INTERCONNECTION FACILITIES STUDY REPORT

GEN-2017-119

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.
06/20/2023	SPP	Final report issued.
06/27/2024	SPP	Upgrades revised per latest study.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request is for a 180 MW generating facility located in Cloud 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 May 01, 2024.

The interconnecting Transmission Owner, ITC Great Plains (ITCGP), 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 (43) Vestas V15-4.3 MW wind turbines for a total generating nameplate capacity of 180 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 138 kV transformation substation with associated 34.5 kV and 345 kV switchgear;
- One 345/34.5 kV 130/173/216 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- Approx. 11.6 mile 345 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 345kV bus at existing Transmission Owner substation ("Elm 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** 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
Elm Creek 345kV GEN-2017-119 Interconnection (TOIF) (ITCGP) (143363): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2017-119 (260 MW/Wind), into the Point of Interconnection (POI) at Elm Creek 345kV	$805,608	100%	$805,608	15 Months
Total	**$805,608**		**$805,608**	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)	Estimated Lead Time
Partly rebuild the Elm Creek to North Manhattan 230 kV line (WERE) (159067): Partly reconductor 2.9 mile of the Elm Creek to North Manhattan 230 kV line to achieve a minimum rating of 390 MVA	Eligible	$7,095,222	100%	$7,095,222	48 Months
Elm Creek 345kV Interconnection Expansion (DISIS-2017-002) (ITCGP) (143360): Expand the Elm Creek 345kV substation to accommodate the interconnection of GEN-2017-119	Ineligible	$3,404,822	100%	$3,404,822	30 Months
Total		**$10,500,044**		**$10,500,044**	

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
NA	**NA**	**NA**	**NA**	**NA**	**NA**
Total		NA		NA	

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	NA	NA

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
NA	NA	NA	NA
Total	NA		NA

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)	$805,608
Non-Shared Network Upgrade(s)	$10,500,044
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$0
Total	**$11,305,652**

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).

Generation Interconnection Facilities Study Report
For GEN 2017-119 – 260 MW Wind Generating Facility
In Cloud County, Kansas.
Revised March 18, 2023

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1.0 Overview

ITC Great Plains ("ITCGP") has performed a facility study at the request of Southwest Power Pool ("SPP") for Generation Interconnection request GEN-2017-119 under the SPP Open Access Transmission Tariff. The subject request entails interconnecting a 260 MW wind powered generation facilities in Cloud County, Kansas. The project will interconnect at the existing Elm Creek substation. It is scheduled for completion by December 31, 2025. This date will be revised further into the process.

The ITCGP scope of this Facility Study is to provide a cost estimate for the Customer's interconnection facilities. This study does not directly address any of the Network Upgrades that may be identified in the DISIS 2017-002, the facilities that are being constructed by the interconnection customer, or any potential sub-transmission facilities (if any) that may be required.

1.1 Facility Study Summary

ITCGP estimates the total project cost of the customer's interconnection facilities will be **$4,210,429** (+/- 20% accuracy) including applicable company overheads in 2023 dollars. It includes **$3,404,821** for Network Upgrades and **$805,608** for Transmission Owner Interconnection Facilities. It is further estimated that the required legal/real estate acquisition and construction activities will require approximately 24 months after the GIA is executed. The attached report contains additional details regarding the estimate as well as results of short circuit studies, review of reactive compensation, and information on Interconnection & Operating requirements.

ITCGP intends to self-fund the network upgrades for this project and will require a Facility Service Agreement to be negotiated in parallel with the GIA for this project.

The GEN 2017-119 interconnection facilities will require Network Upgrades on the ITCGP system to connect the new generation. Network Upgrades consist of the following:

- Add 2-breakers at the 345 kV ITCGP Elm Creek Substation for GEN 2017-119 POI.
- Expansion of Elm Creek Substation.

In addition to the identified Network Upgrades, there are specific Interconnection Facilities which ITCGP will construct, own, operate, and maintain. These facilities include the new line entrance structure and 345kV disconnect switch on the end of the radial line from GEN 2017-119 at the ITCGP substation as well as any ITCGP relaying, and control equipment required for the protection of the developer's radial line.

