



**INTERCONNECTION
FACILITIES STUDY
REPORT**

GEN-2018-022

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By SPP Generator Interconnections Dept.

REVISION HISTORY

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CONTENTS

Revision History i

Summary 1

 Introduction 1

 Phase(s) of Interconnection Service 1

 Compensation for Amounts Advanced for Network Upgrade(s)..... 1

 Interconnection Customer Interconnection Facilities 2

 Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s) 3

 Shared Network Upgrade(s) 4

 Contingent Network Upgrade(s)..... 5

 Affected System Upgrade(s) 6

 Conclusion..... 8

Appendices 9

 A: Transmission Owner’s Interconnection Facilities Study Report and Network Upgrades Report(s)... 10

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2018-022 is for a 300 MW generating facility located in Nodaway, MO. The Interconnection Request was studied in the DISIS-2018-001 Impact Study for ER/NR. The Interconnection Customer's requested in-service date is July 15, 2025.

The interconnecting Transmission Owner, Evergy (GMO), 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-eight (108) 3.326MW INGECON SUN 3825TL U C600 and one (1) 3.15 MW Sungrow SG3150U-MV for a total generating nameplate capacity of 300 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;
- Two 345/34.5 kV 108/144/180 MVA (ONAN/ONAF/ONAF) step-up transformers to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 1.42 miles overhead 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 ("Mullen Creek 345kV 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 Mullen Creek 345kV Substation GEN-2018-022 Interconnection (TOIF) (EMW) (UID156168): Facilitate the interconnection of GEN-2018-022 Estimated Lead Time: 36 Months</u>	\$1,705,965	100.00%	\$1,705,965
Total	\$1,705,965		\$1,705,965

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 Mullen Creek 345kV Substation Interconnection Expansion (DISIS-2018-001) (UID156169): Facilitate the interconnection of GEN-2018-022 Estimated Lead Time: 36 Months</u>	Ineligible	\$16,363,049	100.00%	\$16,363,049
Total		\$16,363,049		\$16,363,049

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>TSMO’s Holt 345 kV Substation (UID158563): Line terminal work at the Transource owned Holt 345kV substation associated with building the Holt to Atchison new 345kV line. This will require Holt substation to be reconfigured to a 345kV breaker and a half from the current ring bus. Estimated Lead Time: 48 Months</u>	Eligible	\$20,623,461	90.24%	\$18,610,611
<u>EKC’s Holt to Atchison New 345 kV Line (DISIS-2018-001) (UID 158628): Evergy to build a new 345kV line from Holt (Transource) to Atchison (MEC) Line. The straight-line distance between these subs is approximately 22.5 miles. This estimate assumes a total line length of 25 miles. Estimated easement costs are included in this estimate but are only estimates. Estimated Lead Time: 48 Months</u>	Eligible	\$61,642,822	90.24%	\$55,626,483
Total		\$82,266,283		\$74,237,094

