



INTERCONNECTION FACILITIES STUDY REPORT

GEN-2020-056

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By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
May 21, 2025	SPP	Initial draft report issued.
June 5, 2025	SPP	Final report issued.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2020-056 is for a 20 MW generating facility located in Russell County, KS. The Interconnection Request was studied in the DISIS-2020-001 Impact Study for NRIS. The Interconnection Customer's requested in-service date is 1/3/2025.

The interconnecting Transmission Owner, Sunflower Electric Power Corporation (SUNC), 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 one hundred (100) SG250HX-US solar inverters for a total generating nameplate capacity of 20 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 115kV transformation substation with associated 34.5 kV and 115kV switchgear;
- One 115kV/34.5 kV 13.5/18/22.5 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 0.01 mile overhead 115kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 115kV bus at existing Transmission Owner substation ("Russell 115 kV Substation") 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** list 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 (\$)
<u>Transmission Owner's Russell 115 kV Substation GEN-2020-056 Interconnection (TOIF) (UID144624): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2020-056 (20/Solar), into the Point of Interconnection (POI) at Russell 115 kV Substation. Estimated Lead Time: 18 Months</u>	\$2,177,009	100.00%	\$2,177,009
Total	\$2,177,009		\$2,177,009

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)
<u>Transmission Owner's Russell 115 kV Substation GEN-2020-056 Interconnection (UID144325): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2020-056 (20/Solar), into the Point of Interconnection (POI) at Russell 115 kV Substation. Estimated Lead Time: 18 Months</u>	Ineligible	\$309,607	100.00%	\$309,607
Total		\$309,607		\$309,607

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 (\$)
<u>NA</u>				
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
NA	\$0	

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 (\$)
AECI - Upgrade bushing CTs, breaker switchers on Sylvan-Sedalia 69 kV line (at Sedalia) to 1200 amp rating. Estimated Lead Time: 30 Months	\$350,000	11.74%	\$41,104
AECI - Rebuild 69 kV 6.31 mile long line from Coffman Bend - J-7 to 795 ACSR rated at 100C.. Estimated Lead Time: 48 Months	\$5,900,000	13.83%	\$816,211
Total	\$6,250,000		\$857,315

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 20 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)	\$2,177,009
Non-Shared Network Upgrade(s)	\$309,607
Shared Network Upgrade(s)	\$0
Affected System Upgrade(s)	\$857,315
Total	\$2,486,616

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).

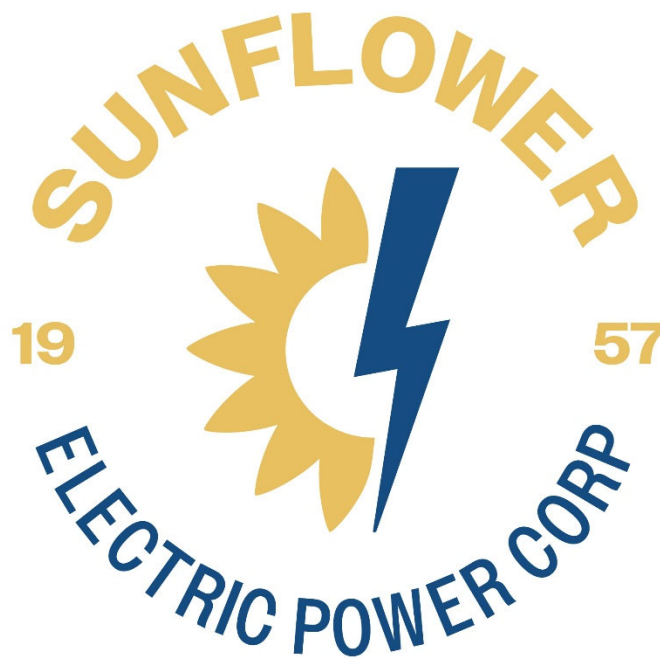
APPENDICES

**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).



**Interconnection Facilities Study
for GEN-2020-056 Network Upgrades
and TOIF upgrades at the Russell 115 kV Substation**



May 20, 2025

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STUDY OVERVIEW:

The Southwest Power Pool has requested a Facility Study for Interconnection Facilities and Network Upgrades from Sunflower Electric Power Corporation (Sunflower) at the Russell 115 kV substation for request GEN-2020-056. The GEN-2020-056 request consists of a total of 20 MW of solar generation interconnecting to the Russell 115 kV bus.

There are no Non-Shared Network Upgrades identified to accept a new generator lead. The cost for these Network Upgrades is estimated as \$0.

The Transmission Owner Interconnection Facility addition identified is a new 115 kV generator lead connection into the existing 115 kV substation. The cost for adding the new 115 kV generator lead is estimated as \$2,308,822.

