



**INTERCONNECTION
FACILITIES STUDY
REPORT**

GEN-2017-183

Published April 2023

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
04/14/2023	SPP	Initial draft report issued.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request is for a 400 MW generating facility located in Hodgeman/Ford County, KS. The Interconnection Request was studied in the DISIS-2017-002 Impact Study for ERIS. The Interconnection Customer's requested in-service date is December 01, 2024.

The interconnecting Transmission Owner, Evergy (KCPL), 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 (160) 2.5-116 General Electric wind turbines for a total generating nameplate capacity of 400 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 345 kV transformation substation with associated 34.5 kV and 345 kV switchgear;
- One 345/34.5 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;
- Approx. 382 mile 345 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 345 kV bus at existing Transmission Owner substation ("Nashua-St. Joe 345kV") 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>Nashua - St. Joe 345kV GEN-2017-183 Interconnection (TOIF) (KCPL) (143453):</u> Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2017-183 (400 MW/Wind), into the Point of Interconnection (POI) at Nashua - St. Joe 345kV	\$614,710	100%	\$614,710	36 Months
Total	\$614,710		\$614,710	

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>NA</u>	NA	NA	NA	NA	NA
Total		NA		NA	

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>Nashua - St. Joe 345kV New Interconnection Substation (DISIS-2017-002) (143452):</u> Construct a new Nashua - St. Joe 345kV substation to accommodate the interconnection of GEN-2017-183 and GEN-2017-184.	Ineligible	\$27,950,399.00	50%	\$13,975,199.50	36 Months
Total		\$27,950,399.00		\$13,975,199.50	

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>NA</u>	<u>NA</u>	<u>NA</u>

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>AECI; Upgrade relay limits at Locust Creek 161 kV on Hickory Creek line with ratings of 203 MVA Summer/291 MVA Winter</u>	\$50,000	16.65%	\$ 8,324
<u>AECI; Rebuild 26.49-mile-long Morgan to Brookline 161 kV line with 1192 ACSR rated at 100C</u>	\$34,450,000	7.29%	\$ 2,510,557
<u>AECI; Upgrade Sullivan 161/138 kV transformer #1 with 143S MVA Summer/167 MVA Winter transformer</u>	\$4,000,000	10.32%	\$ 412,655
<u>AECI; Rebuild 0.6-mile-long Thomas Hill to Thomas Hill Mine Tap 69 kV line with 795 ACSR at 100C</u> <u>Upgrade bushing CTs at Thomas Hill on Thomas Hill Mine Tap line with 1200A bushing CTs</u> <u>Upgrade jumpers at Thomas Hill on Thomas Hill Mine Tap line with 795 ACSR</u>	\$790,000	8.02%	\$ 63,340
<u>AECI; Rebuild 9.24-mile-long Cairo to Huntsville 69 kV line with 795 ACSR rated at 100C</u> <u>Upgrade disconnect switches at Cario 69 kV on Huntsville line with 1200A switches</u>	\$8,570,000	8.02%	\$ 687,121
<u>AECI; Rebuild 4.50-mile-long Huntsville to Thomas Hill Mine Tap 69 kV line with 795 ACSR rated at 100C</u>	\$4,050,000	8.02%	\$ 324,719
<u>AECI; Rebuild 4.90-mile-long Enon Bus 2 to Ethlyn Bus 2 161 kV line with 795 ACSR rated at 100C</u>	\$6,370,000	8.02%	\$ 510,559
<u>AECI; Rebuild 5.58-mile-long Conway to Phillipsburg 69 kV line with 336.4 ACSR rated at 100C</u>	\$5,040,000	7.06%	\$ 355,994

