INTERCONNECTION FACILITIES STUDY REPORT

GEN-2017-187

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By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
04/14/2023	SPP	Initial draft report issued.
04/18/2023	SPP	Nameplate capacity corrected. POI corrected in upgrade descriptions.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request is for a 150 MW generating facility located in Terry County, TX. The Interconnection Request was studied in the DISIS-2017-002 Impact Study for ERIS. The Interconnection Customer's requested in-service date is December 30, 2025.

The interconnecting Transmission Owner, Southwestern Public Service (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 (51) 3.3 MVA Power Electronics 3000 MU Inverters for a total generating nameplate capacity of 150 MW.

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 115/34.5 kV 110/147/184 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- Unspecified lead distance 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 ("Flatland") 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
Flatland 115kV GEN-2017-187 Interconnection (TOIF) (SPS) (143461): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2017-187 (150 MW/Solar), into the Point of Interconnection (POI) at Flatland 115kV	$841,906	100%	$841,906	30 Months
Total	**$841,906**		**$841,906**	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)	Estimated Lead Time
Flatland 115kV GEN-2017-187 Interconnection (Non-Shared NU) (SPS) (143460): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2017-187 (150 MW/Solar), into the Point of Interconnection (POI) at Flatland 115kV	Ineligible	$16,197,956	100%	$16,197,956	30 Months
Total		**$16,197,956**		**$16,197,956**	

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
NA	**NA**	**NA**	**NA**	**NA**	**NA**
Total		NA		NA	

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
NA	**NA**	**NA**

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
NA	NA	NA	NA
Total	NA		NA

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 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)	$841,906
Non-Shared Network Upgrade(s)	$16,197,956
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$0
Total	**$17,039,862**

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 60 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 Interconnections as Requested by Southwest Power Pool (SPP)

DISIS 2017-002
Group 5
GEN-2017-187

Xcel Energy Services, Inc.

Southwestern Public Service Co.
Transmission Planning South
Updated 2/9/2023

Executive Summary

The Southwest Power Pool (SPP or Transmission Provider) evaluated the generation facilities requesting to interconnect to the SPS transmission system in the Definitive Interconnection System Impact Study (DISIS-2017-002), which was completed in February 2023. 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) request, Southwestern Public Service Company (SPS or Transmission Owner) determined what modifications/upgrades where needed on the SPS transmission system. Below are the Generation Interconnection requests and associated modification/upgrade costs:

Request Number		**TAM**	**TOIF**
GEN-2017-187		$ 16,197,956	$ 841,906

NOTE: The cost estimates are 2022 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 and the costs associated with them. Below is a description of the different project(s) and the scoping level costs associated with each. All costs identified below are without escalation. All projects, routes, and costs are subject to change.

New 115 kV Substation "Flatland"

A new 115 kV, six position breaker and one-half, switching station to be installed west of existing SPS substation Sulphur Springs to provide point-of-interconnection for GEN-2017-187. Substation will be located at 32.9786694 N, -102.3377361 W, in Terry County, Texas.

Transmission Line Details

Relocate T19 (Terry Co.-Sulphur Springs), T20 (Seagraves-Sulphur Springs), W68 (Diamondback-Sulphur Springs) to the new Flatland Substation. Install two, short (approximately 0.10 mile each) transmission lines from the new Flatland Switching Station to the existing Sulphur Springs substation.

Substation Details

Construct a new 115 kV breaker and one-half switching station west of the existing Sulphur Springs Substation. Install the necessary breakers, switches, metering equipment, protective relays, etc., to accommodate the connection of the customer's 150 MW, solar generation facility for GEN-2017-187.

Total Cost

The total cost estimate for this Network Upgrade is:

$	16,197,956	TAM
$	841,906	TOIF
$	17,039,862	Total Cost

The estimate is accurate to +/- 20%

Time Estimate

The information listed below is the expected duration for construction from the date of execution of the agreement to project in-service date.

