



**INTERCONNECTION
FACILITIES STUDY
REPORT**

GEN-2017-148

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By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
01/20/2023	SPP	Initial draft report issued.
07/24/2023	SPP	Table 5 revised to reflect updated AECI costs.
08/24/2023	SPP	Final report issued.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2017-148 is for a 202 MW generating facility located in Newton County, MO. The Interconnection Request was studied in the DISIS-2017-002 Impact Study for ERIS. The Interconnection Customer's requested in-service date is December 1, 2026.

The interconnecting Transmission Owner, Liberty Utilities (EDE), 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 one (101) 2.0 MW - GE 2.0 WTG Wind Turbine Generation Systems for a total generating nameplate capacity of 202 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 161 kV transformation substation with associated 34.5 kV and 161 kV switchgear;
- One 161/34.5 kV 135/180/225 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- 26 mile overhead kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 161 kV bus at existing Transmission Owner substation ("Joplin 161kV") 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
<u>Transmission Owner’s Joplin 161kV GEN-2017-148 Interconnection (TOIF) (EDE) (143399):</u> Interconnect the following Interconnection Customer facility, GEN-2017-148 (202 MW/Wind), into the Point of Interconnection (POI) at Joplin 161kV *TOIF is included in the cost estimate for 143398	\$0	100%	\$0	36 Months
Total	\$0		\$0	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
<u>Transmission Owner’s Joplin 161kV GEN-2017-148 Interconnection (Non-Shared NU) (EDE) (143398):</u> Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2017-148 (202 MW/Wind), into the Point of Interconnection (POI) at Joplin 161kV	Ineligible	\$77,516,722	100%	\$77,516,722	36 Months
Total		\$77,516,722		\$77,516,722	

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
<u>N/A</u>	N/A	N/A	N/A	N/A	N/A
Total		N/A		N/A	

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
<u>N/A</u>	N/A	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 (\$)
<u>NA</u>	NA	NA	NA
Total	NA		NA

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 202 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)	\$0
Non-Shared Network Upgrade(s)	\$77,516,722
Shared Network Upgrade(s)	\$0
Affected System Upgrade(s)	\$0
Total	\$77,516,722

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).



August 11, 2023

Budgetary Estimate – Rebuild Joplin SW Sub 389 to Add New 161kV Terminal for DISIS 2017-148

Currently, Joplin SW Sub 389 consists of six terminals on a single 161kV bus and is fully land-locked with no option to expand or shift. In order to accommodate a new GI customer’s request for a new transmission line terminal per 2017-148, the substation will need to be rebuilt and converted to a breaker and a half layout, including re-routing of all existing 161kV and 69kV transmission lines and distribution lines to the new sub site.

Sub Work:

High level scope includes building a new 7-position breaker and a half substation – with transformers, 69kV, and 12kV infrastructure – across the highway on property not owned by Liberty.

- Retire all existing equipment: breakers: (6)-161kV, (3)-69kV, (4)-12kV; 150MVA 161/69kV autotransformer, 22.4MVA 161/12kV transformer, tertiary capacitor bank, DFR, and all associated PT’s, switches, structures, foundations, bus-work, control enclosure and relay panels.
- Install new equipment: breakers: (11)-161kV, (3)-69kV, (4)-12kV; 150MVA 161/69kV autotransformer, 22.4MVA 161/12kV transformer, tertiary capacitor bank, DFR, and all associated PT’s, switches, structures, foundations, bus-work, and relay panels in a new control enclosure.

Maximo budgetary estimate #29322, Version 1 has been created.

Table 1 – Sub Estimate

Maximo Estimate	-	\$35,470,340
Engineering & Owner's Engineer	25%	\$8,867,585
Program Management	30%	\$10,641,102
Land Estimate (10 acres)		\$500,000
Subtotal	-	\$55,479,027
Contingency	20%	\$11,095,805
Total Line Work	-	\$66,574,832



August 11, 2023

Line Work:

High level scope includes re-routing (4) 161kV lines, (2) 69kV lines, and (4) 12kV lines from the current substation to the new substation site. Easement, land and tree clearing costs are not included in this line estimate.

- Retire: (3) 161kV Steel Poles; (6) 161kV Wood Poles; (2,100) ckt feet of 161kV 795 ACSR; (2,100) ckt feet of 161kV bundled Dove (12,600 Ln feet); and approximately 10,000 Ln feet of Distribution 1/0 ACSR.
- Install: (12) 161kV Self-Supporting Towers; (4) 69kV Self-Supporting Towers; (2) 161kV Direct Bury Steel Poles; (33) 69kV Direct Bury Steel Poles; (108) 161kV Insulators; (124) 69kV Insulators; (24) 161kV Guys and Anchors; (46) Dist. Guys; (33) Dist. anchors; (93) Dist. fixtures; (1,600) ckt feet of 161kV 1780 ACSR (5,040 Ln feet); (600) ckt feet of bundled 556 ACSR (3,600 Ln feet); (3,630) ckt ft of 161kV 795 ACSR (10,800 Ln feet); (6,600) ckt feet of 69kV 556 ACSR (19,800 Ln feet); (40,000) Ln feet of 556 AAC Distribution Conductor; (6,000) Ln ft of OPGW; 8 Motor Operated Dist. Switches and appurtenances.

