INTERCONNECTION FACILITIES STUDY REPORT

GEN-2023-GR4

Published April 2024

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
04/29/2024	SPP	Initial draft report issued.
5/10/2024	SPP	Revision

CONTENTS

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2023-GR4 is for a 72 MW generating facility located in Lea County, New Mexico. The Interconnection Request was studied in the GEN-2023-GR4 Replacement Impact Study for Energy Resource Interconnection Service (ERIS). The Interconnection Customer's requested in-service date is May 1, 2026.

The interconnecting Transmission Owner, Southwestern Public Service Co. (SPS), performed a detailed IFS at the request of SPP. The full report is included in Appendix A. SPP has determined that full Interconnection Service will be available after the assigned Transmission Owner Interconnection Facilities (TOIF), Non-Shared Network Upgrades, Shared Network Upgrades, Contingent Network Upgrades, and Affected System Upgrades that are required for full interconnection service are completed.

The primary objective of the IFS is to identify necessary Transmission Owner Interconnection Facilities, Network Upgrades, other direct assigned upgrades, cost estimates, and associated upgrade lead times needed to grant the requested Interconnection Service.

PHASE(S) OF INTERCONNECTION SERVICE

It is not expected that Interconnection Service will occur in phases. However, full Interconnection Service will not be available until all Interconnection Facilities and Network Upgrade(s) can be placed in service.

COMPENSATION FOR AMOUNTS ADVANCED FOR NETWORK UPGRADE(S)

FERC Order ER20-1687-000 eliminated the use of Attachment Z2 revenue crediting as an option for compensation. The Incremental Long-Term Congestion Right (ILTCR) process will be the sole process to compensate upgrade sponsors as of July 1st, 2020.

INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES

The Generating Facility is proposed to consist of twenty (20) PE FS4200M solar inverters operating at 3.655 MW with a reduced dispatch of 72.85 MW. The inverters are rated at 4.2 MW, thus the generating capability of the Replacement Generating Facility (RGF) of 84 MW, exceeds the requested Interconnection Service amount of 72 MW. The injection amount of the RGF must be limited to 72 MW at the Point of Interconnection (POI). As a result, the customer must install monitoring and control equipment as needed to ensure that the amount of power injected at the POI does not exceed the Interconnection Service amount.

The Interconnection Customer's Interconnection Facilities to be designed, procured, constructed, installed, maintained, and owned by the Interconnection Customer at its sole expense include:

- 34.5 kV underground cable collection circuits;
- 34.5 kV to 115 kV transformation substation with associated 34.5 kV and 115 kV switchgear;
- One (1) 115 kV 117 MVA (57/75/95) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- Five and two-tenths (5.2) miles overhead kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 115 kV bus at existing Transmission Owner substation ("Cunningham 115 kV") that is owned and maintained by Transmission Owner;
- All transmission facilities required to connect the Interconnection Customer's substation to the POI;
- Equipment at the Interconnection Customer's substation necessary to maintain a composite power delivery at continuous rated power output at the high side of the generator substation at a power factor within the range of 95% lagging and 95% leading in accordance with Federal Energy Regulatory Commission (FERC) Order 827. The Interconnection Customer may use inverter manufacturing options for providing reactive power under no/reduced generation conditions. The Interconnection Customer will be required to provide documentation and design specifications demonstrating how the requirements are met; and,
- All necessary relay, protection, control, and communication systems required to protect Interconnection Customer's Interconnection Facilities and Generating Facilities and coordinate with Transmission Owner's relay, protection, control, and communication systems.

TRANSMISSION OWNER INTERCONNECTION FACILITIES AND NON-SHARED NETWORK UPGRADE(S)

To facilitate interconnection, the interconnecting Transmission Owner will perform work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities.

Table 1 and **Table 2** lists the Interconnection Customer's estimated cost responsibility for Transmission Owner Interconnection Facilities (TOIF) and Non-Shared Network Upgrade(s) and provides an estimated lead time for completion of construction. The estimated lead time begins when the Generator Interconnection Agreement has been fully executed.

Table 1: Transmission Owner Interconnection Facilities (TOIF)

Transmission Owner Interconnection Facilities (TOIF)	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)	Estimated Lead Time
Cunningham 115kV GEN-2023-GR4 Interconnection (TOIF): Remove existing and replace a new 115 kV high-side switch, equipment foundations, CTs, arresters, underground line termination structure, jumpers, and bus work.	$777,717	100%	$777,717	36 Months
Total	**$777,717**		**$777,717**	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)	Estimated Lead Time
None	Eligible	$0	%	$0	N/A
Total		**$0**		**$0**	

SHARED NETWORK UPGRADE(S)

The Interconnection Customer's share of costs for Shared Network Upgrades is estimated in **Table 3** below.

