



Facilities Study For Southwest Power Pool (SPP)

ERAS 2025-001

Group 5

ERAS-2025-030

Xcel Energy Services, Inc.

Southwestern Public Service Co.

Transmission Planning South

Updated 5/7/2026

Executive Summary

The Southwest Power Pool (SPP or Transmission Provider [TP]) evaluated the generation facilities requesting to interconnect to the SPS transmission system in the Expedited Resource Adequacy Study (ERAS-2025-001), which was completed in February, 2026. The requests for interconnection were placed with SPP in accordance with the Scope of Interconnection Facilities Study GIP Section 8.10 and the Interconnection Facilities Study Procedures in accordance with GIP Section 8.11.

ERAS-2025-030 (Interconnection Customer or IC) requested the interconnection of a 350 MW solar energy generation facility, located in Chaves County, New Mexico, to the Southwestern Public Service Company (SPS or Transmission Owner [TO]) transmission network. SPS will construct a new 230 kV substation named “Bitter Lake”. The new substation will be laid out as a three-breaker ring bus, and expandable for a future breaker and one-half configuration. After substation construction is complete, the IC will connect to the SPS 230 kV bus. The IC is required to build one 230 kV generation tie-line from their collector substation facilities to the SPS Bitter Lake Substation. The IC will be required to maintain a Power Factor between 0.95 lagging and 0.95 leading at the POI.

The customer will refer to other requirements that may be needed at the following link:

[Salesforce](#) (**Xcel Energy Interconnection Guidelines For Transmission Interconnected Producer-Owned Generation Greater Than 20 MW**).

Coordination with Xcel Energy is required during the under-frequency relay-setting phase for the generation. The IC is required to report their generation off-nominal frequency tripping relay settings to SPP and SPS. SPS specifies that generators shall not trip at frequencies above 58.5 Hz unless exceptions in the Transmission Provider Criteria are met. The IC agrees that the energy generating units installed at this interconnection will not be tripped for under-frequency conditions above 58.5 Hz in compliance with Transmission Provider criteria. This means that the generation subject to this Interconnection Agreement may not trip for under-frequency conditions on the transmission system until all under-frequency load shedding relays have operated. SPS will also require that the IC follow all applicable criteria, guidelines, standards, requirements, regulations, and procedures issued by the North American Electric Reliability Corporation (NERC), SPP, and the Federal Energy Regulatory Commission (FERC) or their successor organizations.

The IC is responsible for all the cost of the Interconnection Facilities, installation of the direct assigned Transmission Owner Interconnection Facilities (TOIF) which are facilities paid for by the IC but are owned, operated, and maintained by SPS; inclusive of all construction required for the IC to interconnect at SPS’ Substation.

Other network upgrades identified by SPP will have an impact on the total overall costs for interconnection of the IC.

It is anticipated that the entire process of constructing the Substation for the acceptance of the IC facility output and the network upgrades allocated to this project will require approximately 36-42 months to complete after an Interconnection Agreement is signed and authorization to proceed is received. The IC’s cost for the interconnection of this generation facility is shown below in Table 1:

Table 1: Cost Summary¹

Non-shared Network Upgrades:	\$ 30,977,228
Transmission Owner Interconnection Facilities:	\$ 5,100,814
Total:	\$ 36,078,042

General Description of SPS² Facilities

1. **Construction at the SPS Bitter Lake Substation:** See Appendix A, Figure A-1 for general vicinity location map of the SPS facility.

Location: The IC will build one 230 kV generation tie-line from their generation facility to the 230 kV Bitter Lake Substation, in Chaves County, New Mexico. SPS requires the IC to run dual OPGW conductors from their generation facility to provide redundant communication. The customer will terminate their generation tie-line to transmission terminal structures installed and owned by SPS. The transmission terminal structures will be located outside of the Substation. SPS will install transmission jumpers at the transmission terminal structure and phase conductors along with fiber optics cable to the Point-Of-Interconnection terminal inside the Substation. The transmission terminal structure will provide a clear change-of-ownership point for the IC.

Bus Design: The 230 kV, three-breaker ring-bus configuration, expandable to a breaker and one-half configuration will be constructed to accommodate the POI for the ERAS-2025-030 solar generation facility.

Revenue Metering: An individual billing meter will be installed at the SPS substation on the line terminal from the IC's substation, which meets the standards: ANSI C12.1 accuracy class 0.2 (3-PT's IEEE C57.13 accuracy class 0.3 and 3-CT's IEEE C57.13 accuracy class 0.15) for full 3-phase 4-wire metering. Pulses out of the billing meter will be sent via SCADA to the Transmission Owner's Control Center in Amarillo, Texas.

