Grover 230 kV Substation: Install dual reactors and convert the station to a 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	634
Project title	Grover 230 kV Substation: Install dual reactors and convert the station to a ring bus
Project description	At Grover 230 kV Substation – Install dual reactors and convert the station to a ring bus.
Email	Company specific
Project in-service date	06/2026
Tie-line impact	No
Interregional project	No
Is the proposer offering a binding cap on capital costs?	No
Additional benefits	This project converts the Grover Substation to a ring bus eliminating the simultaneous outage of multiple components at the substation including a Penelec distribution bank that serves approximately 1491 customers, 12 of which are critical customers.

Project Components

1. Grover 230 kV Substation – Install dual reactors and convert the station...
2. Grover Substation: Design, Install, and test/commision the MPLS Equipmen...
3. East Towanda-Marshall 230 kV Line
4. Marshall Substation: Replace Grover (former Bridge Street AA1-144) 230 ...
5. Bridge Street (AA1-144) Substation: Retune wideband wave trap and line t...

Substation Upgrade Component

Component title	Grover 230 kV Substation – Install dual reactors and convert the station to a ring bus
Project description	Grover 230 kV Substation – Install dual reactors and convert the station to a ring bus
Substation name	Grover
Substation zone	Penelec
Substation upgrade scope	Below Grade -Grading, fencing, grounding, and stoning for substation expansion -Install oil containment for reactors -Install (1 lot) foundations, trench, conduit, and grounding for new equipment Above Grade -Install (1) pre-fabricated control house -Install (3) 230kV H-frame structures -Install (2) 230kV 46.4MVAR shunt reactors -Install (7) 230kV, 3000A, 63kAIC circuit breakers -Install (2) 230kV, 3000A, 63kAIC circuit breakers with independent pole operation and point on wave switching controller for reactor switching -Install (2) 230kV, 2000A motor operated line disconnect switches -Install (2) 230kV, 2000A wideband wave traps and tuners -Install (14) 230kV, 2000A manual, GOAB disconnect switches -Install (14) 230kV, 3000A manual, GOAB disconnect switches -Install (18) 230kV CVTs -Install (1) 230kV, 167kVA SSVT -Install (6) 180 kV (144 kV MCOV) surge arresters -Install (1 set) slip-over CTs to the 230kV bushings of No 1 TR -Install (1 lot) rigid bus, cable, fittings, insulators, and support structures as shown on the proposed layout -Install (2) in-sub wood poles and strain conductor for connection to capacitor bank Relay & Control -Install (1) ATS in new control building -Install (8) breaker control panels with SEL501 and LOR BF relaying -For the Marshall 230kV line, install:(1) SEL421/SEL411L line relay panel, (1) carrier panel with (1) RLF-9785, (3) RLF-9780, (1 lot) PCM5350s and (1 lot) hybrids For the Bridge Street (AA1-144) 230kV line, install: (1) SEL421/SEL411L line relay panel,(1) carrier panel with (1) RLF-9785, (3) RLF-9780, (1 lot) PCM5350s and (1 lot) hybrids. Install (2) Reactor panels with (1) SEL587Z relay, (1) SEL487E relay, and (1) Bitronics M871 meter. Install (2) Reactor bus panels with (2) SEL487B relays. Install (1) No 1 TR bus panel with (2) SEL487B relays. Revise existing transformer relaying to trip 230kV ring via LOR-ERs. Revise #1 Capacitor bank relaying for 230kV ring bus. Install (1) #1 Cap Bank bus panel with (2) SEL487B relays. Install (1) SCADA RTU. Install (1) HMI Panel, including RTAC and GPS clock Additional Equipment to be Removed -Remove 230kV line air switches A4 and A6 -Remove (2) 230kV wave traps -Remove (1 lot) 230kV strain bus -Remove (3) 230kV H-frame structures