Table 3: Interconnection Customer Shared Network Upgrade(s)

Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)	Estimated Lead Time
None	Eligible	$0	%	$0	N/A
Total		**$0**		**$0**	

All studies have been conducted assuming that higher-queued Interconnection Request(s) and the associated Network Upgrade(s) will be placed into service. If higher-queued Interconnection Request(s) withdraw from the queue, suspend, or terminate service, the Interconnection Customer's share of costs may be revised. Restudies, conducted at the customer's expense, will determine the Interconnection Customer's revised allocation of Shared Network Upgrades.

CONTINGENT NETWORK UPGRADE(S)

Certain Contingent Network Upgrades are **currently not the cost responsibility** of the Interconnection Customer but will be required for full Interconnection Service.

Table 4: Interconnection Customer Contingent Network Upgrade(s)

Contingent Network Upgrade(s) Description	Current Cost Assignment	Estimated In-Service Date
None	$0	N/A

Depending upon the status of higher- or equally-queued customers, the Interconnection Request's in-service date is at risk of being delayed or Interconnection Service is at risk of being reduced until the in-service date of these Contingent Network Upgrades.

AFFECTED SYSTEM UPGRADE(S)

To facilitate interconnection, the Affected System Transmission Owner will be required to perform the facilities study work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities. **Table 5** displays the current impact study costs provided by either MISO or AECI as part of the Affected System Impact review. The Affected System facilities study could provide revised costs and will provide each Interconnection Customer's allocation responsibilities for the upgrades.

Table 5: Interconnection Customer Affected System Upgrade(s)

Affected System Upgrades Description	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
None	$0	%	$0
Total	$0		$0

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 72 MW can be granted. Full Interconnection Service will be delayed until the TOIF, Non-Shared NU, Shared NU, Contingent NU, Affected System Upgrades that are required for full interconnection service are completed. The Interconnection Customer's estimated cost responsibility for full interconnection service is summarized in the table below.

Table 6: Cost Summary

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilities Upgrade(s)	$777,717
Non-Shared Network Upgrade(s)	$0
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$0
Total	**$777,717**

Use the following link for Quarterly Updates on upgrades from this report: https://spp.org/spp-documents-filings/?id=18641

A draft Generator Interconnection Agreement will be provided to the Interconnection Customer consistent with the final results of this IFS report. The Transmission Owner and Interconnection Customer will have 30 days to negotiate the terms of the GIA consistent with the SPP Open Access Transmission Tariff (OATT).

APPENDICES

A: TRANSMISSION OWNER'S INTERCONNECTION FACILITIES STUDY REPORT AND NETWORK UPGRADES REPORT(S)

See next page for the Transmission Owner's Interconnection Facilities Study Report and Network Upgrades Report(s).

Facility Study for Generation Replacement as Requested by Southwest Power Pool (SPP)

GEN-2023-GR4

Xcel Energy Services, Inc.

Southwestern Public Service Co.
Transmission Planning South
5/9/2024

SPP Internal Only

Executive Summary

The Southwest Power Pool (SPP or Transmission Provider) evaluated the generation request to replace existing generation facilities on the Southwestern Public Service Company (SPS) transmission system pursuant to the SPP Open Access Transmission Tariff (OATT), Attachment V Section 3.9 and SPP Business Practice 7800. The evaluation was completed by SPP on February 16, 2024. SPS, as Interconnection Customer (IC) and owner of an Existing Generation Facility (EGF) with a Point of Interconnection (POI) at the Cunningham Substation 115kV bus submitted the EGF for study under the SPP Generator Replacement process.

To accommodate the Interconnection Customer's (IC's) request, SPS as Transmission Owner determined the modifications/upgrades that are needed on the SPS transmission system for this replacement generation. In the table below the associated modification/upgrade costs have been identified.

Request Number		**TAM**	**TOIF**
GEN-2023-GR4		$	$ 777,717

NOTE: The cost estimates are 2023 dollars with an accuracy of ± 20%. The estimates do not include escalation costs.

General Description of SPS Modifications/Upgrades

The objective of this study is to identify the modification/upgrades along with the costs associated with facilities necessary to interconnect the replacement generation identified in GEN-2023-GR4. Below is a description of the different project(s) and the associated scoping level costs. All costs identified below are without escalation. All projects, routes, and costs are subject to change once this scoping level cost estimate is updated with an engineering level cost estimate.

