

Bremo TX#9 Load Relief~Alternative 1~Bear Garden to Fork Union Connection

General Information

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| Proposing entity name | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Does the entity who is submitting this proposal intend to be the Designated Entity for this proposed project? | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Company proposal ID | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| PJM Proposal ID | 473 |
| Project title | Bremo TX#9 Load Relief~Alternative 1~Bear Garden to Fork Union Connection |
| Project description | Re-route one (1) circuit from the Bremo substation to the Fork Union substation, approximately 1.6 miles. All transmission line will be installed within the existing ROW extents via the use of one (1) set of double circuit structures. Line 2193 (230kV) will be rebuilt with the existing line 2111 (230kV). This proposal provides a direct connect between Bear Garden substation and Fork Union substation by wrecking and rebuilding line #2193 as a double circuit using a conductor with summer rating of 1573MVA and connecting it to line #2111. Fiber optic communication will be considered for this line. At Fork Union, line leads for line #2193 will be upgraded to 4000A. Also, line #2111 will be terminated into a third row of breaker and a half string with two 4000A breakers and associated switches. This will lead to line #2111 Bear Garden – Fork Union and Line #2193 Bremo – Fork Union. No upgrades at Bear Garden is required. However, controller and relay setting will be updated. |
| Email | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Project in-service date | 06/2027 |
| Tie-line impact | No |
| Interregional project | No |
| Is the proposer offering a binding cap on capital costs? | No |
| Additional benefits | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |

Project Components

1. 230kV Line #2193 (Bremo to Fork Union) wreck and rebuild
2. Extension of 230kV Line #2111 Bear Garden to Fork Union
3. Bear Garden Substation 230kV Termination relay update
4. Bremo Substation 230kV Line Removal
5. Fork Union Substation 230kV line Termination

Transmission Line Upgrade Component

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|----------------------------|---|
| Component title | 230kV Line #2193 (Bremo to Fork Union) wreck and rebuild |
| Project description | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Impacted transmission line | Line #2193 |
| Point A | Bremo |
| Point B | Fork Union |
| Point C | |
| Terrain description | The project area is in the central Virginia Piedmont region with elevations ranging from approximately 200 to 360 feet. The terrain is predominately vegetated existing right-of-way consisting of moderate slopes. The line will cross no roads, a railroad track, several small streams, and one Section 10 Navigable waterway (James River). |

Existing Line Physical Characteristics

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|----------------------------|--|
| Operating voltage | 230 |
| Conductor size and type | 2-636 ACSR (24/7) 150°C MOT [0.11 miles]; 2-721 ACAR (18/19) 90°C MOT [1.63 miles] |
| Hardware plan description | Existing segment of the line will remain as is. For the extension segment, new hardware will be used. The existing hardware were installed in 1980's. |
| Tower line characteristics | Most of the existing structures are built in 1980's and are suitable for single circuits. New Structures are being installed to accommodate with extension of lines #2111. |

Proposed Line Characteristics

| | Designed | Operating |
|--|---|--------------------------|
| Voltage (kV) | 230.000000 | 230.000000 |
| | Normal ratings | Emergency ratings |
| Summer (MVA) | 1573.000000 | 1573.000000 |
| Winter (MVA) | 1648.000000 | 1648.000000 |
| Conductor size and type | 2-768 ACSS/TW-HS (20/7) 250°C MOT [1.5 miles], 2-721 ACAR (18/19) 90°C MOT [.06 miles] | |
| Shield wire size and type | DNO-11410 OPGW shield wire | |
| Rebuild line length | 1.6 | |
| Rebuild portion description | See Scope of Work in attachments for designation of removed, modified and installed structures. | |
| Right of way | No new or additional right of way is required to complete this project. | |
| Construction responsibility | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Benefits/Comments | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Component Cost Details - In Current Year \$ | | |
| Engineering & design | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Permitting / routing / siting | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| ROW / land acquisition | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Materials & equipment | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Construction & commissioning | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Construction management | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Overheads & miscellaneous costs | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |

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| Contingency | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Total component cost | \$3,263,786.14 |
| Component cost (in-service year) | \$3,495,514.96 |

