

# Shingletown 230 kV Substation: Create a 230 kV Ring Bus

## General Information

Proposing entity name	Company specific
Does the entity who is submitting this proposal intend to be the Designated Entity for this proposed project?	Yes
Company proposal ID	Company specific
PJM Proposal ID	779
Project title	Shingletown 230 kV Substation: Create a 230 kV Ring Bus
Project description	Convert Shingletown 230 kV Substation into a six-breaker ring bus. The current configuration is a straight bus with three 230 kV lines and two 230-46 kV transformers. The scope of work includes the installation of five 230 kV breakers & disconnect switches, relocation of one 230 kV breaker, CVT installations, Wavetrap installations, bus & substation conductor construction, SCADA/communications, and relaying. There will be remote-end upgrades at Lewistown & Shawville substations.
Email	Company specific
Project in-service date	06/2025
Tie-line impact	Yes
Interregional project	No
Is the proposer offering a binding cap on capital costs?	No
Additional benefits	

## Project Components

1. Shingletown 230 kV Substation: Create a 230 kV Ring Bus
2. Lewistown 230 kV Substation: Replace Terminal Equipment & Revise Relaying
3. Shawville 230 kV Substation: Replace Terminal Equipment & Revise Relaying

## Substation Upgrade Component

Component title	Shingletown 230 kV Substation: Create a 230 kV Ring Bus
Project description	Convert Shingletown 230 kV Substation into a six-breaker ring bus. The current configuration is a straight bus with three 230 kV lines and two 230-46 kV transformers. The scope of work includes the installation of five 230 kV breakers & disconnect switches, relocation of one 230 kV breaker, CVT installations, Wavetrap installations, bus & substation conductor construction, SCADA/communications, and relaying.
Substation name	Shingletown
Substation zone	APS
Substation upgrade scope	At Shingletown 230 kV Substation: - Install (1 lot) foundations, trench, conduit, and grounding - Install fence, ground grid, stone for substation expansion. - Install (1) prefabricated control house - Install (5) 230kV circuit breakers - Relocate (1) 230kV circuit breaker (Shawville breaker B7) - Install (12) 230kV 2000A GOAB circuit breaker disconnect switches - Install (3) 230kV 2000A motor operated line disconnect switches - Install (2) 230kV motor operated transformer disconnect switches - Install (15) 230kV CVTs - Install (6) 230kV class surge arresters - Replace (1) 230kV wave trap on the Dale Summit line with a 2000A wave trap - Install (1 lot) bus, cable, and support structures - Replace terminal conductor that does not meet or exceed the transmission line ratings - Relocate Dale Summit relays to new control building & Install (1) Powercomm PCM-5350 - Relocate Lewistown line relays to new control building, Install (2) UPLCs for dual-channel DTT, & Install (1) PowerComm PCM-5350 - Relocate Shawville line relays to new control building, Install (2) UPLCs for dual-channel DTT, & Install (1) PowerComm PCM-5350 - Relocate cap bank relays to new control building - Install (1) bus protection panel - Install (2) transformer protection panels with a SEL487B and SEL421 and SEL501 for BF Relaying - Install (1) SCADA RTU - Install (1) HMI - Remove (1) 230kV wave trap (cap bank wave trap) - Remove Dale Summit equipment from existing terminal Re-terminate the Dale-Summit-Shingletown 230kV Line into the expanded Shingletown Substation: - Install (2) single circuit wood three-pole deadend structures with 0.1 miles of 1272 kcmil 45/7 ACSR shielded by 7#8 Alumoweld - Remove (1) existing wood H-frame structure and (1) existing three-pole deadend structure. - Remove approximately 0.1 miles of exiting conductor and shield wire.