The Interconnection Customer is responsible for constructing all sole-use facilities such as the wind farm collector station and the radial 345kV line from the collector station to the ITCGP Elm Creek substation. While this report does define Interconnection Customer owned Interconnection Facilities in enough detail to explain basic requirements, it does not define or contain all of the detailed requirements. Additional metering, communications, and operational requirements may be identified as the Interconnection and Operating Agreements are developed and further communications between the Transmission Owner and Interconnection Customer take place. The Interconnection Customer's low voltage system is not defined in this report.

2.0 Voltage Guidelines:

Reactive power, voltage regulation and operating requirements will be as per Transmission Operator (TOP) and Transmission Provider directives. Interconnection Customer will operate the Generating Facility to a voltage schedule of 350 kV (1.014 pu) with a bandwidth of +/- 6 kV (0.017 pu) at the Point of Interconnection (POI) utilizing the Generating Facility's required power factor design capability as

indicated in SPP DISIS 2017-002. As per SPP DISIS 2017-002, the Interconnection Customer's required power factor capability is 0.95 lagging to 0.95 leading (at the POI).

For further clarification, the Interconnection Customer may meet the +/- 0.95 power factor requirement by utilizing reactive capability from the wind generators or by adding external reactive compensation. Note that any reactive compensation installed by the Interconnection Customer shall not cause voltage distortion in accordance with Article 9.7.6 Power Quality of the Generation Interconnection Agreement.

The Interconnection Customer will regulate the Generating Facility's voltage to the specified voltage set point within the defined bandwidth stated above using an automatic voltage controller utilizing the inherent reactive power capability in the wind turbines and if applicable external reactive compensation.

The above voltage schedule is subject to change. If the need for a change is identified, it will be done within the limits of the GIA provisions stated in Section 9.6 and the Generating Facility's power factor design criteria as stated above. If a schedule change is needed, appropriate written documentation of the change will be provided to the Interconnection Customer.

The Interconnection Customer is required to have a generator operator available for 24/7 communication with the TOP. The TOP may, at any time request a variance from the schedule in response to system operating/security requirements.

3.0 Network Upgrades

3.1 Upgrades to Elm Creek

3.1.1 Project Location:
The network upgrades will be constructed at the existing 345 kV ITCGP Elm Creek substation.

3.1.2 Project Overview:
The purpose of this project is to expand the 345kV Elm Creek Substation to provide a transmission system interconnection for the GEN 2017-119 Wind Farm. The switchyard will be expanded to consist of three 345kV circuit breakers arranged in a ring bus configuration.

The 345kV switchyard will be updated with adequate AC and DC station service supplies, new control and protection panels and a new RTU for communication with the Transmission Owner's master control station.

3.1.3 Design Criteria:
The Transmission Owner's standards will be applicable. Where no applicable standards are available, the Transmission Owner will substitute industry standards and other good utility practices.

