INTERCONNECTION FACILITIES STUDY REPORT

GEN-2018-062

Published January 2024

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
January 26, 2024	SPP	Initial draft report issued.
February 8, 2024	SPP	Final report issued.

CONTENTS

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2018-062 is for a 75.6 MW generating facility located in Wyandotte, KS. The Interconnection Request was studied in the DISIS-2018-001 Impact Study for ER/NR. The Interconnection Customer's requested in-service date is October 6, 2028.

The interconnecting Transmission Owner, Evergy (KACY), 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 Twenty-one (21) 3.619 MW Solar Inverters for a total generating nameplate capacity of 75.6 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 60/80/100 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 31 miles 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 ("Nearman 161kV 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** 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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Nearman 161kV Substation GEN-2018-062 Interconnection (TOIF) (KACY) (UID156172): Facilitate the interconnection of GEN-2018-062 Estimated Lead Time: 0 Months	$0	100.00%	$0
Total	**$0**		**$0**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Nearman 161kV Substation Interconnection Expansion (DISIS-2018-001) (UID156173): Facilitate the interconnection of GEN-2018-062 Estimated Lead Time: 40 Months	Ineligible	**$3,485,616**	100.00%	**$3,485,616**
Total		**$3,485,616**		**$3,485,616**

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
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	Eligible	$20,623,461	1.12%	$230,983
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	Eligible	$61,642,822	1.12%	$690,400
Total		**$82,266,283**		**$921,383**

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
***MISO/MEC's Atchison 345 kV Substation: substation and line work to accommodate the new proposed 345 kV line into Atchison County Substation**	$12,500,000	1.12%	$11,280,000
Total	$12,500,000		$140,000

***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 75.6 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)	$3,485,616
Shared Network Upgrade(s)	$921,383
Affected System Upgrade(s)	$140,000
Total	**$4,546,999**

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).

SPP DISIS-2018-062	
Kansas City Board of Public Utilities - Transmission Owner's Interconnection Facilities (TOIF)	
Description	**Allocated Cost Estimate**
Removing this option due to changes in KCBPU forecasted projects. There is currently two (2) spare 161 kV terminals at Nearman 161 kV substation. One of these terminals is designated for an upcoming project to complete the double circuit 161 kV line from Quindaro to Nearman substation. This line was originally constructed as double circuit but only one of the lines were brought into each substation. The remaining other spare terminal is also designated for a future KCBPU internal project and we prefer not to relinquish our final spare bus position. **Estimated Lead Time: 0 Month's**	$0
Total TOIF:	**$0**

SPP DISIS-2018-062	
Kansas City Board of Public Utilities - Network Upgrades Constructed by Transmission Owner	
Description	**Allocated Cost Estimate**
Extend north & south 161kV bus east for new bay. Construct a new breaker & half bay at Nearman Creek Substation to interconnect project transmission line to the substation bus. **Estimated Lead Time: 40 Month's**	$3,485,616
Total Non-Shared Network Upgrades:	**$3,485,616**

GEN-2018-062
Nearman Substation Expansion
Cost Estimate

Site Work

Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
Fence	600	LF	89.985		$ 53,991.00	$ 53,991.00
Cut	1481.48	CY	9.065		$ 13,429.62	$ 13,429.62
Fill & compact	740.74	CY	38.5175		$ 28,531.45	$ 28,531.45
Haul Off	1777.776	CY	15.12		$ 26,879.97	$ 26,879.97
Top Rock	987.65	CY	264.25		$ 260,986.51	$ 260,986.51
Site Geo Technical	1	EA	10000		$ 10,000.00	$ 10,000.00

Foundations

Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
161kV Take Off Tower A Frame	4	EA	14000		$ 56,000.00	$ 56,000.00
161kV Vertical Break Switch Supports fnd (high bus)	4	EA	4375		$ 17,500.00	$ 17,500.00
161kV A Frame Bus Supports fnd (low bus)	4	EA	4375		$ 17,500.00	$ 17,500.00
161kV Surge Arrestor fnd	3	EA	1487.5		$ 4,462.50	$ 4,462.50
161kV PT(CCVT) fnd	3	EA	2100		$ 6,300.00	$ 6,300.00
161 kV Vertical Break Switch fnd (low bus)	8	EA	2100		$ 16,800.00	$ 16,800.00
161kV Circuit Breaker fnd Portion	2	EA	8750		$ 17,500.00	$ 17,500.00
Yard Light fnd	3	EA	1487.5		$ 4,462.50	$ 4,462.50