## Transformer Information

None

New equipment description

At Shingletown 230 kV Substation: - Install (1 lot) foundations, trench, conduit, and grounding - Install fence, ground grid, stone for substation expansion. - Install (1) prefabricated control house - Install (5) 230kV circuit breakers - Relocate (1) 230kV circuit breaker (Shawville breaker B7) - Install (12) 230kV 2000A GOAB circuit breaker disconnect switches - Install (3) 230kV 2000A motor operated line disconnect switches - Install (2) 230kV motor operated transformer disconnect switches - Install (15) 230kV CVTs - Install (6) 230kV class surge arresters - Replace (1) 230kV wave trap on the Dale Summit line with a 2000A wave trap - Install (1 lot) bus, cable, and support structures - Replace terminal conductor that does not meet or exceed the transmission line ratings - Relocate Dale Summit relays to new control building & Install (1) Powercomm PCM-5350 - Relocate Lewistown line relays to new control building, Install (2) UPLCs for dual-channel DTT, & Install (1) PowerComm PCM-5350 - Relocate Shawville line relays to new control building, Install (2) UPLCs for dual-channel DTT, & Install (1) PowerComm PCM-5350 - Relocate cap bank relays to new control building - Install (1) bus protection panel - Install (2) transformer protection panels with a SEL487B and SEL421 and SEL501 for BF Relaying - Install (1) SCADA RTU - Install (1) HMI - Remove (1) 230kV wave trap (cap bank wave trap) - Remove Dale Summit equipment from existing terminal Re-terminate the Dale-Summit-Shingletown 230kV Line into the expanded Shingletown Substation: - Install (2) single circuit wood three-pole deadend structures with 0.1 miles of 1272 kcmil 45/7 ACSR shielded by 7#8 Alumoweld - Remove (1) existing wood H-frame structure and (1) existing three-pole deadend structure. - Remove approximately 0.1 miles of exiting conductor and shield wire. All new equipment to meet or exceed the ratings of the existing transmission line conductors. These will be the ratings of the Dale Summit - Shingletown 230 kV Line upon completion of this project: SN: 617 MVA, SE: 754 MVA, SLD: 853 MVA; WN: 699 MVA, WE: 894 MVA, WLD: 967 MVA These will be the ratings of the Lewistown - Shingletown 230 kV Line upon completion of this project: SN: 546 MVA, SE: 666 MVA, SLD: 753 MVA; WN: 619 MVA, WE: 790 MVA, WLD: 853 MVA These will be the ratings of the Shawville - Shingletown 230 kV Line upon completion of this project: SN: 546 MVA, SE: 666 MVA, SLD: 753 MVA; WN: 619 MVA, WE: 790 MVA, WLD: 853 MVA

Substation assumptions

Assumptions: Line and transformer disconnect switches and surge arresters can be mounted to existing lattice dead end structures or switch stands, Construction can be performed in to keep one of the transformers in service, New control building is required to create ring bus, Existing line and cap bank relay panels have SEL501s for BF relaying, AC service is adequate for new equipment, New RTU and HMI panel will be required to move relaying to new control building, Fence can be expanded on existing FE owned property. The re-termination of the Dale-Summit-Shingletown 230kV Line will now cross the Atherton-Shingletown East 46kV, Atherton-Shingletown West 46kV, Atherton-Shingletown 46kV, Patterson Street-Shingletown 46kV, and Centre Hall- Shingletown 46kV lines, a LON will be required, minimum ecological concerns, & an aerial LiDAR survey will be required.

Real-estate description

The substation fence will need to be expanded ~10,500 sq. ft. The property needed for the expansion is owned by FirstEnergy.

Construction responsibility

Company specific

Benefits/Comments

Currently, the Shingletown #82 230-46 kV transformer has a 230 kV switch instead of a protective device. A transformer fault will de-energizing the #2 230 kV bus until the transformer is isolated, resulting in a voltage drop violation at Shingletown Substation. Converting the Shingletown 230 kV Substation to a ring bus will resolve the voltage drop violation and provide additional reliability benefit by eliminating the multiple-element outages associated with the bus faults, #81 transformer fault, and multiple stuck breaker contingencies. It will also provide greater operation flexibility for maintenance outages.

**Component Cost Details - In Current Year \$**

Engineering & design	This information is considered confidential and proprietary
Permitting / routing / siting	This information is considered confidential and proprietary
ROW / land acquisition	This information is considered confidential and proprietary
Materials & equipment	This information is considered confidential and proprietary
Construction & commissioning	This information is considered confidential and proprietary
Construction management	This information is considered confidential and proprietary
Overheads & miscellaneous costs	This information is considered confidential and proprietary
Contingency	This information is considered confidential and proprietary
Total component cost	\$11,342,200.00
Component cost (in-service year)	\$13,361,400.00

**Substation Upgrade Component**

Component title	Lewistown 230 kV Substation: Replace Terminal Equipment & Revise Relaying
Project description	Replace Terminal Equipment & Revise Relaying at Lewistown Substation on the Shingletown 230 kV terminal.
Substation name	Lewistown
Substation zone	Penelec

Substation upgrade scope

At Lewistown Substation, on the Shingletown 230 kV terminal: - Replace (1) 230kV wave trap and tuner with wideband - Revise relay settings - Install (2) UPLCs for dual-channel DTT - Install (1) PowerComm PCM-5350