3.1.4 One-Line Diagrams:
See Figure 1 for Transmission Owner One-Line.

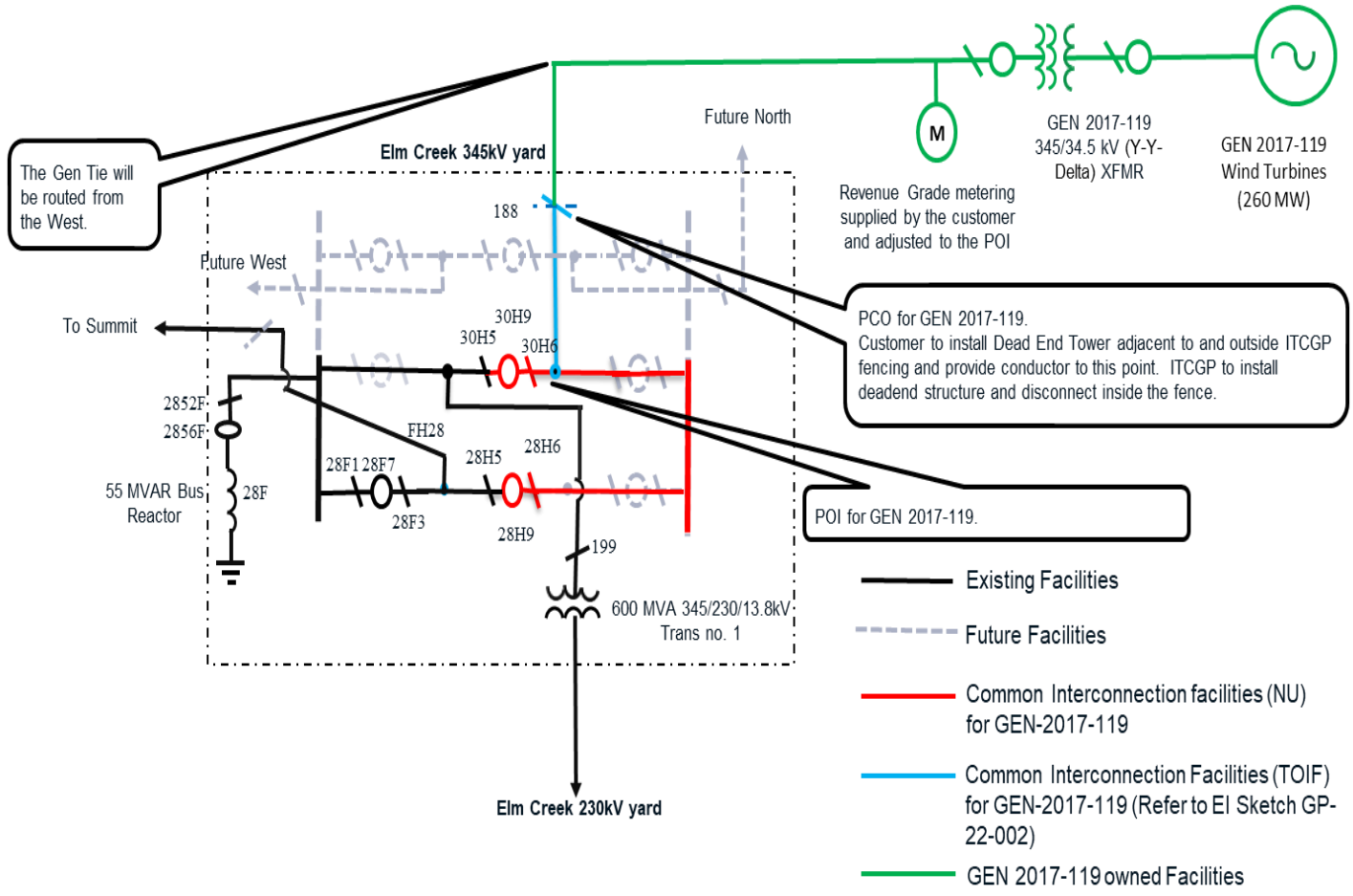

Figure 1 GEN 2017-119 Interconnection Substation One Line

3.1.5 Route Information: N/A

3.1.6 Right-of-Way Information:

It is assumed that the interconnection customer will be responsible for building the 345 kV line required to connect the ITCGP Switching Station at the POI with the customer's substation. As such, the interconnection costs contained herein do not include any costs for extending any ITCGP transmission lines. Please see section 6 for general guidelines.

3.1.7 Permitting:

The Interconnection Customer will be responsible for satisfying all community or governmental site plan or zoning approval requirements which may include wetland or flood plain permits. The Transmission Owner will be responsible for the control center building permit and the KDHE storm water construction permits associated with the Transmission Owner portions of the construction.

3.1.8 Metering & Ownership Demarcation:
Covered in section 4.1.9

3.1.9 Protection & Control Overview:
One set of 345kV CCVTs will be installed. OPGW

will be installed.

Three 345kV breaker control panels with microprocessor-based relays will be installed. Breaker failure protection, automatic reclosing supervised by synchronism check will be provided.

One 345kV line relaying panel with microprocessor-based relays will be installed.

3.1.10 Insulation Coordination:
345kV, 1050kV BIL

3.1.11 Short Circuit Study Results - Bus Fault Levels:
ITCGP calculated bus fault levels for the interconnection substation and adjacent substations to determine if the added generation will cause fault currents to exceed interrupting ratings for existing equipment and for use in sizing future equipment. Calculations are based on data for the interconnection transformer and installed wind turbines supplied by the Interconnection Customer. Variance from supplied data could materially change calculated short circuit values. Results are displayed in Table 1.