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
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>AECI’s NU01 OPEN BRANCH FROM BUS 300084 [5GRNFRT 161.00] TO BUS 505440 [DONIPH5 161.00] CKT 1 OPEN BRANCH FROM BUS 300040 [7FLETCH 345.00] TO BUS 300054 [7GOBKNOB 345.00] CKT 1 OPEN BRANCH FROM BUS 300048 [7STFRAN 345.00] TO BUS 300054 [7GOBKNOB 345.00] CKT 1</u>	\$3,750,000	16.37%	\$613,891
<u>AECI’s NU02 OPEN BRANCH FROM BUS 300084 [5GRNFRT 161.00] TO BUS 505440 [DONIPH5 161.00] CKT 1 OPEN BRANCH FROM BUS 300040 [7FLETCH 345.00] TO BUS 300054 [7GOBKNOB 345.00] CKT 1 OPEN BRANCH FROM BUS 300048 [7STFRAN 345.00] TO BUS 300054 [7GOBKNOB 345.00] CKT 1</u>	\$8,850,000	16.37%	\$1,448,782
<u>AECI’s NU03 OPEN BRANCH FROM BUS 300084 [5GRNFRT 161.00] TO BUS 505440 [DONIPH5 161.00] CKT 1 OPEN BRANCH FROM BUS 300040 [7FLETCH 345.00] TO BUS 300054 [7GOBKNOB 345.00] CKT 1 OPEN BRANCH FROM BUS 300048 [7STFRAN 345.00] TO BUS 300054 [7GOBKNOB 345.00] CKT 1</u>	\$5,320,000	16.33%	\$868,748
<u>AECI’s NU04 OPEN BRANCH FROM BUS 300084 [5GRNFRT 161.00] TO BUS 505440 [DONIPH5 161.00] CKT 1 OPEN BRANCH FROM BUS 300040 [7FLETCH 345.00] TO BUS 300054 [7GOBKNOB 345.00] CKT 1 OPEN BRANCH FROM BUS 300048 [7STFRAN 345.00] TO BUS 300054 [7GOBKNOB 345.00] CKT 1</u>	\$1,820,000	16.33%	\$297,203
<u>AECI’s NU05 OPEN LINE FROM BUS 300036 [5ELATHRP 161.00] TO BUS 301310 [5REX 161.00] CKT 1</u>	\$4,200,000	6.01%	\$252,557

<u>AECI's NU07 OPEN BRANCH FROM BUS 300088 [5HUBEN 161.00] TO BUS 300102 [5MRSHFL 161.00] CKT 1</u>	\$4,418,000	16.78%	\$741,342
<u>*MISO/MEC's Atchison 345 kV Substation: substation and line work to accommodate the new proposed 345 kV line into Atchison County Substation</u>	\$12,500,000	90.24%	\$11,280,000
Total	\$40,858,000		\$15,502,523

***MISO/MEC's Atchison 345 kV Substation cost estimate assumes:**

1. The existing third-party wind farm will be willing to move its existing overhead collector feeder and potentially a wind anemometer tower, in order to be able to move an existing line to a new terminal.
2. The cost for the wind farm's work is not included and it should be noted the wind farm would not be required by FERC to move its feeder or provide the MidAmerican the easement to move the existing 345 kV line to make room for the proposed line
3. The existing dead-end structure for the line that will be moved can accommodate the new line
4. The proposed new line will have OPGW for the primary communications path for system protection
5. A second, independent communication path for system protection will be provided by the Transmission Owner of the new line and such costs are covered in their estimate of the proposed line

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 300 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)	\$1,705,965
Non-Shared Network Upgrade(s)	\$16,363,049
Shared Network Upgrade(s)	\$74,237,094
Affected System Upgrade(s)	\$15,502,523
Total	\$107,808,631

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

**Costs associated with
DISIS-2018-001
GEN-2018-022**

October 2023

Introduction

This report summarizes the scope of the Interconnection Facilities Analysis for Network Upgrade(s) to determine costs related to the addition of the SPP-GI DISIS-2018-001 Interconnection Request(s). Evergy, as a TO, is receiving an unprecedented amount of GI interconnect requests. The cost estimates and interconnect information supplied are based on current system configuration. There are many cases of multiple GI's requesting POIs at the same substation. Ongoing changes in Evergy's transmission system configuration could affect the required system upgrades and costs necessary to meet any particular GI interconnect request in the future.

Southwest Power Pool Generation Interconnection Request:

Per the SPP Generator Interconnection Procedures (GIP), SPP has requested that Evergy perform an Interconnection Facilities Study (IFS) for Network Upgrade(s) 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 for the following Interconnection Request(s):

Upgrade Type	UID	Upgrade Name	Lead Time	DISIS Cost Estimate
Interconnection	156168	Mullin Creek 345kV Substation GEN-2018-022 Interconnection (TOIF) (EMW)	36	\$1,705,966
Interconnection	156169	Mullin Creek 345kV Substation Interconnection Expansion (DISIS-2018-001)	36	\$16,363,050

Mullin Creek Substation GEN-2018-022 Interconnection (TOIF) (EMW)

345kV Substation

TOIF for rebuilding Mullin Creek 345kV to a breaker and a half configuration to accommodate GEN-2018-022 (300 MW of Solar). UID 156168

Total Cost

The total cost estimate for this TOIF is:

\$	0	Transmission Line
\$	1,700,863	Substation
\$	5,103	AFUDC
\$	0	Contingency
\$	1,705,966	Total

This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings cannot be assured.