Generation-Tie Line Details

The IC has requested that SPS, as Transmission Owner, build the new 115 kV gen-tie from the solar facility to the Cunningham Substation. The IC shall be responsible for all construction costs of this new 115 kV gen-tie. The gen-tie will consist of a new 115 kV line from the solar collector substation site to the existing Cunningham Station 115 kV substation. The gen-tie will consist of both an overhead portion and an underground portion. The overhead portion is assumed to be approximately 6.5 miles in length and the underground portion will be approximately 600 feet in length connecting from the gen-tie dead-end structure to the Cunningham 115 kV bus.

Cunningham Substation Details

Remove an existing 115 kV Motor Operate Switch (MOS), associated stand, jumpers, etc. and replace with a new 115 kV high-side switch, equipment foundations, CTs, lightning arresters, underground line termination structure, jumpers, and bus work.

Total Cost

The total cost estimate for this Network Upgrade is:

$	0 TAM
$	777,717 TOIF
$	777,717 Total Cost

The estimate is accurate to +/- 20%

Time Estimate

The information listed below is the expected construction duration from the date the Generation Interconnection Agreement signed and project in-service date.

Total Project Duration	36	Months

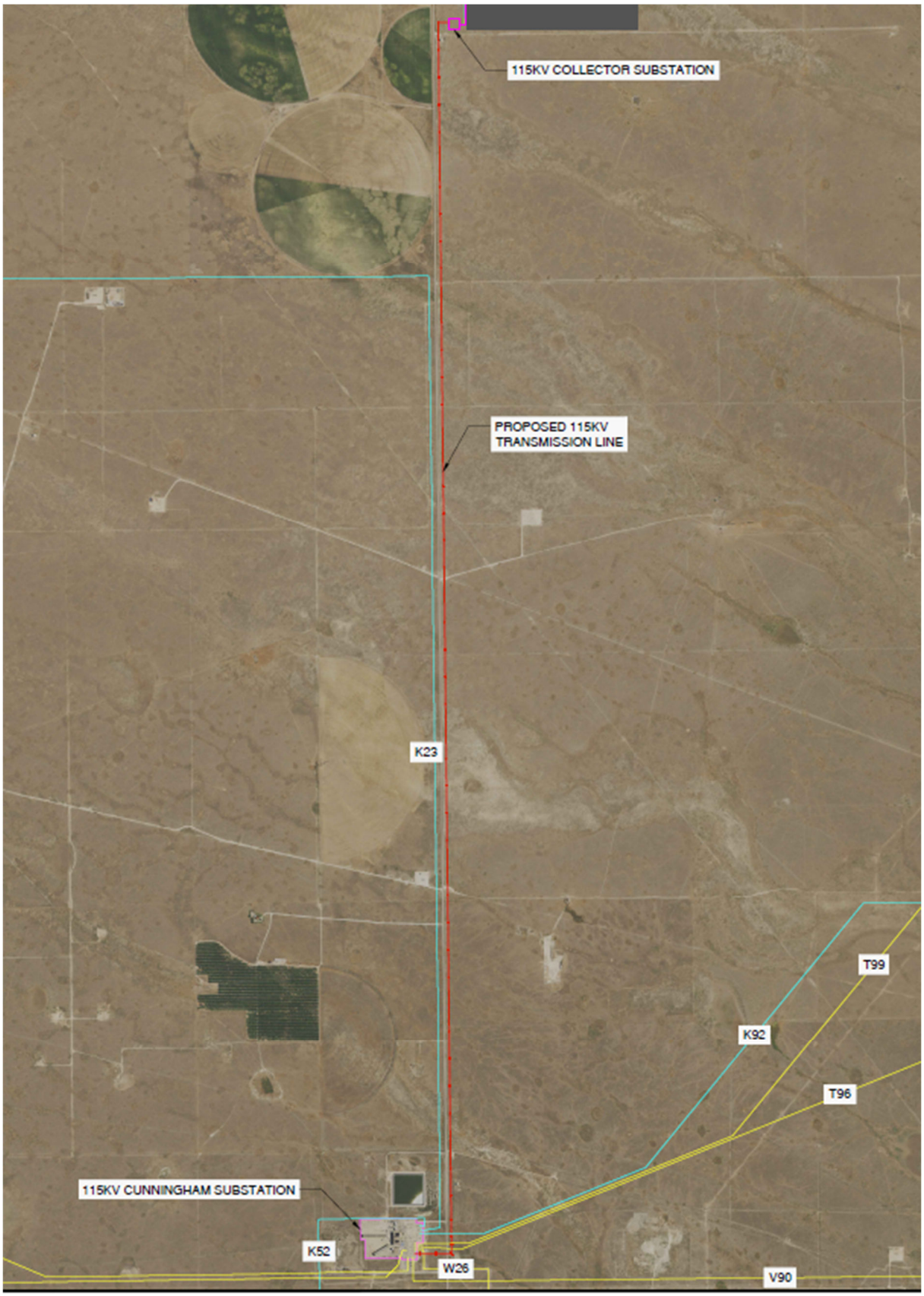

Figure 1 – Proposed Collector Site and Gen-Tie Location

The Figure 2 shown below illustrates the expected communication between the IC, SPP and SPS.