## Transformer Information

None

New equipment description

At Lewistown Substation, on the Shingletown 230 kV terminal: - Replace (1) 230kV wave trap and tuner with wideband - Revise relay settings - Install (2) UPLCs for dual-channel DTT - Install (1) PowerComm PCM-5350 All new equipment to meet or exceed the ratings of the existing transmission line conductor. These will be the ratings of the Lewistown - Shingletown 230 kV Line upon completion of this project: SN: 546 MVA, SE: 666 MVA, SLD: 753 MVA; WN: 619 MVA, WE: 790 MVA, WLD: 853 MVA

Substation assumptions

Assumptions: Control building has adequate space for new equipment, DC service is adequate.

Real-estate description

N/A - No substation expansion is necessary at Lewistown substation.

Construction responsibility

Company specific

Benefits/Comments

Upgrading the Shingletown 230 kV terminal at Lewistown Substation will increase the thermal ratings of the Shingletown - Lewistown 230 kV Line.

## Component Cost Details - In Current Year \$

Engineering & design

This information is considered confidential and proprietary

Permitting / routing / siting

This information is considered confidential and proprietary

ROW / land acquisition

This information is considered confidential and proprietary

Materials & equipment

This information is considered confidential and proprietary

Construction & commissioning

This information is considered confidential and proprietary

Construction management

This information is considered confidential and proprietary

Overheads & miscellaneous costs

This information is considered confidential and proprietary

Contingency

This information is considered confidential and proprietary

Total component cost

\$292,293.04

Component cost (in-service year) \$325,652.96

## Substation Upgrade Component

Component title Shawville 230 kV Substation: Replace Terminal Equipment & Revise Relaying

Project description Replace Terminal Equipment & Revise Relaying at Shawville Substation on the Shingletown 230 kV terminal.

Substation name Shawville

Substation zone Penelec

Substation upgrade scope At Shawville Substation, on the Shingletown 230 kV terminal: - Replace (1) 230kV wave trap and tuner with a 2000A wideband unit - Replace limiting 1033 ACSR with conductor - Revise relay settings - Install (2) UPLCs for dual-channel DTT - Install (1) PowerComm PCM-5350

## Transformer Information

None

New equipment description At Shawville Substation, on the Shingletown 230 kV terminal: - Replace (1) 230kV wave trap and tuner with a 2000A wideband unit - Replace limiting 1033 ACSR with conductor - Revise relay settings - Install (2) UPLCs for dual-channel DTT - Install (1) PowerComm PCM-5350 All new equipment to meet or exceed the ratings of the existing transmission line conductor. These will be the ratings of the Shawville - Shingletown 230 kV Line upon completion of this project: SN: 546 MVA, SE: 666 MVA, SLD: 753 MVA; WN: 619 MVA, WE: 790 MVA, WLD: 853 MVA

Substation assumptions Assumptions: Control building has adequate space for new equipment, DC service is adequate.

Real-estate description N/A - No substation expansion is necessary at Shawville Substation.

Construction responsibility Company specific

Benefits/Comments Upgrading the Shingletown 230 kV terminal at Shawville Substation will increase the thermal ratings of the Shingletown - Shawville 230 kV Line.

## Component Cost Details - In Current Year \$

Engineering & design This information is considered confidential and proprietary

Permitting / routing / siting This information is considered confidential and proprietary

ROW / land acquisition	This information is considered confidential and proprietary
Materials & equipment	This information is considered confidential and proprietary
Construction & commissioning	This information is considered confidential and proprietary
Construction management	This information is considered confidential and proprietary
Overheads & miscellaneous costs	This information is considered confidential and proprietary
Contingency	This information is considered confidential and proprietary
Total component cost	\$292,293.04
Component cost (in-service year)	\$325,652.96

## Congestion Drivers

None

## Existing Flowgates

FG #	From Bus No.	From Bus Name	To Bus No.	To Bus Name	CKT	Voltage	TO Zone	Analysis type	Status
APS-VD45	235248	01SHINGL	235248	01SHINGL	0	230	201	FERC 715 Voltage Drop	Included
APS-VD46	235248	01SHINGL	235248	01SHINGL	0	230	201	FERC 715 Voltage Drop	Included

## New Flowgates

None

## Financial Information

Capital spend start date	06/2023
Construction start date	01/2024
Project Duration (In Months)	24

## Additional Comments

None