<u>AECI: Rebuild 13.2-mile-long Northboro to Tarkio 69 kV line with 336 ACSR rated at 100C</u>	\$11,880,000	23.28%	\$ 2,765,327
<u>AECI: Rebuild 17-mile-long Belltown to Palmyra 69 kV line with 336 ACSR rated at 100C</u> <u>Upgrade bushing CTs at Belltown 69 kV on Palmyra line with 70 MVA Summer/85 MVA Winter rated bushing CTs</u>	\$15,500,000	9.93%	\$ 1,538,961
<u>AECI: - Rebuild 18.4-mile-long Cairo to Letner 69 kV line with 336 ACSR rated at 100C</u>	\$16,560,000	9.96%	\$1,649,934
<u>AECI: - Rebuild 5.4-mile-long Letner to Shelbina 69 kV line with 336 ACSR rated at 100C</u>	\$4,860,000	10.96%	\$532,811
<u>AECI: - Rebuild 8.8-mile-long Sue City to Lovelake 69 kV line with 336 ACSR rated at 100C</u> <u>Upgrade bushing CTs at Lovelace 69 kV on Sue City line with 70 MVA Summer/85 MVA Winter rated busing CTs</u>	\$8,120,000	10.97%	\$891,019
<u>AECI: Rebuild 3.6-mile-long Macon East 3 to Macon Tap 69 kV line with 336 ACSR rated at 100C</u>	\$3,240,000	11.03%	\$357,230
<u>AECI: Rebuild 9.8-mile-long Sue City to Novelty Dist 69 kV line with 336 ACSR rated at 100C</u>	\$8,820,000	10.97%	\$967,831
<u>AECI: Upgrade bushing CTs at Chamois 69 kV on Reform 69 kV line with 600A rated bushing CTs</u>	\$200,000	12.65%	\$25,305
<u>AECI: Rebuild 6.50-mile-long Coffman Bend to J-7 69 kV line with 366 ACSR rated at 100C</u>	\$5,850,000	4.87%	\$284,850
<u>AECI: Rebuild 4.40-mile-long Coffman Bend to Knobby 69 kV line with 336 ACSR rated at 100C</u>	\$3,960,000	4.87%	\$192,822
<u>AECI: Rebuild 2.4-mile-long Palmyra to Bross 69 kV line with 336 ACSR rated at 100C</u>	\$2,160,000	9.87%	\$213,165
<u>AECI: Rebuild 2.8-mile-long South River to Bross 3 69 kV line with 336 ACSR rated at 100C</u>	\$2,520,000	9.87%	\$248,693
<u>AECI: Rebuild 0.2-mile-long Novelty to Novelty Distribution 69 kV line with 336 ACSR rated at 100C</u> <u>Upgrade bushing CTs at Novelty 69 kV on Novelty Distribution line with 600A rated bushing CTs</u>	\$380,000	10.83%	\$41,165
<u>AECI: Rebuild 2.3-mile-long Lakenan to Shelbina 69 kV line with 336 ACSR rated at 100C</u>	\$2,070,000	10.90%	\$225,647

<u>AECI; Rebuild 11.6-mile-long Belltown to Lakenan 69 kV line with 336 ACSR rated at 100C</u> <u>Upgrade bushing CTs at Belltown 69 kV on Lakenan line with 600A rated bushing CTs</u>	\$10,550,000	10.86%	\$1,145,670
<u>AECI; Rebuild 0.5-mile-long Macon East 3 to Ten Mile Tap 69 kV line 4/0 line section with 336</u> <u>ACSR rated at 100C</u>	\$450,000	10.78%	\$48,501
<u>AECI; Uprate 12.4-mile-long Knobby to Turkey Creek 69 kV line from 75C rating to 100C</u>	\$3,700,000	4.87%	\$180,162
<u>AECI; Upgrade wave-traps and disconnect switches at Choteau 161 kV on Maid line with 873</u> <u>MVA Summer/1071 MVA Winter rated equipment</u>	\$400,000	10.92%	\$43,664
<u>AECI; Rebuild to 1.2-mile-long Axtell to Macon Lake 69 kV line with 1192 ACSR</u>	\$1,560,000	9.23%	\$144,028
<u>AECI; Rebuild to 1.1-mile-long Axtell to Macon Tap 69 kV line with 1192 ACSR</u>	\$1,430,000	9.23%	\$132,026
<u>AECI; Rebuild to 4.3-mile-long Macon Lake to Bevier Tap 69 kV line with 1192 ACSR</u>	\$5,590,000	9.23%	\$516,102
Total	\$173,120,000		\$17,018,182

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)	\$614,710
Non-Shared Network Upgrade(s)	\$0
Shared Network Upgrade(s)	\$13,975,199.50
Affected System Upgrade(s)	\$17,018,182
Total	\$31,608,091.50

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).