Disturbance Monitoring Device: A Disturbance Fault Recorder (DFR), capable of recording faults, swings, and long-term trending, will be installed to monitor and record conditions in the substation and on the transmission lines. The disturbance equipment will also be equipped with a GPS time synching clock. This equipment will have communication capability with a dedicated communication circuit. The disturbance equipment will have its own dedicated communications circuit.

Remote Terminal Unit (RTU): A RTU will be utilized for communications with the new IC facilities. A Communication SEL Relay will be utilized for relay communications and other functions as required; these costs will be directly assigned to the IC. The IC will provide and install an RTU for metering and telemetry at the IC's facility as required by the latest Xcel Energy Interconnection Guidelines.

Communications: To meet its Communications obligations, the IC shall be responsible for planning with the local phone company to provide a communication circuit as required by the Transmission Owner. Transmission Owner equipment may include but is not limited to the following: relay communication equipment, RTU, and disturbance monitoring equipment. Prior to any construction, the IC is required to contact the Transmission Owner substation-engineering

¹ The cost estimates are 2026 dollars with an accuracy level of $\pm 20\%$.

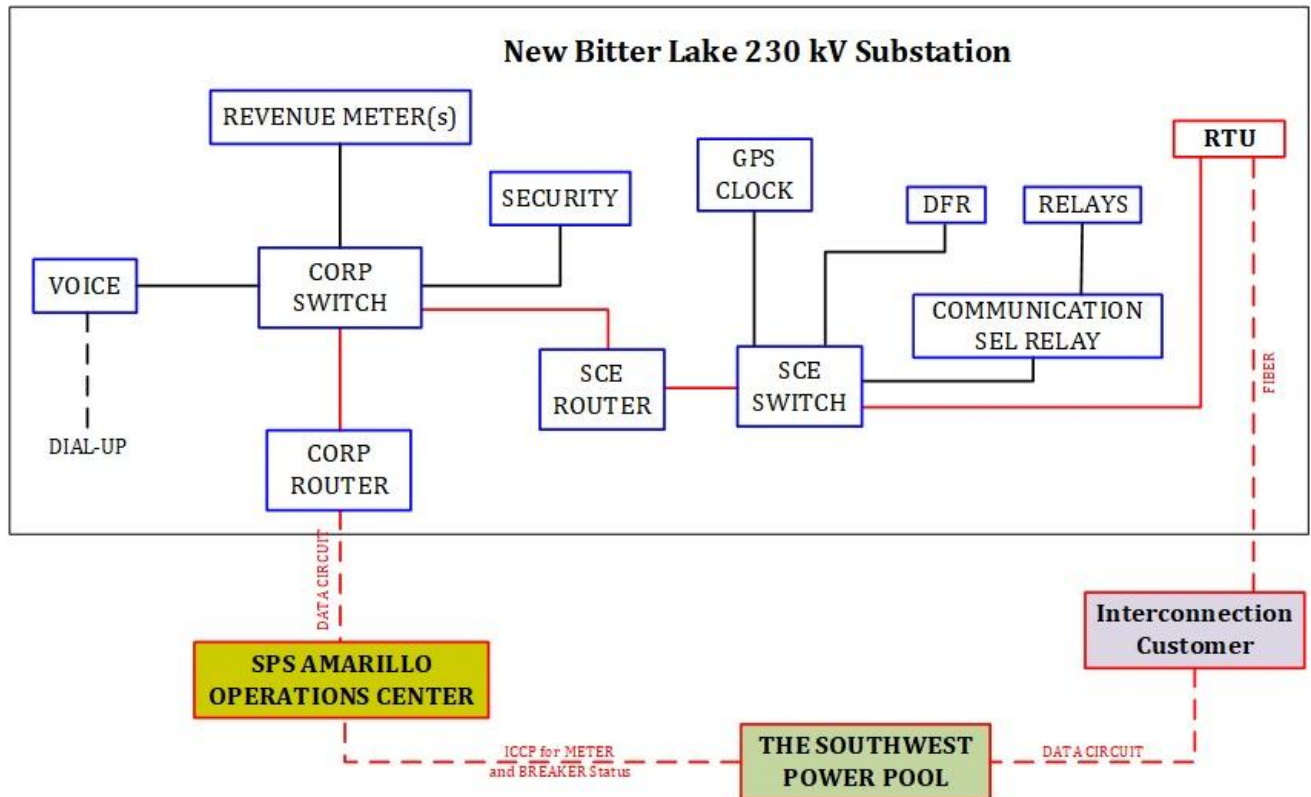
² All modifications to SPS facilities will be owned, maintained, and operated by SPS.

department for all communication details and provide detail of the method to be used in communication.