Total Project Duration	30	Months

Figure 1 – Flatland Location

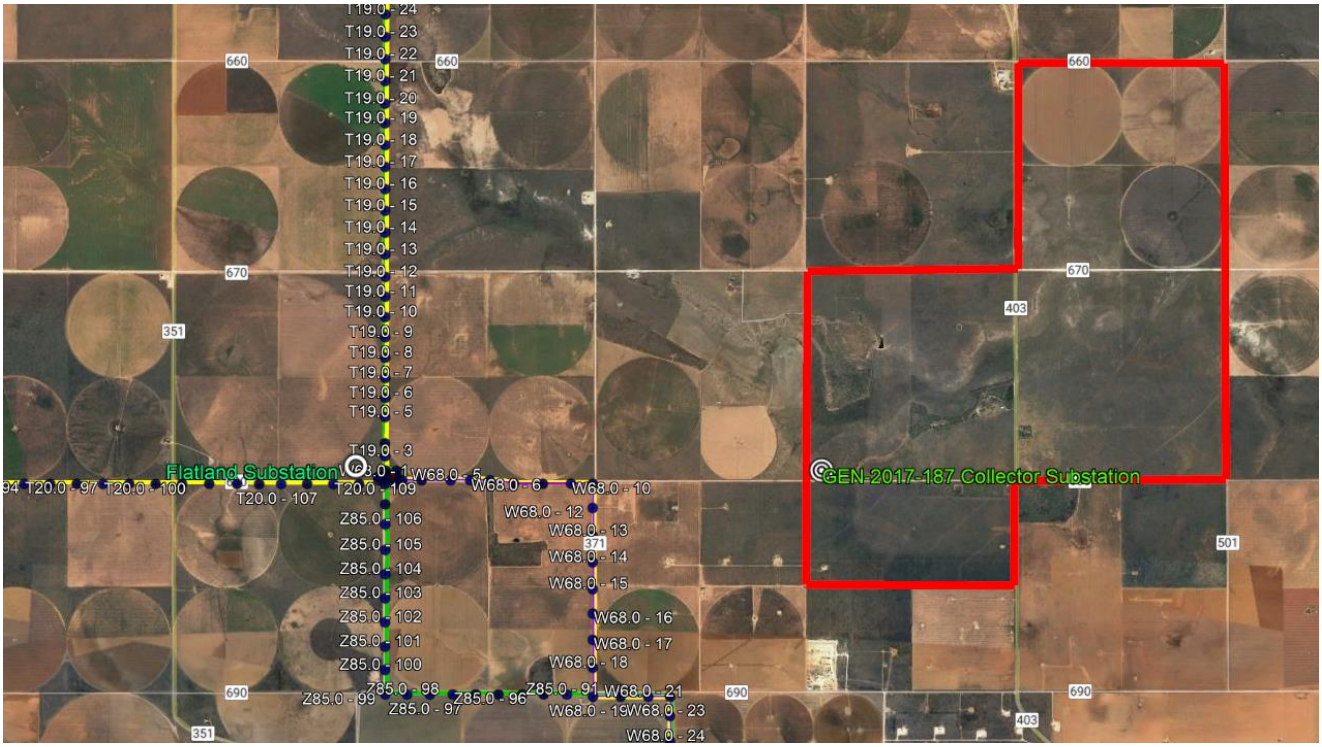

Figure 2 below shows the expected communication between the IC, SPP and SPS.
SPS will not serve as a proxy for communication from the IC to SPP.

Figure 2 – Flatland Communication Information

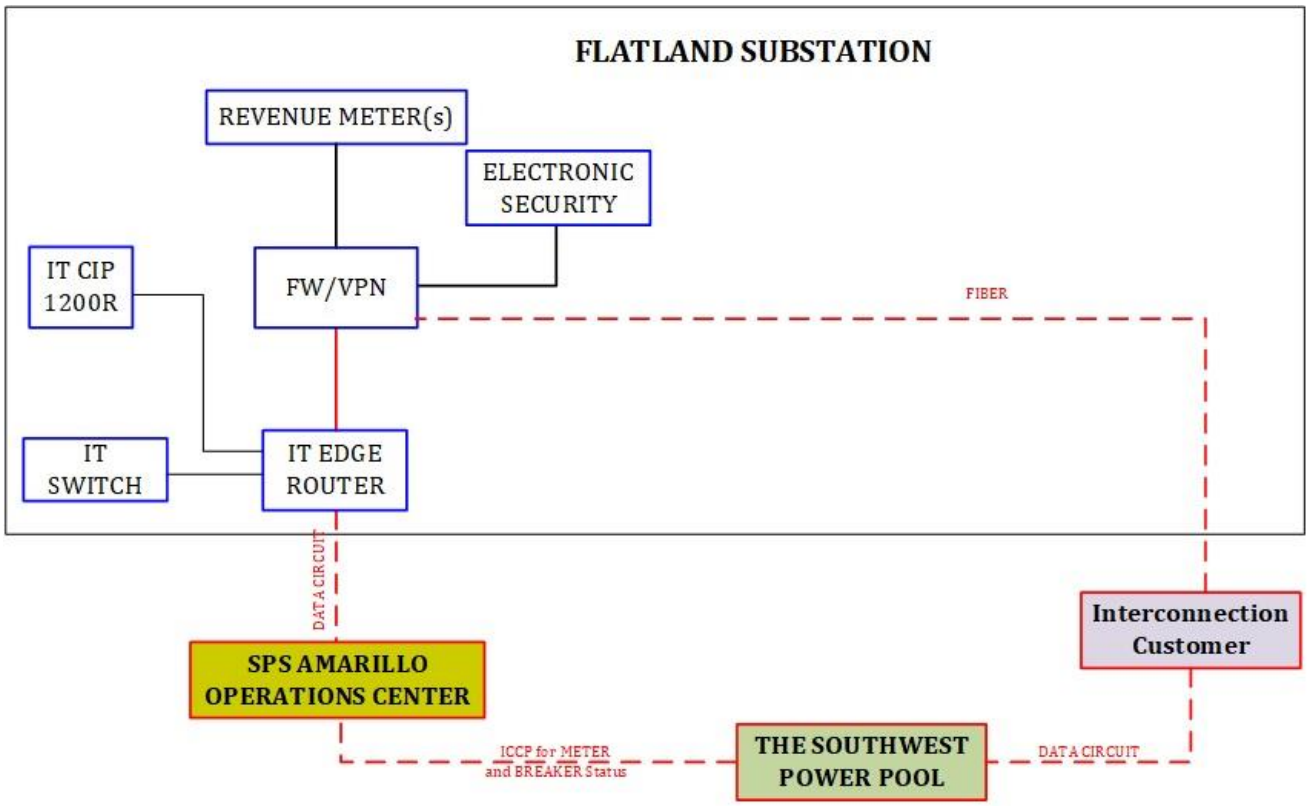

Figure 3 – Flatland Fault Current Information

Table 3 - Available fault current at interconnection location

Short Circuit Information without contribution from new Generator Facilities (GEN 2017-187)		
	Fault Current (Amps)	Impedance (Ω)

Fault Location	Line-to-Ground	3–Phase	Z^+	Z^0
115 kV Bus	4174.02	5542.67	3.05380+j11.5831	5.20460+j23.1982

Other

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

– END OF REPORT –