Table 1 – Short Circuit Results

Fault Location	Maximum Fault Current (Amps)	
	Phase	Ground
GEN 2017-119	5639	455

Fault currents shown in Table 1 are within the circuit breaker interrupting capabilities with the addition of 260 MW contributed by GEN 2017-119.

3.1.12 Reactive Compensation:
ITCGP evaluated the impact of the proposed interconnection on the reactive compensation equipment presently planned or in service at the Elm Creek Substation facilities. ITCGP studies concluded that no additional reactive compensation is required for interconnection of GEN 2017-119 at this time ITCGP may review the need for reactive compensation at a future time during which the size of a reactor would be further refined with additional studies after the GIA is signed.

3.1.13 Other Equipment & Materials:

- Gas Circuit Breakers (GCB): three (2) 345 kV, 3000A rated, 63kAIC.
- Disconnect Switch: eight (3) 345 kV, 3000A rated, 1050 kV BIL.
- CCVTs: six (3) 345kV, 3-winding, 1550kV BIL.
- Insulators: sixty (40) 345 kV, 1050 kV BIL station post, porcelain.

- Surge Arresters: six (3) 345kV, vertical mount, 209MCOV, polymer.

- Control Cable: Control cables per Transmission Owner standards will be installed in direct buried PVC conduits, above grade LFMC conduits and in pre-cast cable trench. All control cables from the yard will be terminated at the relaying control panels. The control building will have overhead cable trays for necessary cable runs and inter-panel connections.

3.1.14 Relaying, Control, & SCADA:
Panel Requirements

- 1 – RD3024 – Tie Breaker Control (SEL-351S)
- 1 – RD3070 – "A" Line Relaying, Carrier (SEL-421 & UPLC)
- 1 – RD3076 – "B" Line Relaying, Carrier (SEL-311C & UPLC)

3.1.15 Grounding System:
The grounding system will be designed and installed per Transmission Owner's standards. These standards follow the IEEE 80 standards.

3.1.16 Lightning Shielding Design:
Lightning shielding will be provided per Transmission Owner's standards. Multiple H-frame structures along with shield wire will be used for lightning protection.

3.1.17 Yard Lighting:
Yard lighting will be installed to be sufficient for visual indication of the disconnect switch positions or egress of personnel and will not serve as task lighting.

3.1.18 Structures:
The required new outdoor steel structures listed below will be hot-dipped galvanized wide flange structures or tubular steel:

- Eight (8) 345 kV disconnect switch stands
- Nineteen (19) 345 kV bus support
- Four (4) 345kV wave trap stands
- Three (3) H-frame line entrance structures
- Six (6) 345kV CCVT stands
- Six (6) 345kV surge arrester stands

3.1.19 Foundations:
Foundations and slabs will be designed and installed in accordance with the owner's standards and specifications. The minimum design depth to firm bearing is contingent upon soil borings at the site.

3.1.21 Scheduling Requirements:
Legal/Real Estate Procurement 9 weeks
Material Procurement / Design 78 weeks
Substation Construction 36 weeks
Closeout Activities 4 weeks

3.1.20 Site Work:
Site grading in not expected for the additions to the 345kV switchyard.

3.1.21 Total Network Upgrade Cost: $3,404,821
Total Cost Estimate Accuracy: +/- 20%

Note that the cost estimate provided is expressed in 2023 terms and includes applicable company overheads.

4.0 Transmission Owner Interconnection Facilities (TOIF)

4.1 GEN 2017-119 – Interconnection Facilities

4.1.1 Project Location:
The ITCGP 345 kV Elm Creek substation that will be expanded.

4.1.2 Project Overview:
A new line entrance structure will be added at the ITCGP Elm Creek switchyard for termination of the line from the collector substation. A disconnect switch will be installed beneath this structure for isolation of the developer's line. Line relaying will be added to protect the line. A set of CCVT's and surge arresters will be added to the line terminal.

4.1.3 Design Criteria:
The Transmission Owner's standards will be applicable. Where no applicable standards are available, the Transmission Owner will substitute industry standards and other good utility practices.