Steel Structures

Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
161kV Take Off Tower A Frame	1	EA	78750	$ 78,750.00	$ 54,250.00	$ 133,000.00
161kV Vertical Break Switch Stand (high)	2	EA	8750	$ 17,500.00	$ 54,250.00	$ 71,750.00
161kV Vertical Break Switch Stand (low)	4	EA	6475	$ 25,900.00	$ 17,500.00	$ 43,400.00
161kV Surge Arrestor Stand	3	EA	875	$ 2,625.00	$ 875.00	$ 3,500.00
161kV PT(CCVT)	3	EA	1225	$ 3,675.00	$ 1,750.00	$ 5,425.00
161kV A Frame Bus Support Stands (high)	4	EA	8750	$ 35,000.00	$ 8,750.00	$ 43,750.00
161kV A Frame Bus Support Stands (low)	4	EA	6125	$ 24,500.00	$ 8,750.00	$ 33,250.00
Yard Light Poles	3	EA	787.5	$ 2,362.50	$ 875.00	$ 3,237.50

Raceway

Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
Cable Trench Expansion	1	LOT	40000	$ 40,000.00	$ 61,250.00	$ 101,250.00

Grounding

Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
Ground Grid	1	LOT	114929.9		$ 114,929.85	$ 114,929.85

Control Cable

Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
Control Cable	1	LOT	43750	$ 43,750.00	$ 35,000.00	$ 78,750.00