The following communications schematic diagram, which includes communication equipment information for the IC, Transmission Provider (Southwest Power Pool) and Transmission Owner (Southwestern Public Service), is provided to assist the Parties as a template:

A schematic outlining the proposed communications is provided below:

Table 1



The IC shall be responsible for providing the dual fiber optic communication circuit installed in the overhead transmission line static wire from the customer's substation to the SPS substation for protective relaying and for transmitting metering and status data to SPS. Utilizing this fiber optic connection, SPS will establish a direct connection to the IC's RTU.

SPS will not serve as a proxy for communication from the IC to SPP.

2. Transmission and Remote Substation Work – Engineering and Construction

- a. **Coordination:** The Xcel Energy Transmission Engineering and Design groups require an engineering review of the customer's design prior to any construction by the IC or its contractor on any customer transmission lines, the proposed termination to the SPS substation, or doing work in close proximity to any SPS transmission line. It is the IC's responsibility to initiate the design review in a timely manner before construction of any transmission line begins. If the review has not been made or the design at any of the aforementioned locations is deemed inadequate, the crossing(s) and or termination into the interchange will be delayed until the matters are resolved. SPS will not be held responsible for these delays

- b. **Fault or Short Circuit Study:** The IC will coordinate with the System Protection Engineering department at SPS on the available fault current at the interconnection location following the acceptance of the Generator Interconnection Agreement (GIA) and prior to final design on the IC's facilities. The table below shows the approximate available fault current at the interconnection location. The fault data does not contain fault current contribution from the IC's facility.

Table 1: Available fault current at interconnection location

Short Circuit Information without contribution from new Generator Facilities (ERAS-2025-030)				
Fault Location	Fault Current (Amps)		Impedance (Ω)	
	Line-to-Ground	3-Phase	Z^+	Z^0
Bitter Lake Substation	1874.90	6132.20	2.54285, j21.5048	5.88562, j27.0073

3. Right-Of-Way

- a. **Permitting:** The IC will be responsible for any permitting and right of way of their substation and their generation tie-line from their collector substation to the Bitter Lake Substation. The customer will refer to the Xcel Energy *Right-of-Way, Easements, and Encroachments* web page and the attached Xcel Energy Job Aid document for information concerning crossing of SPS transmission lines with customer generation tie-lines: [Right of Way | Transmission | Corporate | Xcel Energy](#)

4. Construction Power and Retail Service

- a. **Responsibility:** It is the sole responsibility of the IC to arrange for both construction and station power. The IC needs to plan for retail service from the local retail provider. The retail provider and the Customer will be responsible for making any necessary transmission service arrangements as required under the SPP OATT.

5. Project and Operating Concerns:

- a. **Collaboration:** Close work between the Transmission group, the IC's personnel and local operating groups will be imperative in order to meet any in-service date that has been established.
- b. **Reactive Power Requirements:** The IC will be required to maintain a power factor between 0.95 lagging and 0.95 leading at the Point of Interconnection (POI). All capacitors required will be installed on the lower voltage bus at IC's substation. This is required to maintain acceptable dynamic voltage rise as per latest revision of the Xcel Energy Interconnection Guidelines for Transmission Interconnection Producer-Owned Generation Greater than 20 MW. If switched reactive devices are used on the IC's system, they need to be switched in stages where the voltage rise is less than 3%.