Transmission Line Upgrade Component

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|----------------------------|---|
| Component title | Extension of 230kV Line #2111 Bear Garden to Fork Union |
| Project description | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Impacted transmission line | Line #2111 |
| Point A | Bear Garden |
| Point B | Fork Union |
| Point C | Bremo |
| Terrain description | The project area is in the central Virginia Piedmont region with elevations ranging from approximately 200 to 360 feet. The terrain is predominately vegetated existing right-of-way consisting of moderate slopes. The line will cross no roads, a railroad track, several small streams, and one Section 10 Navigable waterway (James River). |

Existing Line Physical Characteristics

| | |
|----------------------------|--|
| Operating voltage | 230 |
| Conductor size and type | 2-636 ACSR (24/7) 150°C MOT [1.34miles] |
| Hardware plan description | Existing segment of the line remains as is. For the extension segment, new hardware will be used. 1.6 miles of DNO-11410 OPGW will be installed. The existing structures were installed in 1980's. |
| Tower line characteristics | New structures will be used for the extension. |

Proposed Line Characteristics

| | Designed | Operating |
|--------------|------------|------------|
| Voltage (kV) | 230.000000 | 230.000000 |

| | Normal ratings | Emergency ratings |
|--|---|--------------------------|
| Summer (MVA) | 1573.000000 | 1573.000000 |
| Winter (MVA) | 1648.000000 | 1648.000000 |
| Conductor size and type | 2-768 ACSS/TW-HS (20/7) 250°C MOT | |
| Shield wire size and type | DNO-11410 OPGW shield wire | |
| Rebuild line length | 1.6 | |
| Rebuild portion description | See Scope of Work in attachments for designation of removed, modified and installed structures. | |
| Right of way | No new or additional right of way is required to complete this project. | |
| Construction responsibility | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Benefits/Comments | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Component Cost Details - In Current Year \$ | | |
| Engineering & design | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Permitting / routing / siting | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| ROW / land acquisition | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Materials & equipment | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Construction & commissioning | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Construction management | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Overheads & miscellaneous costs | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Contingency | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. | |
| Total component cost | \$4,696,667.87 | |
| Component cost (in-service year) | \$5,030,131.28 | |

Substation Upgrade Component

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|--------------------------|---|
| Component title | Bear Garden Substation 230kV Termination relay update |
| Project description | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Substation name | Bear Garden |
| Substation zone | 363 |
| Substation upgrade scope | N/A |

Transformer Information

| | |
|-----------------------------|--|
| None | |
| New equipment description | No new substation equipment will be installed as part of this proposal. |
| Substation assumptions | 1. Relay Settings and protection & control design for the new line termination will be revised as part of the SPE scope of work. 2. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. |
| Real-estate description | The substation will not be expanded for this project. |
| Construction responsibility | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Benefits/Comments | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |

Component Cost Details - In Current Year \$

| | |
|---------------------------------|---|
| Engineering & design | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Permitting / routing / siting | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| ROW / land acquisition | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Materials & equipment | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Construction & commissioning | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Construction management | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Overheads & miscellaneous costs | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |

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| Contingency | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Total component cost | \$162,599.00 |
| Component cost (in-service year) | \$174,143.53 |

Substation Upgrade Component

| | |
|--------------------------|---|
| Component title | Bremo Substation 230kV Line Removal |
| Project description | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Substation name | Bremo |
| Substation zone | 363 |
| Substation upgrade scope | Retire substation material: 1. Retire one (1) 230kV, 3000A, Breaker 211122, associated foundations, grounding, and terminal connections. 2. Retire one (1), 230 kV, 3000A 3-Phase Center Break Switch 211125 and terminal connections. 3. Retire three (3) 230kV, CCVTs 2111P1, 2111P2, 2111P3, associated foundations, steel, and terminal connections. 4. Retire three (3), 180 kV, 144 kV MCOV, Station Class Surge Arresters associated foundations, steel, and terminal connections. Retire relay material: 1. Two (2), Panel Retirement (Panel 37 and 46) |