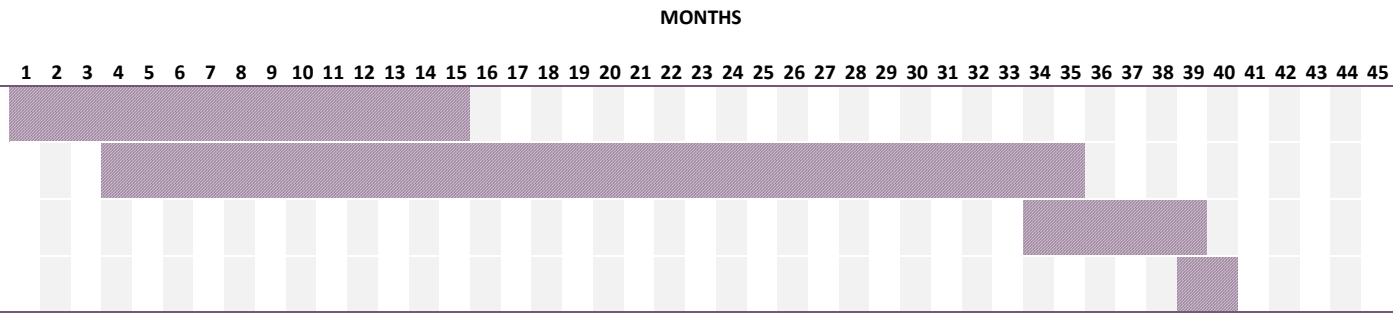
Buswork and Fittings

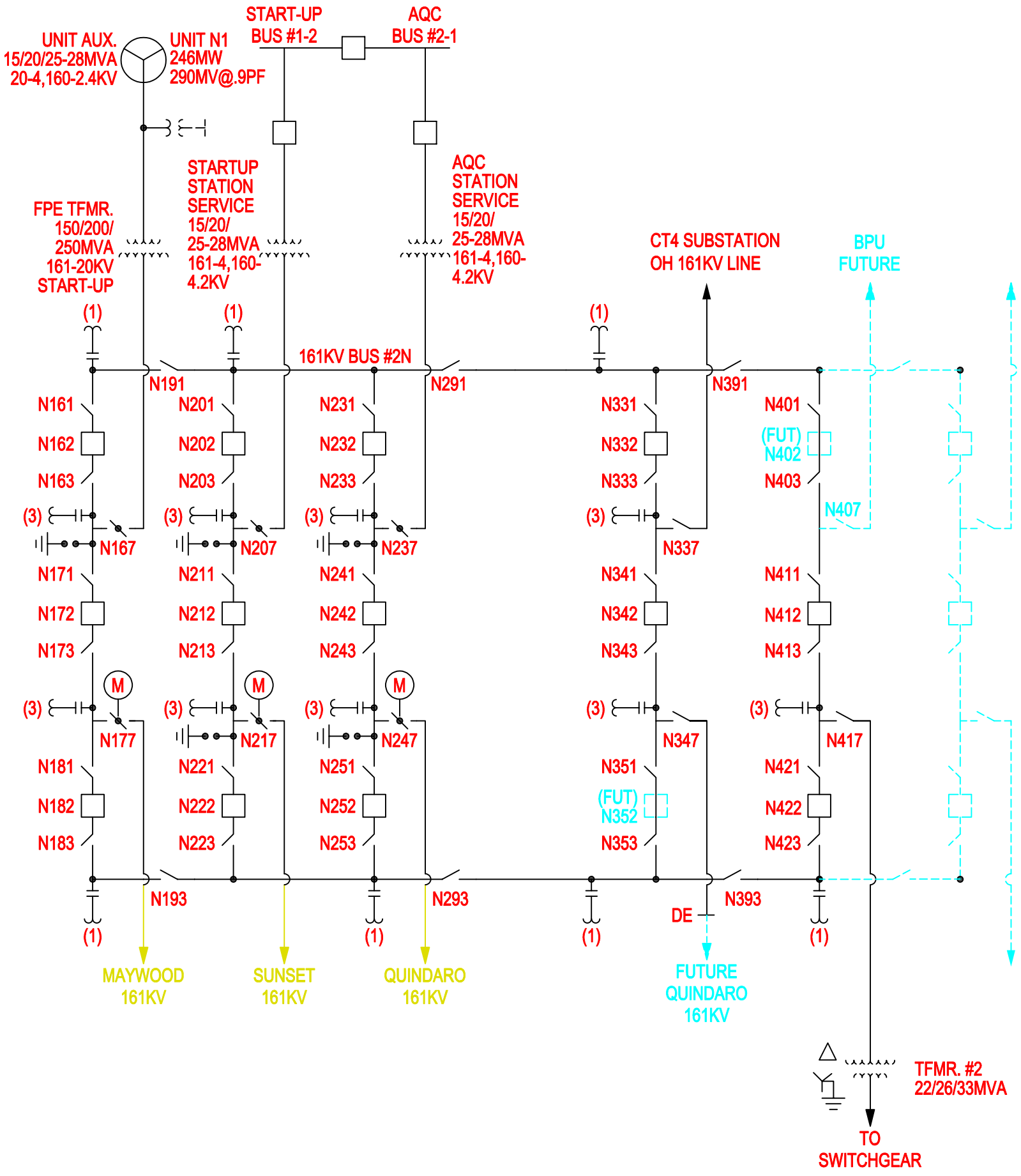
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
4" IPS Alum Schedule 40 Bus	882	LF	50.0675	$ 44,159.54	$ 76,789.13	$ 120,948.66
2 x 2.5" IPS Alum Schedule 40 Bus	180	LF	36.75	$ 6,615.00	$ 15,671.25	$ 22,286.25
Misc. Connectors Jumpers Assemblies/Breaker/Switch	1	LOT	17500	$ 17,500.00	$ 26,250.00	$ 43,750.00
161kV Insulators	40	EA	822.5	$ 32,900.00	$ 16,450.00	$ 49,350.00

Circuit Breakers Structures						
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
161kV SF6 Breakers	2	EA	105000	$ 210,000.00	$ 4,200.00	$ 214,200.00
Disconnect Switches						
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
161kV Vertical Break Disconnect Switch	6	EA	55000	$ 330,000.00	$ 94,500.00	$ 424,500.00
161kV Center Break Disconnect Switch	1	EA	55000	$ 55,000.00	$ 15,750.00	$ 70,750.00
Potential and Current Transformers						
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
161kV PTs/CCVT	3	EA	12592	$ 37,776.00	$ 5,250.00	$ 43,026.00
Surge Arrestors						
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
161kV Surge Arrestor	3	EA	4375	$ 13,125.00	$ 3,000.00	$ 16,125.00
Metering and Relay						
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
North Bus Differential Relay Panel	1	EA	35000	$ 35,000.00	$ 5,000.00	$ 40,000.00
South Bus Differential Relay Panel	1	EA	35000	$ 35,000.00	$ 5,000.00	$ 40,000.00
Line Relay Panel	1	EA	35000	$ 35,000.00	$ 5,000.00	$ 40,000.00
Control House						
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
AC Panel Expansion	1	LOT	2000	$ 2,000.00	$ 6,000.00	$ 8,000.00
DC Panel Expansion	1	LOT	2000	$ 2,000.00	$ 6,000.00	$ 8,000.00
RTU Expansion	1	LOT	3740	$ 3,740.00	$ 7,480.00	$ 11,220.00
Testing and Commissioning						
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
Testing and Commissioning	1	LOT	100000		$ 100,000.00	$ 100,000.00
Engineering Services						
Item Name	Quantity	Units	Unit Cost	Material Extended	Subcontractor/ Labor Extended	Extended Cost
Electrical, Mechanical, Civil, Procurement Support	1	LOT	750000		$ 750,000.00	$ 750,000.00
					Project Contingency	$ 316,874.18
					Total Expansion Cost	**$ 3,485,616.00**

DISIS-2018-001 Project Schedule

MILESTONE	START	DURATION
Engineering	1	15
Procurment	4	32
Construction	34	6
Testing	39	2





DATE: 10/17/08

NEARMAN
SUBSTATION
ONE-LINE

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.