4.1.4 One-Line Diagrams: See Figure 1

4.1.5 Site Plan: N/A.

4.1.6 Route Information: N/A

4.1.7 Right-of-Way Information: N/A

4.1.8 Permitting: Same as that covering section 3.1.7

4.1.9 Metering & Ownership Demarcation:
The Interconnection Customer or others will provide, own, operate and maintain revenue metering. The specifics of the revenue metering will be defined during the detailed engineering phase of the project. The customer must cooperate with the Transmission Provider and Local Transmission Owner requirements in the metering design. Revenue metering equipment will be required at customer's project substation with loss compensation to the Point of Interchange in the Transmission Owner's substation.

The ownership demarcation will be at first substation steel H-frame within the security fence of the Transmission Owner substation.

The Interconnection Customer will be required to provide enough conductor to terminate on the H-frame and extend down to reach grade level.

4.1.10 Protection & Control Overview:
- One set of 345kV CCVTs will be installed on the GEN 2017-119 line.
- Two paths of fiber optic cable (OPGW) will be required for line protection. They will be supplied by the Interconnection Customer.

- One 345kV line relaying panel with microprocessor-based relays will be installed.

4.1.11 Insulation Coordination:
345kV, 1050kV BIL

4.1.12 Short Circuit Study Results - Bus Fault Levels: See Table 1 above

4.1.13 Other Equipment & Materials:

- Disconnect Switch: One (1) 345 kV, 3000A rated, 1050 kV BIL.
- CCVTs: Three (3) 345 kV, 3-winding, 1550kV BIL.
- Surge Arresters: Three (3) 345 kV, vertical mount, 209 kV MCOV, polymer.
- Control Cables: Control cables per Transmission Owner standards will be installed in direct buried PVC conduits, above grade LFMC conduits and in pre-cast cable trench. All control cables from the yard will be terminated at the relaying control panels. The control building will have overhead cable trays for necessary cable runs and inter-panel connections.

4.1.14 Relaying, Control, & SCADA:
Panel Requirements: One RD3048 Panel – Fiber optic current differential (SEL 311L Relays)

4.1.15 Grounding System:
The grounding system will be designed and installed per Transmission Owner's standards. These standards follow the IEEE 80 standards.

4.1.16 Lightning Shielding Design:
The attachment of the OPGW shield wire from the developer's line to the H-frame will provide lightning protection for the Interconnection Facility equipment at GEN 2017-119 interconnection substation.

4.1.17 Yard Lighting:
Yard lighting will be installed to be sufficient for visual indication of the disconnect switch position or egress of personnel and will not serve as task lighting.

4.1.18 Structures:
The required new outdoor steel structures listed below will be hot-dipped galvanized wide flange structures or tubular steel:

- One (1) 345 kV disconnect switch stand
- Two (1) H-frame line entrance structures
- Three (1) 345 kV CCVT stands
- Three (1) 345 kV surge arrester stands

4.1.19 Foundations:
Foundations will be designed and installed in accordance with the owner's standards and specifications. The minimum design depth to firm bearing is contingent upon soil borings at the site.

4.1.20 Conductors, Shield Wires, & OPGW: N/A

4.1.21 Insulators: N/A

4.1.22 Removal of Existing Facilities: N/A

4.1.23 Site Work: N/A

4.1.24 Total TOIF Cost: $805,608
Total Cost Estimate Accuracy: +/- 20%
Total Project cost (Network Upgrades and Interconnection facilities): $4,210,429

Note that the cost estimate provided is expressed in 2023 terms and includes applicable company overheads and potential tax gross ups.

5.0 Interconnection Customer Interconnection Facilities

5.1 GEN 2017-119 Interconnection facilities

All facilities within the Interconnection Customer's collector substation and between the Interconnection Customer's substation and ITCGP's Elm Creek interconnection substation are not included in this report and are the sole responsibility of the Interconnection Customer. Some of the key facilities are briefly mentioned below. The Point of Interconnection (POI) and the Point of Change of Ownership (PCO) are shown in Figure.

The Interconnection Customer shall construct the 345 kV radial line from the wind farm collector station to ITCGP's Elm Creek substation. Installation of OPGW shield wire on the radial line from GEN 2017- 119 containing at least 12 single mode fibers will be required for ITCGP relaying and communication purposes.

The customer's step-up transformer between the wind farm's 34.5 kV collector network and the 345 kV facilities will require a high side breaker capable of interrupting a transformer high side winding fault.