Transformer Information

	Name	Capacity (MVA)
Transformer	na	na

	High Side	Low Side	Tertiary
Voltage (kV)	na	na	na
New equipment description	Below Grade -Grading, fencing, grounding, and stoning for substation expansion -Install oil containment for reactors -Install (1 lot) foundations, trench, conduit, and grounding for new equipment Above Grade -Install (1) pre-fabricated control house -Install (3) 230kV H-frame structures -Install (2) 230kV 46.4MVAR shunt reactors -Install (7) 230kV, 3000A, 63kAIC circuit breakers -Install (2) 230kV, 3000A, 63kAIC circuit breakers with independent pole operation and point on wave switching controller for reactor switching -Install (2) 230kV, 2000A motor operated line disconnect switches -Install (2) 230kV, 2000A wideband wave traps and tuners -Install (14) 230kV, 2000A manual, GOAB disconnect switches -Install (14) 230kV, 3000A manual, GOAB disconnect switches -Install (18) 230kV CVTs -Install (1) 230kV, 167kVA SSVT -Install (6) 180 kV (144 kV MCOV) surge arresters -Install (1 set) slip-over CTs to the 230kV bushings of No 1 TR -Install (1 lot) rigid bus, cable, fittings, insulators, and support structures as shown on the proposed layout -Install (2) in-sub wood poles and strain conductor for connection to capacitor bank Relay & Control -Install (1) ATS in new control building -Install (8) breaker control panels with SEL501 and LOR BF relaying -For the Marshall 230kV line, install:(1) SEL421/SEL411L line relay panel, (1) carrier panel with (1) RLF-9785, (3) RLF-9780, (1 lot) PCM5350s and (1 lot) hybrids For the Bridge Street (AA1-144) 230kV line, install: (1) SEL421/SEL411L line relay panel,(1) carrier panel with (1) RLF-9785, (3) RLF-9780, (1 lot) PCM5350s and (1 lot) hybrids. Install (2) Reactor panels with (1) SEL587Z relay, (1) SEL487E relay, and (1) Bitronics M871 meter. Install (2) Reactor bus panels with (2) SEL487B relays. Install (1) No 1 TR bus panel with (2) SEL487B relays. Revise existing transformer relaying to trip 230kV ring via LOR-ERs. Revise #1 Capacitor bank relaying for 230kV ring bus. Install (1) #1 Cap Bank bus panel with (2) SEL487B relays. Install (1) SCADA RTU. Install (1) HMI Panel, including RTAC and GPS clock		
Substation assumptions	-New control building will be required for new relay panels -230 kV station service will be installed to provide primary power to the substation; 34.5 kV will become backup -Existing control building will be maintained until all relaying is replaced and put in the new control building		
Real-estate description	The substation fence will need to be expanded. The land required is already owned by Penelec.		
Construction responsibility	Company specific		
Benefits/Comments			

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	$14,837,046.91
Component cost (in-service year)	$16,582,885.36

Substation Upgrade Component

Component title	Grover Substation: Design, Install, and test/commision the MPLS Equipment for SCADA
Project description	Grover Substation: Design, Install, and test/commission the MPLS Equipment for SCADA
Substation name	Grover
Substation zone	Penelec
Substation upgrade scope	No hardware associated, just the labor of the install, and test/commission the MPLS Equipment for SCADA

Transformer Information

	Name	**Capacity (MVA)**	
Transformer	na	na	
	High Side	**Low Side**	**Tertiary**
Voltage (kV)	na	na	na
New equipment description	Not Applicable		
Substation assumptions	Not Applicable		

Real-estate description	Not Applicable
Construction responsibility	Company specific
Benefits/Comments	

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	$234,668.93
Component cost (in-service year)	$269,869.28

Transmission Line Upgrade Component

Component title	East Towanda-Marshall 230 kV Line
Project description	Reterminate the East Towanda-Marshall 230 kV Line into the new bay
Impacted transmission line	East Towanda-Marshall 230 kV Line
Point A	East Towanda 230 kV
Point B	Marshall 230 kV
Point C	Grover 230 kV
Terrain description	Terrain is flat and is deforested. The line only needs to be relocated at the Grover substation.

Existing Line Physical Characteristics

Operating voltage	230
Conductor size and type	1033 ACSS 54/7
Hardware plan description	Existing Conditions -The existing East Towanda-Marshall is constructed on wood H-frame structures. The existing conductor is 1033.5 kcmil 54/7 ACSR shielded by (2) 3/8”- 7 strand EHS steel shield wires.
Tower line characteristics	Existing Conditions -The existing East Towanda-Marshall is constructed on wood H-frame structures. The existing conductor is 1033.5 kcmil 54/7 ACSR shielded by (2) 3/8”- 7 strand EHS steel shield wires

Proposed Line Characteristics

	Designed	**Operating**
Voltage (kV)	230.000000	230.000000
	Normal ratings	**Emergency ratings**
Summer (MVA)	546.000000	666.000000
Winter (MVA)	619.000000	790.000000
Conductor size and type	1033 ACSR 54/7	
Shield wire size and type	7 strand #6 Alumoweld shield wires	
Rebuild line length	0.1 miles	
Rebuild portion description	Reterminate the East Towanda-Marshall 230 kV Line into the new bay	
Right of way	The relocation will utilize existing ROW and will be on FE property.	
Construction responsibility	Company specific	
Benefits/Comments		

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	$792,332.05
Component cost (in-service year)	$902,058.97

