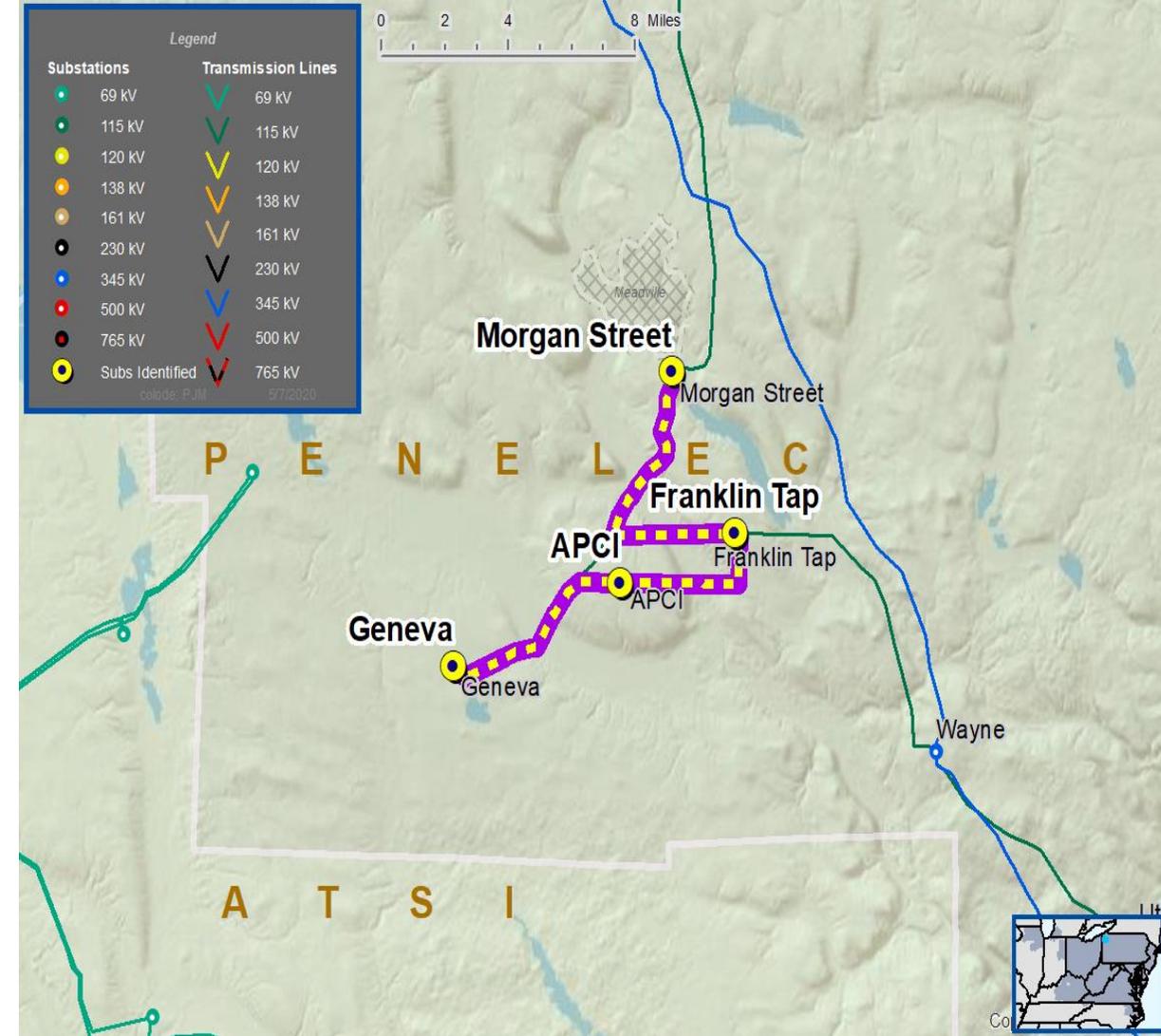
*Equipment Material Condition, Performance and Risk*  
*Operational Flexibility and Efficiency*

**Specific Assumption Reference:**

System Performance Projects Global Factors

- System reliability and performance
  - Substation/line equipment limits
- 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 slide 10&11...**