Maximo budgetary estimate #29348 Version 1 has been created for the 161k Transmission portion, and DDS13922 Version 1 has been created for the 69kV Transmission as well as the Distribution portion. The Table 2 below represents the combination of these two estimates.

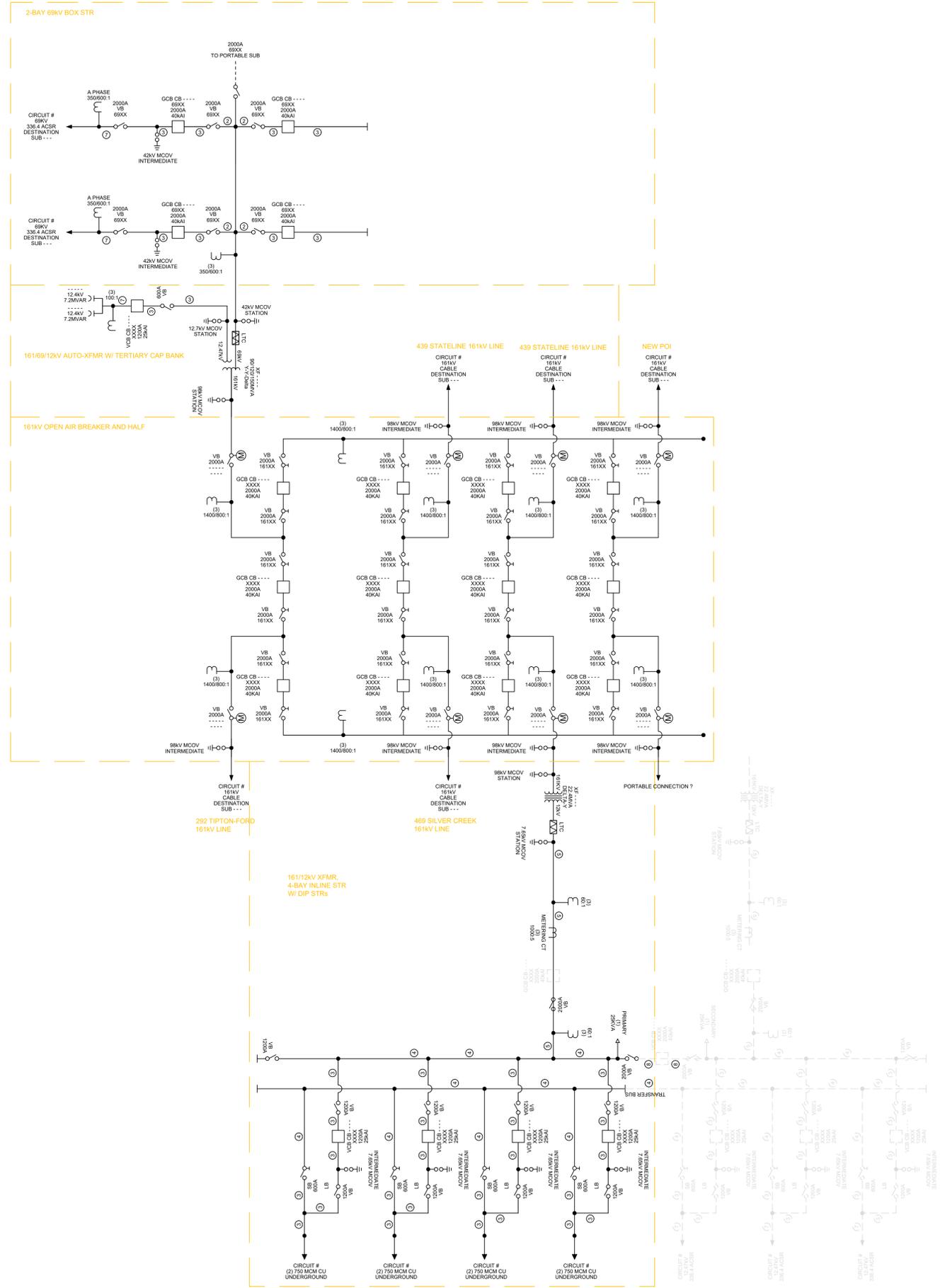
Table 2 – Line Estimate

Maximo Estimate	-	\$5,882,737
Engineering & Owner's Engineer	25%	\$1,470,684
Program Management	30%	\$1,764,821
Subtotal	-	\$9,118,242
Contingency	20%	\$1,823,648
Total Line Work	-	\$10,941,890

Table 3 – Total Budgetary Estimate

Total Estimates	\$77,516,722
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REV	DESCRIPTION	ENGR	DATE	DFTR
00#	REVISION DESCRIPTION	XXX	2019/##/##	XXX



ONE LINE DIAGRAM 389 DISIS

LOCATION: JOPLIN SOUTHWEST		TYPE: 1-LINE	
ENGR: GMH	DRAWN: TECH/DRFT	DATE: 07/25/2023	
SCALE: NO SCALE	SUB NO.	DWG. NO.	SH.
ID NO: ID_NO	SUB_NO.	DWG. NO.	SH#