Substation Upgrade Component

Component title	Marshall Substation: Replace Grover (former Bridge Street AA1-144) 230 kV Line relaying.
Project description	Marshall Substation : Replace Grover (former Bridge Street AA1-144) 230 kV Line relaying.
Substation name	Marshall
Substation zone	Penelec
Substation upgrade scope	At Marshall: Replace Grover (former Bridge Street AA1-144) 230 kV Line relaying. Above Grade Retune wideband wave trap and line tuner as needed Relay & Control Replace Grover (former Bridge Street AA1-144) 230kV line relaying with: -(1) SEL421/SEL411L line relay panel with SEL451 and LOR for BF relaying - Revise AA1-111 (former Moshannon) scheme to incorporate reclosing of 230kV breaker B1 into the SEL-311B backup relay. - Additional Equipment to be Removed - Remove (1) RFL-9780

Transformer Information

	Name	**Capacity (MVA)**	
Transformer	na	na	
	High Side	**Low Side**	**Tertiary**

Voltage (kV)	na	na	na
New equipment description	(1) SEL421/SEL411L line relay panel with SEL451 and LOR for BF relaying		
Substation assumptions	DC service is adequate for new equipment		
Real-estate description	None		
Construction responsibility	Company specific		
Benefits/Comments			

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	$428,791.50
Component cost (in-service year)	$491,811.69

Substation Upgrade Component

Component title	Bridge Street (AA1-144) Substation: Retune wideband wave trap and line tuner as needed.
Project description	Bridge Street (AA1-144) Substation: Retune wideband wave trap and line tuner as needed.
Substation name	Bridge Street
Substation zone	Penelec

Substation upgrade scope	Above Grade - Retune wideband wave trap and line tuner as needed Relay & Control - Adjust relay settings as required

Transformer Information

	Name	Capacity (MVA)
Transformer	na	na

	High Side	Low Side	Tertiary
Voltage (kV)	na	na	na

New equipment description	None retuning and adjusting settings.
Substation assumptions	None
Real-estate description	None
Construction responsibility	Company specific
Benefits/Comments	

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	$24,976.85

Component cost (in-service year) $28,723.37

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
N1-WVM2	200908	26CHAPMAN+	200908	26CHAPMAN+	0	230	226	Winter Baseline Voltage Magnitude	Included
N2-WVM5	200908	26CHAPMAN+	200908	26CHAPMAN+	0	230	226	Winter N-1-1 Voltage Magnitude	Included
N2-WVM1	200908	26CHAPMAN+	200908	26CHAPMAN+	0	230	226	Winter N-1-1 Voltage Magnitude	Included
N2-SVM1	200908	26CHAPMAN+	200908	26CHAPMAN+	0	230	226	Summer N-1-1 Voltage Magnitude	Included
N1-SVM2	200701	26GROVER	200701	26GROVER	0	230	226	Summer N-1 Voltage Magnitude	Included
N1-WVM4	200701	26GROVER	200701	26GROVER	0	230	226	Winter Baseline Voltage Magnitude	Included
N2-WVM4	200701	26GROVER	200701	26GROVER	0	230	226	Winter N-1-1 Voltage Magnitude	Included
N2-WVM8	200701	26GROVER	200701	26GROVER	0	230	226	Winter N-1-1 Voltage Magnitude	Included
N2-SVM2	200701	26GROVER	200701	26GROVER	0	230	226	Summer N-1-1 Voltage Magnitude	Included
N2-SVM3	200701	26GROVER	200701	26GROVER	0	230	226	Summer N-1-1 Voltage Magnitude	Included
N1-WVM1	200909	26LOBO+	200909	26LOBO+	0	230	226	Winter Baseline Voltage Magnitude	Included
N2-WVM2	200909	26LOBO+	200909	26LOBO+	0	230	226	Winter N-1-1 Voltage Magnitude	Included
N2-WVM6	200909	26LOBO+	200909	26LOBO+	0	230	226	Winter N-1-1 Voltage Magnitude	Included
N2-SVM4	200909	26LOBO+	200909	26LOBO+	0	230	226	Summer N-1-1 Voltage Magnitude	Included
N2-SVM5	200909	26LOBO+	200909	26LOBO+	0	230	226	Summer N-1-1 Voltage Magnitude	Included
N1-SVM1	200857	26MARSHALL	200857	26MARSHALL	0	230	226	Summer N-1 Voltage Magnitude	Included
N1-WVM3	200857	26MARSHALL	200857	26MARSHALL	0	230	226	Winter Baseline Voltage Magnitude	Included
N2-WVM7	200857	26MARSHALL	200857	26MARSHALL	0	230	226	Winter N-1-1 Voltage Magnitude	Included
N2-WVM3	200857	26MARSHALL	200857	26MARSHALL	0	230	226	Winter N-1-1 Voltage Magnitude	Included
N2-SVM6	200857	26MARSHALL	200857	26MARSHALL	0	230	226	Summer N-1-1 Voltage Magnitude	Included
N2-SVM7	200857	26MARSHALL	200857	26MARSHALL	0	230	226	Summer N-1-1 Voltage Magnitude	Included

New Flowgates

None

Financial Information

Capital spend start date	01/2023
Construction start date	03/2025
Project Duration (In Months)	41

Additional Comments

None