**Need Number:** PN-2020-015, and APS-2020-008

**Process Stage:** Submission of Supplemental Project for inclusion in the Local Plan 10/16/2020

**Previously Presented:**

Need Meeting 5/21/2020

Solution Meeting 07/16/2020

**Project Driver:**

*Equipment Material Condition, Performance and Risk*

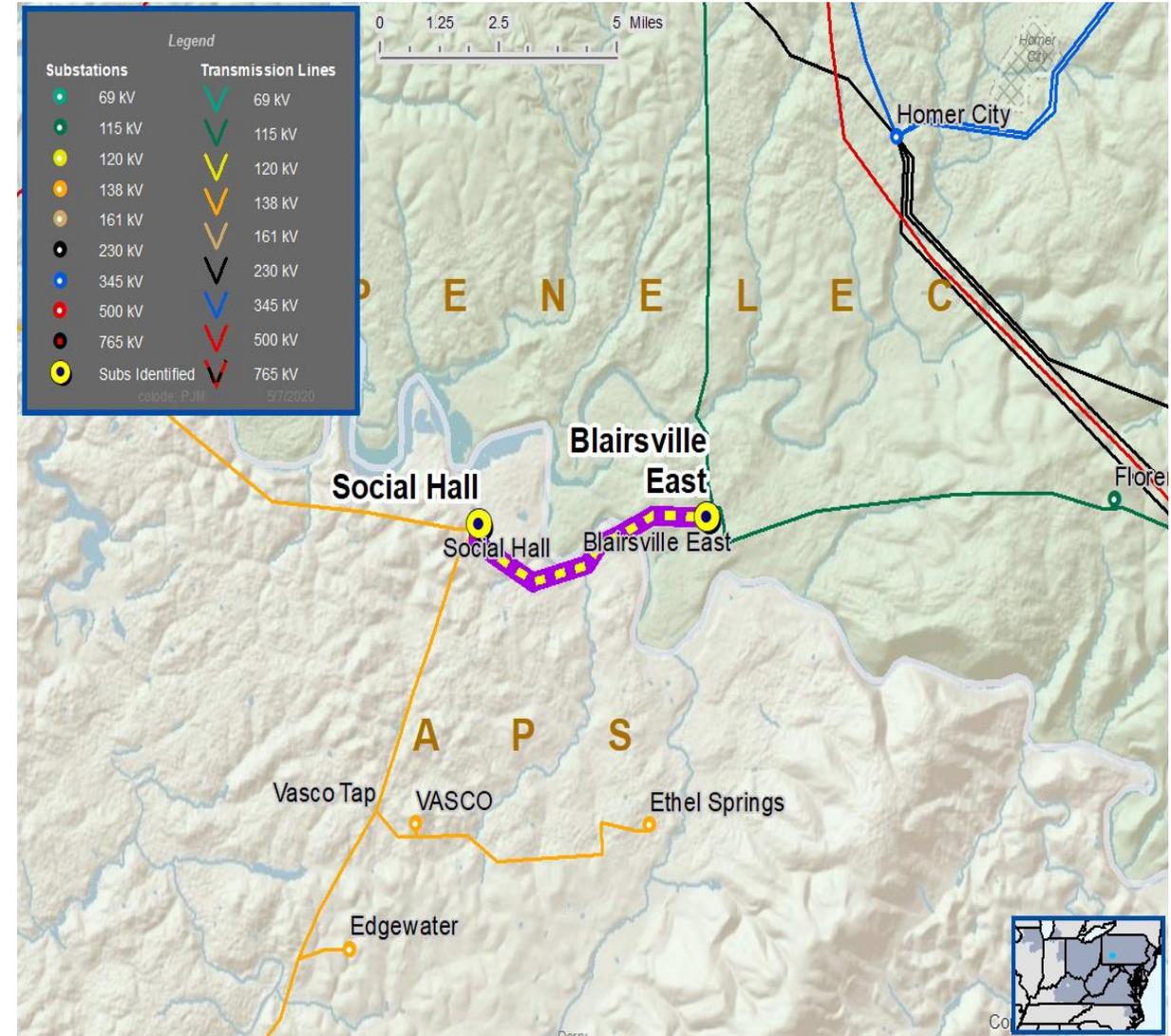
*Operational Flexibility and Efficiency*

**Specific Assumption Reference:**

System Performance Projects Global Factors

- System reliability and performance
  - Substation/line equipment limits
- 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 slide 10&11...**



**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.

Need Number	Transmission Line / Substation Locations	Existing Line Rating (SN / SE)	Existing Conductor Rating (SN / SE)	Limiting Terminal Equipment
PN-2020-010	Hooversville – Tower 51 115 kV Line	137 / 172	178 / 214	Disconnect Switches, CTs, Substation Conductor, Line Trap, Line Relaying
PN-2020-012	Morgan Street – Franklin Tap 115 kV Line	221 / 239	232 / 282	Substation Conductor, Line Relaying, Line Trap
	Franklin Tap – Air Products 115 kV Line	202 / 245	202 / 245	N/A
	Air Products – Geneva 115 kV Line	202 / 239	202 / 245	Line Relaying
PN-2020-015 APS-2020-008	Blairsville East – Social Hall 138 kV Line	225 / 287	243 / 294	Substation Conductor, CTs, Line Relaying, Line Trap

**Selected Solution:**

Need Number	Transmission Line / Substation Locations	Supplemental Project ID	New MVA Line Rating (SN / SE)	Scope of Work	Estimated Cost (\$ M)	Target ISD
PN-2020-010	Hooversville – Tower 51 115 kV Line	s2312	178 / 214	<ul style="list-style-type: none"> <li>Hooversville 115 kV Substation – Replace line trap, line relaying, and substation conductor</li> <li>Tower 51 115 kV Substation – Replace line trap line relaying, substation conductor, disconnect switches, circuit breaker, and CTs</li> </ul>	\$1.1M	03/31/2022
PN-2020-012	Morgan Street – Franklin Tap 115 kV Line	s2313	232 / 282	Morgan Street 115 kV Substation – Replace line trap, line relaying, substation conductor, breaker and bus disconnect switches, and circuit breaker	\$2.5M	05/27/2022
	Franklin Tap – Air Products 115 kV Line		202 / 245	N/A		
	Air Products – Geneva 115 kV Line		202 / 245	<ul style="list-style-type: none"> <li>Geneva 115 kV Substation – Replace line trap, line relaying, breaker and bus disconnect switches, and circuit breakers</li> </ul>		
PN-2020-015 APS-2020-008	Blairsville East – Social Hall 138 kV Line	s2314.1	243 / 294	<ul style="list-style-type: none"> <li>Blairsville East 138 kV Substation – Replace line trap and line relaying</li> <li>Social Hall 138 kV Substation – Replace line trap, line relaying, substation conductor, circuit breaker, and CTs</li> </ul>	\$0.8M	06/01/2021
		s2314.2				

**Model:** 2020 RTEP model for 2025 Summer (50/50)

# Questions?



# Revision History

3/20/2020 – V1 – Original version posted to pjm.com. Included S2176

9/22/2020 – V2 – Added local plan for S2279

10/16/2020 – V3 – Added local plan for S2304, S2305, S2306, S2307, S2312, S2313 and S2314