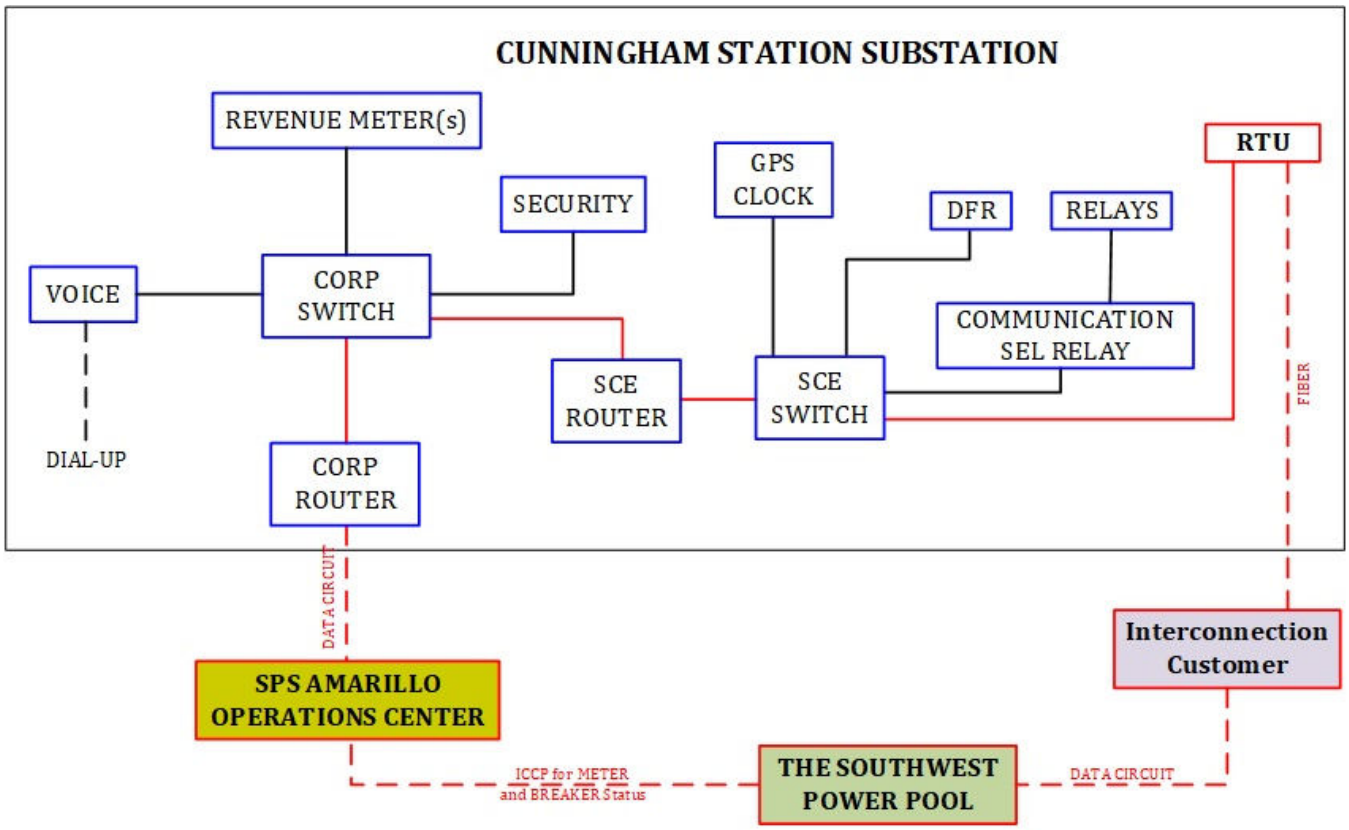

Figure 2 – Cunningham Station Communication Information

Table 3, - Available fault current at the 115 kV Cunningham Substation interconnection location

Short Circuit Information without contribution from new Generator Facilities (GEN 2023-GR4)				
Fault Location	Fault Current (Amps)		Impedance (Ω)	
	Line-to-Ground	3–Phase	Z^+	Z^0
Cunningham 115 kV bus	10,782.90	29,545.10	0.20378+j2.23799	0.21657+j1.66210

Other

Please see the Xcel Energy *Interconnection Guidelines For Transmission Interconnected Producer-Owned Generation Greater Than 20 MW* for additional requirements.

– END OF REPORT –