Transformer Information

| | |
|-----------------------------|--|
| None | |
| New equipment description | No new substation equipment will be installed as part of this proposal. |
| Substation assumptions | 1. Relay Settings and protection & control design for the new line termination will be revised as part of the SPE scope of work. 2. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. |
| Real-estate description | The substation will not be expanded for this project. |
| Construction responsibility | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Benefits/Comments | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |

Component Cost Details - In Current Year \$

| | |
|----------------------|---|
| Engineering & design | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
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|----------------------------------|---|
| Permitting / routing / siting | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| ROW / land acquisition | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Materials & equipment | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Construction & commissioning | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Construction management | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Overheads & miscellaneous costs | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Contingency | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Total component cost | \$295,125.00 |
| Component cost (in-service year) | \$316,078.88 |

Substation Upgrade Component

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|--------------------------|--|
| Component title | Fork Union Substation 230kV line Termination |
| Project description | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Substation name | Fork Union |
| Substation zone | 363 |
| Substation upgrade scope | Purchase and install: Breakers, connectors, leads, insulators, and grounding materials as per engineering standards. |

Transformer Information

None

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| New equipment description | Purchase and install substation material: 1. Two (2), 230kV, 4000A, 63kAIC, SF6 Circuit Breakers 2. Two (2), 230 kV, 4000A 3-Phase Center Break Switches. 3. Four (4), 230kV, Relay Accuracy CCVTs 4. Three (3), 180 kV, 144 kV MCOV, Station Class Surge Arresters. 5. Foundations and steel structures as required. 6. Conductor, connectors, conduit, control cable, and grounding material per engineering standards. Purchase and install relay material: 1. Two (2), 4510 - SEL-2411 Equipment Annunciator 2. One (1), 1110 – 28” Dual SEL-587Z Transmission Bus Panel 3. One (1), 4200 – Bus Differential C.T. Makeup Box 4. Two (2), 1510 – 28” Dual SEL-351 Transmission Breaker w/ Reclosing Panel 5. One (1), 4506 – 3 Phase CCVT Potential Makeup Box 6. One (1), 4507 - Single Phase CCVT Potential Makeup Box 7. One (1), 1340 – 28” Dual SEL-411L CD/Fiber Line Panel 8. Two (2), 4526_A – Circuit Breaker Fiber Optic Makeup Box 9. One (1), Panel Retirement (Panel 5) |
| Substation assumptions | 1. Relay Settings and protection & control design for the new line termination will be revised as part of the SPE scope of work. 2. The scope of work depicted on the drawings assumes that there is no overlap with other designs and construction activities, except if mentioned in this Project Summary. 3. 4-hole pad connections must be replaced with 6-hole connections to maintain 4000A ratings. |
| Real-estate description | The substation will not be expanded for this project. |
| Construction responsibility | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Benefits/Comments | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Component Cost Details - In Current Year \$ | |
| Engineering & design | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Permitting / routing / siting | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| ROW / land acquisition | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Materials & equipment | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Construction & commissioning | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Construction management | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Overheads & miscellaneous costs | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Contingency | The redacted information is proprietary to the Company; therefore, it is privileged and confidential. |
| Total component cost | \$1,675,814.30 |

Component cost (in-service year)

\$1,794,797.12

Congestion Drivers

None

Existing Flowgates

| FG # | Fr Bus No. | From Bus Name | To Bus No. | To Bus Name | CKT | Voltage | TO Zone | Analysis type | Status |
|---------------|------------|---------------|------------|-------------|-----|---------|---------|--------------------------------------|----------|
| 2022W2-GD-LL1 | 314747 | 6BREMO | 314744 | 3BREMO | 1 | 230/115 | 345/345 | Light Load Generation Deliverability | Included |
| 2022W2-N1-LLT | 314747 | 6BREMO | 314744 | 3BREMO | 1 | 230/115 | 345/345 | Light Load Baseline | Included |

New Flowgates

The redacted information is proprietary to the Company; therefore, it is privileged and confidential.

Financial Information

Capital spend start date

06/2025

Construction start date

06/2026

Project Duration (In Months)

24

Additional Comments

None