6. Estimated Construction Costs and Schedule

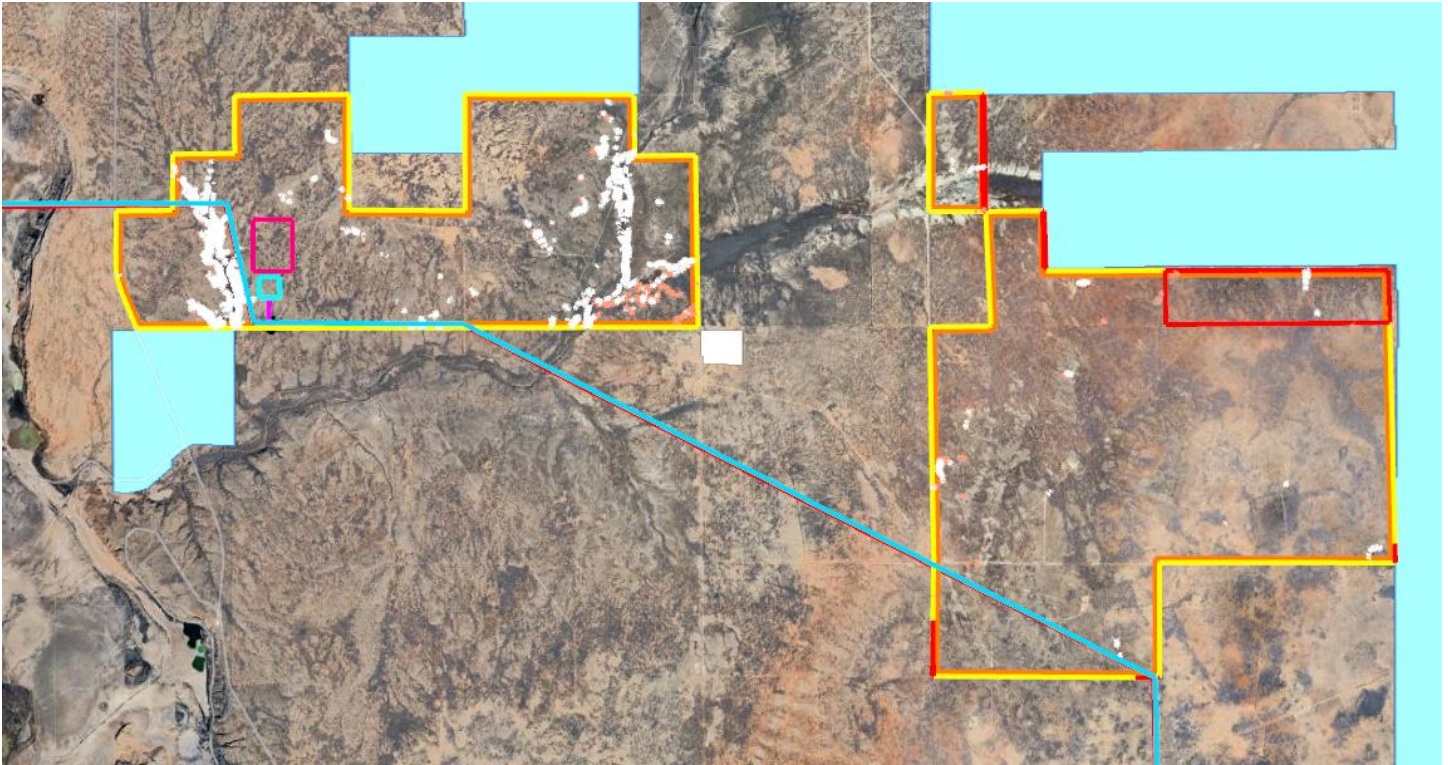
- a. **Schedule:** An engineering and construction schedule for this project is estimated at approximately 36 - 42 months. Other factors associated with clearances, equipment delays, and work schedules could cause additional delays. This is applicable after all required agreements

are signed and internal approvals are granted.

- b. All additional costs for work not identified in this study is the sole responsibility of the IC unless other arrangements are made.