All Interconnection Customer owned 345 kV apparatus as well as the revenue metering equipment located in the Interconnection Customer's substation shall comply with ITCGP standards and will be subject to ITCGP approval. ITCGP will provide the Interconnection Customer with standards during detailed design or upon request. The Interconnection Customer is solely responsible for the SCADA and telecommunications facilities necessary to operate and monitor its facility.

Necessary trip and close signal interlocks will be provided by ITCGP to the Interconnection Customer's generation facility for the safe operation of the system. Interconnection Customer will provide breaker status and current transformer signals to ITCGP for system operation and protection.

Total Project Cost: N/A
Total Cost Estimate Accuracy: N/A

6.0 Right of Way Requirements

The Interconnection Customer shall obtain easements from the Transmission Owner to work in or drive through the Transmission Owner's transmission line right-of-way. The Transmission Owner and Interconnection Customer will also cooperatively negotiate any easements required for the Interconnection Customer's transmission lines and structures. The Transmission Owner agrees to not unreasonably withhold easements.

For the Network Upgrades and any Transmission Owner Interconnection facilities identified in this report, the Transmission Owner agrees to obtain all necessary easements/right-of-way as required to construct those facilities that will be owned and operated by ITCGP.

Interconnection Facilities Study

Costs associated with DISIS-2017-002 Restudy 2

May 2024

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-2017-002 Restudy 2 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	Upgrade description	DISIS Cost Estimate	DISIS Lead Time
Interconnection	159067	Partial rebuild of the Elm Creek to North Manhattan 230 kV line	Partly reconductor 2.9 mile of the Elm Creek to North Manhattan 230 kV line to achieve a minimum rating of 390 MVA	$ 7,095,222.00	48 months
Interconnection	159068	Install a second 650 MVA TX at Nashua	Install a second Nashua 345/161 kV Transformer to achieve a minimum rating of 650 MVA	$ 22,759,204.00	48 months
Interconnection	159069	Terminal upgrades on the Roanridge to Nashua 161 kV line 1	Upgrade terminal equipment on the Roanridge to Nashua 161 kV line 1 to achieve a minimum rating of 286 MVA	$ 112,911.00	24 months

Partial rebuild of the Elm Creek-North Manhattan 230kV line

230kV Partial Line rebuild

Network Upgrades to perform a partial rebuild of the Elm Creek-North Manhattan 230kV Line for the DISIS-2017 Phase 2 Restudy 2. The estimate includes a partial reconductor of 2.9 miles of 230kV line to achieve a minimum rating of 390 MVA. UID 159067

Total Cost

The total cost estimate for this Network Upgrade is:

$	7,074,000	Transmission Line
$	0	Substation
$	21,222	AFUDC
$	0	Contingency
$	7,095,222	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	48	Months
Procurement Time	48	Months
Construction Time	48	Months
Total Project Length	48	Months

Figure 1 – Elm Creek-North Manhattan 230kV Line

Nashua 345/161kV Transformer Addition

345-161kV Substation

Network Upgrades for adding a new 345/161kV Transformer to achieve a minimum rating of 650 MVA. Install new breakers, jumpers, switches and corresponding CT/Relays, converting the substation to a breaker and a half configuration. UID 159068

Total Cost

The total cost estimate for this Network Upgrade is:

$	1,714,028	Transmission Line
$	18,662,706	Substation
$	180,007	AFUDC
$	2,202,463	Contingency
$	22,759,204	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	48-56	Months
Procurement Time	48-56	Months
Construction Time	48-56	Months
Total Project Length	48-56	Months

Figure 2 – Nashua 345kV Sub

Roanridge-Nashua 161kV Line 1 Terminal Upgrades

161kV Substation

Network Upgrades for terminal upgrades on the Roanridge-Nashua 161kV Line 1 to achieve 286 MVA. This upgrade includes a CT/relay and panel replacement at the Roanridge 161kV substation. UID 159069

Total Cost

The total cost estimate for this Network Upgrade is:

$	0	Transmission Line
$	112,574	Substation
$	337	AFUDC
$	0	Contingency
$	112,911	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	24	Months
Procurement Time	24	Months
Construction Time	24	Months
Total Project Length	24	Months

Figure 3 – Roanridge 161kV Sub