Time Estimate

Time estimates are based on current version of the project schedule and some processes of each category run concurrently.

Engineering Time	36-48	Months
Procurement Time	36-48	Months
Construction Time	36-48	Months
<hr/>		
Total Project Length	36-48	Months

Mullin Creek 345kV Substation Interconnection Expansion (DISIS-2018-001) (EKC)

345kV Substation Interconnection Expansion

Network Upgrades for an interconnection expansion to accommodate GEN-2018-022 (300 MW of Solar). This estimate is the cost associated with the interconnection expansion to a three (3) terminal configuration at the Mullin Creek 345kV Substation for the GEN-2018-022 line terminal. Also, the 69kV equipment currently located in the southeast corner of the substation will be relocated to the northeast corner to accommodate the gen lead entering the substation from the south. UID 156169

Total Cost

The total cost estimate for this NU is:

\$	1,933,050	Transmission Line
\$	13,159,942	Substation
\$	109,733	AFUDC
\$	1,160,325	Contingency
<hr/>		
\$	16,363,050	Total

This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings cannot be assured.

Time Estimate

Time estimates are based on current version of the project schedule and some processes of each category run concurrently.

Engineering Time	36-48	Months
Procurement Time	36-48	Months
Construction Time	36-48	Months
<hr/>		
Total Project Length	36-48	Months

Figure 1 –Mullin Creek 345kV Substation





Interconnection Facilities Study

**Costs associated with
DISIS-2018-001**

December 2023

Introduction

This report summarizes the scope of the Interconnection Facilities Analysis for Network Upgrade(s) to determine costs related to the addition of the SPP-GI DISIS-2018-001 Interconnection Request(s). Evergy, as a TO, is receiving an unprecedented amount of GI interconnect requests. The cost estimates and interconnect information supplied are based on current system configuration. There are many cases of multiple GI's requesting POIs at the same substation. Ongoing changes in Evergy's transmission system configuration could affect the required system upgrades and costs necessary to meet any particular GI interconnect request in the future.

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Upgrade Type	UID	Upgrade Name	Lead Time	DISIS Cost Estimate
Current Study	158628	Build Holt to Atchison New 345kV Line	48	\$61,642,822
Current Study	158563	Build Holt to Atchison new 345kV Line (Transource)	48	\$20,623,461

Build new Holt to Atchison 345kV line (DISIS-2018-001)

345kV Substation

Line terminal work at the Transource owned Holt 345kV substation associated with building the Holt to Atchison new 345kV line. This will require Holt substation to be reconfigured to a 345kV breaker and a half from the current ring bus. UID 158563

Total Cost

The total cost estimate:

\$	1,104,600	Transmission Line
\$	19,422,439	Substation
\$	96,422	AFUDC
\$	0	Contingency
<hr/>		
\$	20,623,461	Total

This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings cannot be assured.

Time Estimate

Time estimates are based on current version of the project schedule and some processes of each category run concurrently.

Engineering Time	36-48	Months
Procurement Time	36-48	Months
Construction Time	36-48	Months
<hr/> Total Project Length	36-48	Months

Build new Holt to Atchison 345kV line (DISIS-2018-001)

345kV Line

Every to build a new 345kV line from Holt (Transource) to Atchison (MEC) Line. The straight-line distance between these subs is approximately 22.5 miles. This estimate assumes a total line length of 25 miles. Estimated easement costs are included in this estimate but are only estimates. UID 158628

Total Cost

The total cost estimate:

\$ 59,584,649	Transmission Line
\$	Substation
\$ 2,058,173	AFUDC
\$ 0	Contingency
<hr/> \$ 61,642,822	Total