Appendix A

Figure A-1: General vicinity location map of the POI Substation



Bitter Lake POI Substation Will Be Located in White Polygon

33.3712 N, -103.3008 W

Figure A-2: Transmission Terminal Structure & Change of Ownership

DIAGRAMS ARE NOT FOR CONSTRUCTION PURPOSES

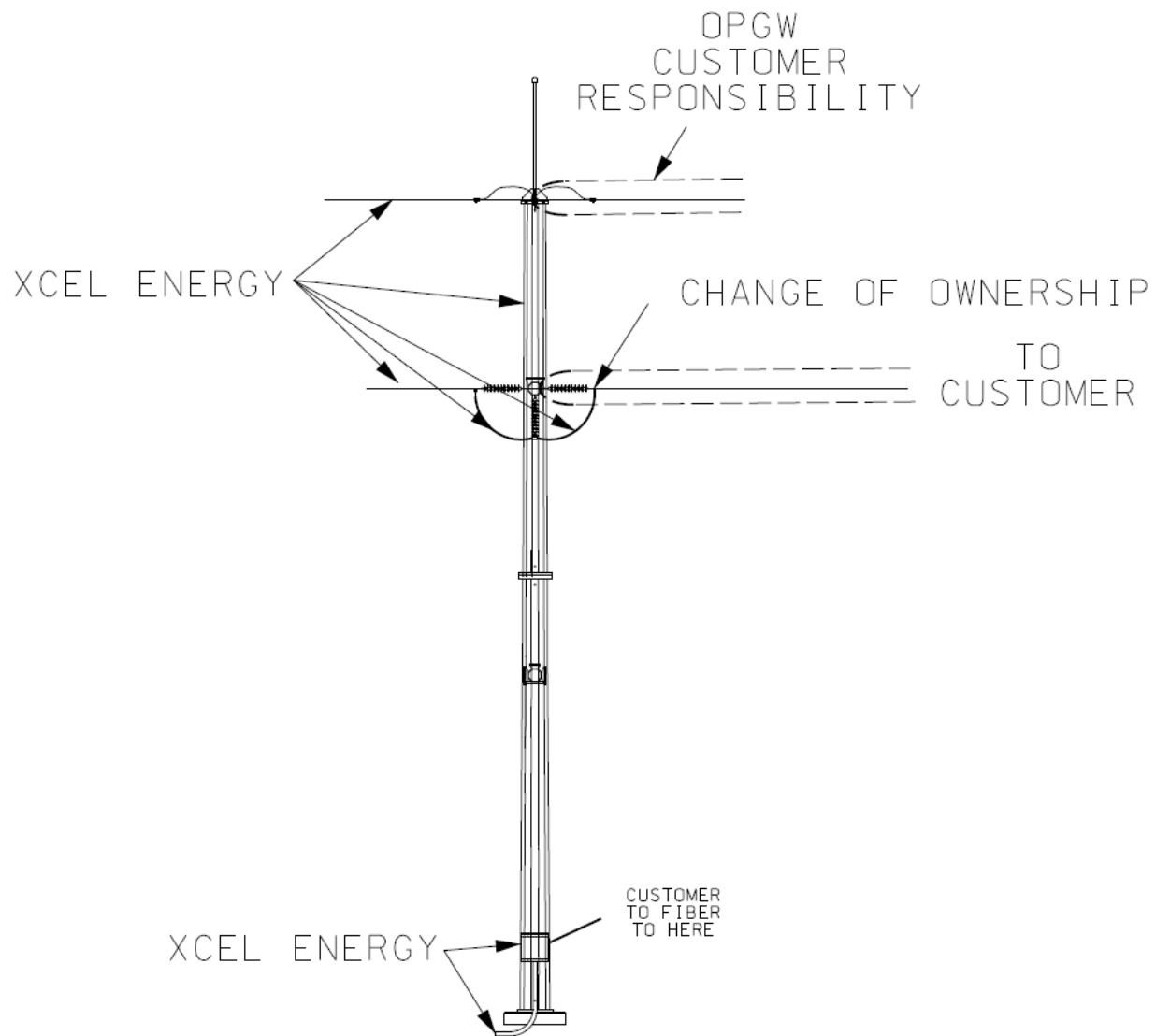
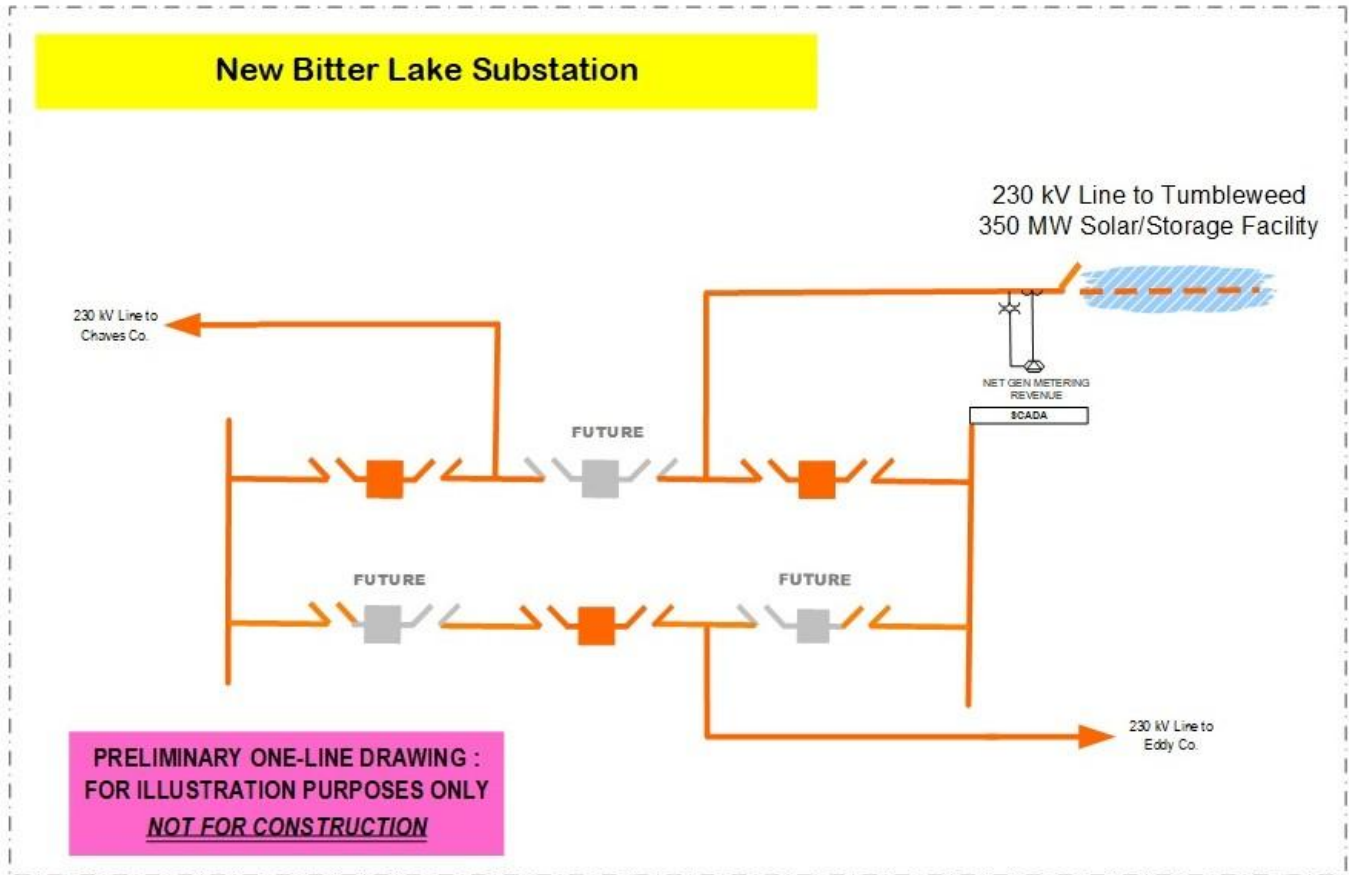