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
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
$	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
Total Project Length	36-48	Months

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

345kV Line

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. UID 158628

Total Cost

The total cost estimate:

$	59,584,649	Transmission Line
$		Substation
$	2,058,173	AFUDC
$	0	Contingency
$	61,642,822	Total

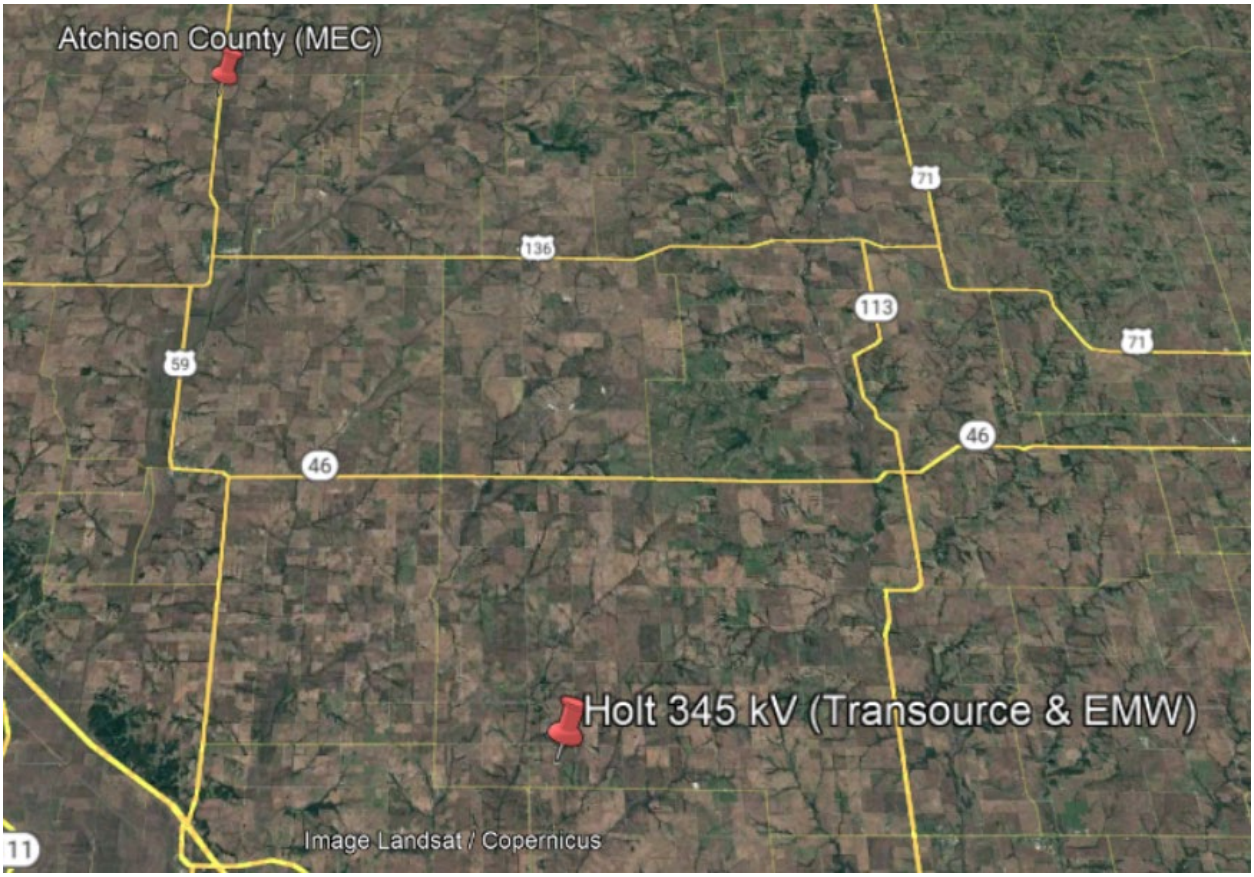
This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings 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
Total Project Length	36-48	Months

Figure 1 –New Holt-Atchison 345kV Line



Holt 345kV substation