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

INTERCONNECTION FACILITIES AND NON-SHARED NETWORK UPGRADES:

Transmission Owner Interconnection Facility (TOIF) additions required by Sunflower consist of the addition of a single 115 kV line terminal, circuit breaker, combination metering CTs and PTs, disconnect switches, structures, foundations, conductors, insulators, and all other associated work and materials in the existing Sunflower Russell 115 kV substation.

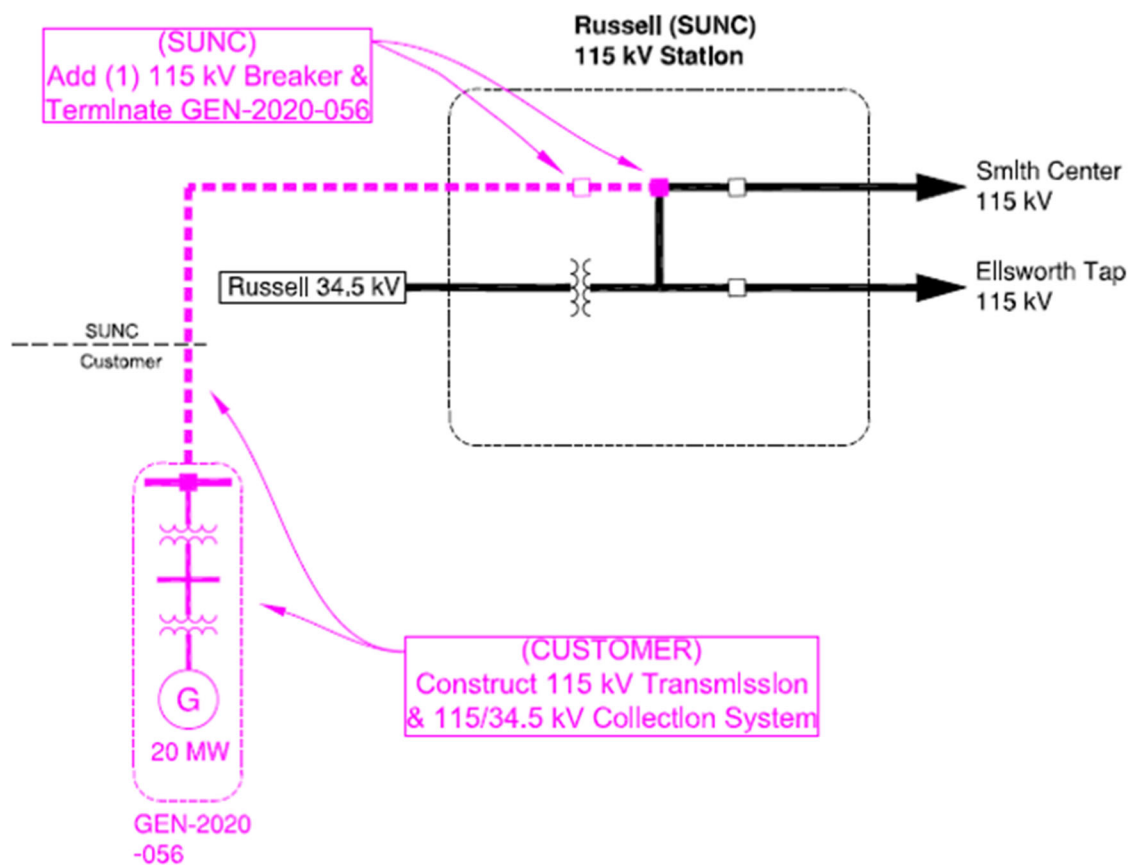
This 115 kV addition shall be constructed and maintained by Sunflower. It is assumed that obtaining all necessary right-of-way for the line into the Sunflower 115 kV substation facilities will be performed by the interconnection customer. The addition of generator 115 kV lead line from the Customer substation into the existing Sunflower Russell 115 kV substation and the 115/34.5 kV step up transformer that connects to the solar inverters is not included and is the responsibility of the interconnection customer.

Non shared Network Upgrades (NU) additions required by Sunflower consist of the addition of a primary/secondary bus differential/breaker failure relay panel in the existing Sunflower Russell 115 kV substation.

This addition shall be constructed and maintained by Sunflower.

The proposed arrangement for interconnection of GEN-2020-056 is shown in Figure 1.

Figure 1: One-line Diagram Facilities for GEN-2019-044



INTERCONNECTION COST:

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

Facilities	Estimated Cost (2023 Dollars)
Transmission Owner Interconnection Facilities (TOIF) Construct one (1) 115 kV line terminal in the existing Russell 115 kV substation with line circuit breaker, switches, dead end structure, line relaying, communications, revenue metering equipment, line arrestors, and all associated equipment and facilities necessary to accept transmission line from Interconnection Customer's Generating Facility.	\$2,177,009
Non-shared Network Upgrades Construct one (1) 115 kV primary/secondary bus differential/breaker failure relay panel.	\$309,607
Total Interconnection Cost:	\$2,486,616

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 18 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.