Figure A-3: Preliminary One-Line Diagram

DIAGRAMS ARE NOT FOR CONSTRUCTION PURPOSES



– END OF REPORT –



**Facility Study for Network Upgrades
as Requested by Southwest Power Pool (SPP)**

ERAS-2025
Group 5

Southwestern Public Service CO.
Transmission Planning
Updated 8/26/2026

Executive Summary

The Southwest Power Pool (SPP or Transmission Provider) evaluated the generation facilities requesting to interconnect to the SPS transmission system in the Expediated Resource Adequacy Study (ERAS-2025), which was completed in February 2026. The requests for interconnection were placed with SPP in accordance with the Scope of Interconnection Facilities Study GIP Section 8.10 and the Interconnection Facilities Study Procedures in accordance with GIP Section 8.11.

To accommodate the Interconnection Customer's (IC) requests, SPP identified multiple network upgrades required as part of the ERAS-2025 study results. Southwestern Public Service Company (SPS or Transmission Owner) performed this Facility Study for the Network Upgrades. Below are the projects identified by SPP:

<u>ERAS-2025 Upgrade Name</u>	<u>SCERT UID</u>	<u>Estimate</u>
Rebuild TUCO to Crawfish Draw 345kV line to minimum 1475 MVA	172205	35,587,986.00

General Description of Network Upgrades

The Objective of this study is to identify the network upgrades and the costs associated with them. Below is a description of the different projects and the scoping level costs¹ associated with each. All costs identified below are without escalation. All projects, routes, and costs are subject to change.

Rebuild the TUCO to Crawfish Draw 345 kV Line (Circuit 2) to a minimum SN/SE Rating of 1475 MVA

The existing line is rated at 997 MVA with bundled (2) 795 ACSR phase conductors. This upgrade will rebuild the line with bundled (2) 795 ACSS phase conductors.

Total Cost

The total cost estimate for this Network Upgrade is:

\$ 35,587,986.00

The estimate is accurate to +/- 20%.