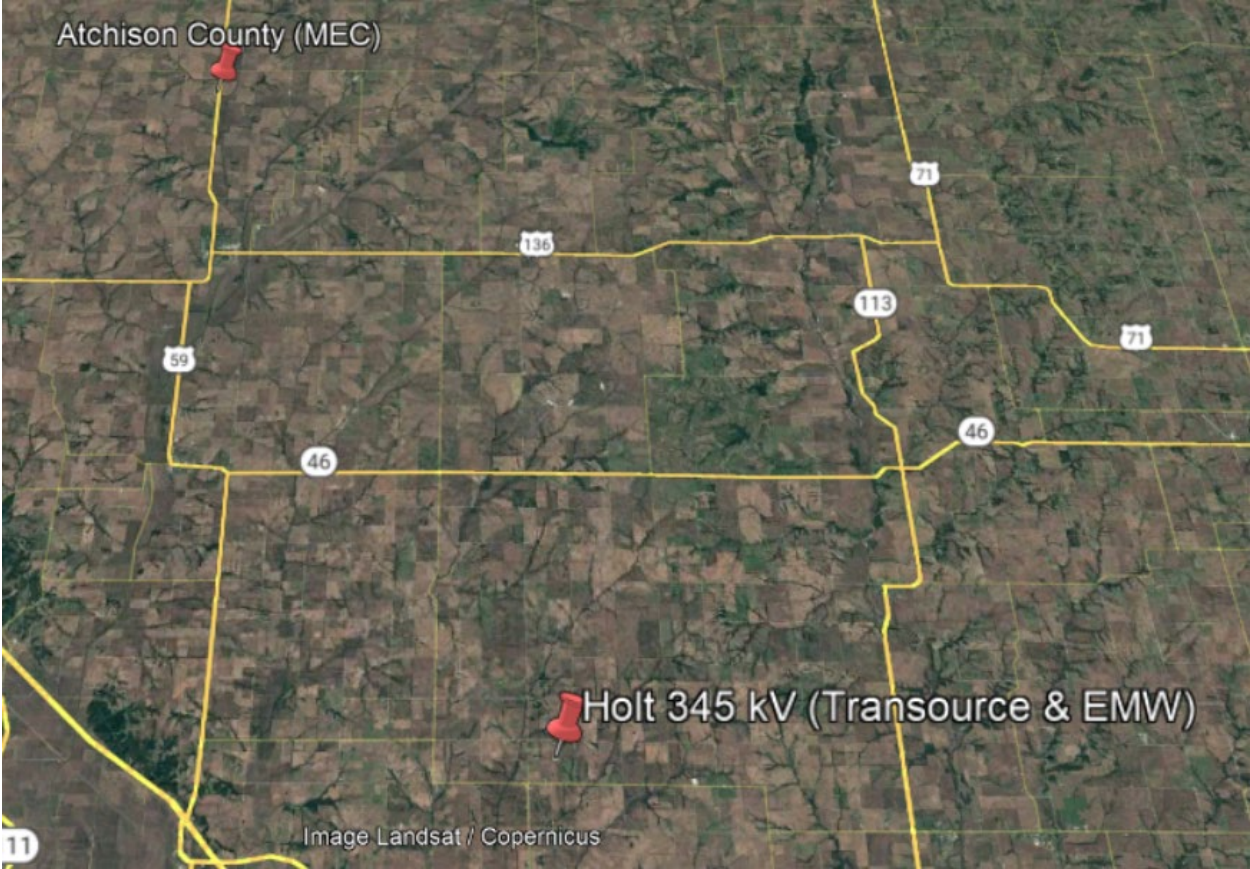
This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings cannot be assured.

Time Estimate

Time estimates are based on current version of the project schedule and some processes of each category run concurrently.

Engineering Time	36-48	Months
Procurement Time	36-48	Months
Construction Time	36-48	Months
<hr/> Total Project Length	36-48	Months

Figure 1 –New Holt-Atchison 345kV Line



Holt 345kV substation