Time Estimate

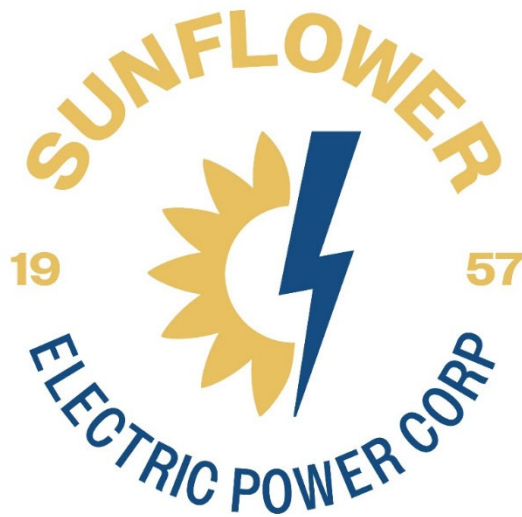
From date of execution of agreement to project in-service date.

Total Project Duration	36-42	Months
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¹ The cost estimates are 2026 dollars with an accuracy level of ±20%.



**Interconnection Facilities Study
for ERAS-2025-001 Network Upgrade:
Walkemeyer to Harbinger 115 kV Line Rebuild**



August 31, 2026

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STUDY OVERVIEW:

The Southwest Power Pool has requested a Facility Study for a Network Upgrade from Sunflower Electric Power Corporation (Sunflower). The Network Upgrade identified includes a rebuild of the Walkemeyer to Harbinger 115 kV transmission line to achieve a minimum rating of 360.54 MVA.

The cost of Sunflower's portion of rebuilding of the Walkemeyer to Harbinger 115 kV transmission line is estimated at \$4,553,876 (UID: 172206).

The purpose of this study is to identify scope and provide estimated costs of facilities required for upgrades on Sunflower's transmission system to allow the generation to run at the full requested capacity.

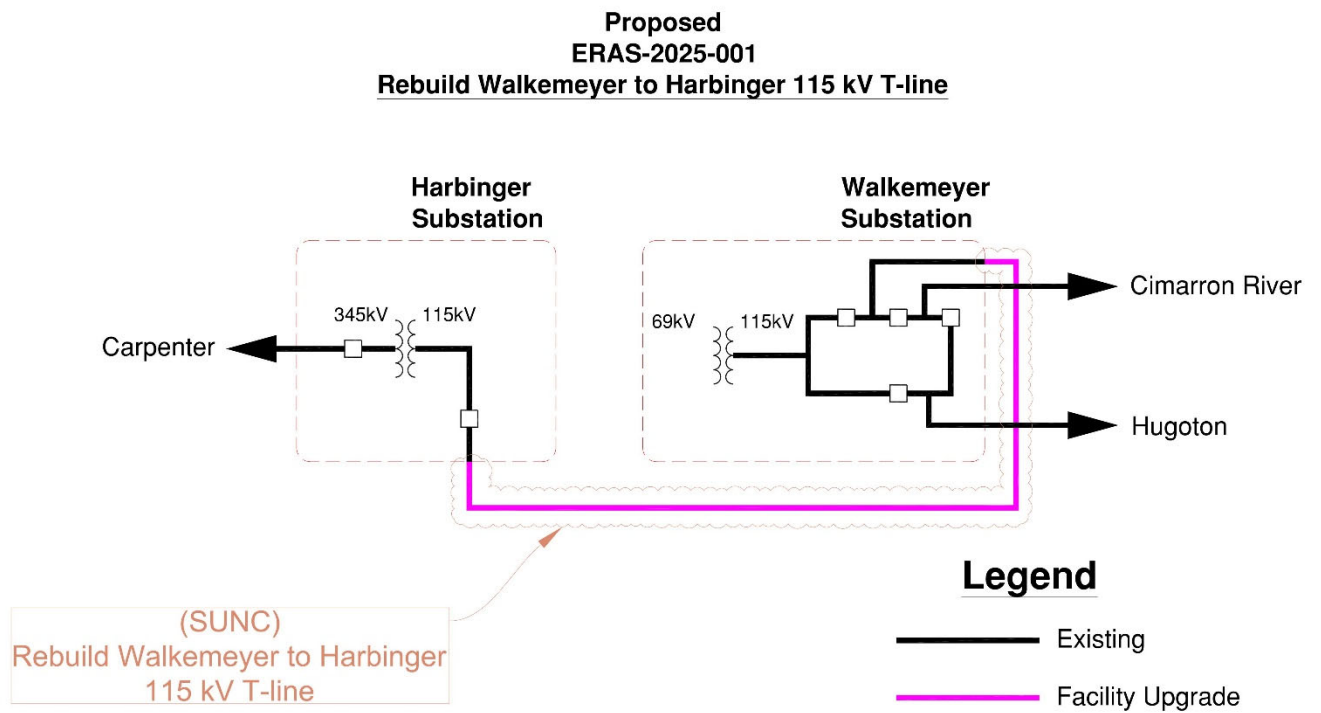
Additional network upgrades required for facilities of other transmission owners are not included in this study and will be identified by SPP.

INTERCONNECTION FACILITIES AND NON-SHARED NETWORK UPGRADES:

Network Upgrades included in this study consist of rebuilding the Walkemeyer to Harbinger 115 kV transmission line required by SPP. The rebuild and associated upgrades shall be constructed and maintained by Sunflower.

The proposed arrangement for upgrades for ERAS-2025-001 is shown in Figure 1.

Figure 1: One-line Diagram Facilities for ERAS-2025-001



INTERCONNECTION COSTS:

Summary of interconnection costs for both Interconnection Facilities and Sunflower identified Network Upgrades can be found in the following table.

Upgrade Type	UID	Upgrade Name/Description	ERAS Cost Estimate	ERAS Lead Time
Interconnection	172206	Walkmyr to Harbng3 115 kV Line Rebuild Rebuilding of the Walkemeyer to Harbinger 115 kV transmission line to achieve a minimum rating of 360.54 MVA	\$4,553,876	36
Total Interconnection Cost:			\$4,553,876	

PROJECT TIMELINE:

Specific construction schedule and milestones will be determined during the Generator Interconnection Agreement negotiations. Sunflower is estimating an engineering and construction schedule for this project as approximately 36 months. Other factors associated with clearances, equipment procurement delays and work schedules could cause additional delays. This is applicable after all required agreements are signed and internal approvals are granted.



FACILITY STUDY

for

Expedited Resource Adequacy Study ERAS-2025-001 Restudy #1 172204

DeGrasse 345kV Substation Reconfiguration
Woods County
Oklahoma

August 27th, 2026

Benjamin Sasu
Senior Engineer
Transmission Planning
OG&E Electric Services

Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Oklahoma Gas and Electric (OG&E) performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting customer for SPP Expedited Resource Adequacy Study request ERAS-2025-001 UID 172204. The request for this study was placed with SPP in accordance with SPP's Open Access Transmission Tariff, which covers this one-time accelerated study for generation on SPP's transmission system. The requirement for reconfiguration at DeGrasse 345kV Substation to prevent the two lines to Woodward 345kV from sharing a circuit breaker consists of installing a breaker, line disconnect switch, relay, and settings upgrade and other associated equipment. The total cost of OKGE is estimated at **\$1,500,000.**

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Introduction

The Southwest Power Pool has requested a Facility Study for the purpose of reconfiguring a 345kV substation to prevent two 345kV lines from sharing a circuit breaker within the service territory of OG&E Electric Services (OKGE) in Woods County, Oklahoma. The proposed 345kV substation is at DeGrasse Substation in Woods County. This substation is owned by OKGE. The cost for this upgrade is estimated at **\$1,500,000**.

Network Constraints in the Southwest Public Service (SPS), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

Other Network Constraints in the American Electric Power West (AEPW), Southwest Public Service (SPS), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

Interconnection Facilities

The primary objective of this study is to identify attachment facilities. The requirement is for reconfiguring DeGrasse 345kV to prevent the two lines to Woodward 345kV from sharing a circuit breaker. This upgrade will be constructed and maintained by OKGE. The total cost for OKGE to work on this upgrade is estimated at **\$1,500,000**

The costs of interconnecting the facility to the OKGE transmission system are listed in Table 1.

Short Circuit Fault Duty Evaluation

It is standard practice for OG&E to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating with re-closer de-rating applied, as determined by the ANSI/IEEE C37.5-1979, C37.010-1979 & C37.04-1979 breaker rating methods.

For this reconfiguration, OG&E found no breakers that exceeded their interrupting capabilities on their system. Therefore, there are no short circuit upgrade costs associated with the ERAS-2025-001 UID 172204.

Table 1: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2026 DOLLARS)
Lead time	36 Months
OKGE – Interconnection Facilities (UID 172204) - Install a new breaker, line disconnect switch, and associated equipment's	\$300,000
OKGE – Network Upgrades (UID 1772204) - Install a new breaker, line switches, Relaying, setting upgrade	\$1,200,000
OKGE – Land or ROW –	\$0
Total	\$1,500,000

Prepared by Benjamin Sasu
Senior Engineer, Transmission Planning
OG&E Electric Services

August 27th, 2026

Reviewed by:
Adam Snapp, P.E.
Director Transmission Planning

DeGrasse 345kV Substation

