# NextEra Energy Transmission Southwest

# Facility Study Report

### GEN- 2022-054 (Bourbon 2 Solar)

## 1. Background:

Per the Generator Interconnection Procedures (GIP), Attachment V, Section 8.11, SPP requests that NextEra Energy Transmission Southwest (NEET SW) perform a facilities study for the following Interconnection and/or Network Upgrade(s):

| Upgrade Type | Upgrade Name |
|---|---|
| Interconnection | Wolf Creek - Blackberry 345kV GEN-2022-054 Interconnection (Non- Shared NU) (NEET SW) |
| Interconnection | Wolf Creek - Blackberry 345kV GEN-2022-054 Interconnection (TOIF) (NEET SW) |

## 2. Study Requirements:

NEET SW has performed this Facility Study report in accordance with the Generator Interconnection Procedures (GIP), Attachment V, Section 8.11 for the Interconnection and/or Network Upgrade(s) as described in Section 1.

**2.1.** The Facility Study report includes an evaluation of the following:

**2.1.1.** Perform/develop a substation layout, perform a preliminary bus design, determine all electrical equipment requirements, and if required, determine a suitable site location to accommodate the Request. Develop/compile cost estimates for all NEET SW labor, overheads, equipment additions, modifications, etc. to accommodate the generator interconnection.

**2.1.2.** Develop an overall construction schedule for completion of the necessary additions and/or modifications.

**2.1.3.** Point Of Change of Ownership shall mean the point, as set forth in Appendix A to the Generator Interconnection Agreement, where the Interconnection Customer's Interconnection Facilities connect to the Transmission Owner's Interconnection Facilities. For the purposes of this Facility Study report, the Point of Change of Ownership location is defined as the overhead 345kV line connecting the Interconnection Customer’s substation to the Point of Change of Ownership (“POCO”) at Transmission Owner’s dead-end structure outside Transmission Owner’s existing Wolf Creek - Blackberry 345kV Substation.

**2.1.4.** The Point of Interconnection is the physical point where the interconnection facilities attach to the new 345kV substation bus station built by the transmission owner to interconnect the Bourbon 2 solar project.

**2.1.5.** Other Interconnection/Metering Requirements. Basic indication, metering, monitoring control, and relaying requirements due to a generator interconnection are included in the cost estimate. NEET SW generation metering requirements, as an SPP Transmission Owner, must be met. A list of specific needs will be provided by NEET SW once design has progressed.

## 3. Study results for Bourbon 2 Solar (GEN-2022-054):

This Facility Study Report evaluates the interconnection requirements for the Bourbon 2 Solar project, a 200 MW solar generation facility proposed to interconnect to NEET SW's Wolf Creek to Blackberry 345kV. Bourbon Solar 2 will interconnect at the same Point of Interconnection (POI) station that will be constructed for the Bourbon 1 Solar project (GEN-2020-090) sharing a common generator tie line.

Bourbon 1 Solar (GEN-2020-090) is a 204.3 MW solar project connecting to NEET SW's Wolf Creek - Blackberry 345kV transmission line via a newly constructed five-breaker, breaker-and-a-half POI station. The combined capacity of both projects totals 404.3 MW.
From the perspective of the NEET SW POI station, both projects will appear as a single 404.3 MW generator connecting at one breaker position.

### 3.1. Station Physical

All breakers, switches, and associated equipment installed at the POI station for Bourbon 1 Solar are rated sufficiently high to accommodate the combined 404.3 MW capacity. No additional physical components, upgrades, or replacements are required for Bourbon 2 Solar.

### 3.2. Civil & Structural

The civil and structural scope completed for Bourbon Solar 1 fully supports the interconnection of Bourbon 2 Solar. No additional civil or structural modifications are required.

### 3.3. Relay & Control

The addition of Bourbon 2 Solar to the shared generator tie line and POI station necessitates relay setting adjustments to ensure proper protection coordination between the POI station and the Bourbon 2 Solar substation.

The scope of work includes, but is not limited to, fiber modifications, OPGW fiber patch panel splicing, setup of a three-terminal differential scheme, relay setting modifications and modeling requirements, relay end-to-end testing and commissioning, and efforts associated with the protection scheme modifications.

### 3.4. Environmental Requirements

Compliance with all applicable federal, state, and local regulations will be strictly adhered to. All applicable and required permits and approvals will be obtained by the customer generator prior to construction.

## 4. Transmission Line Scope

The transmission line scope for Bourbon Solar 1 encompasses Bourbon Solar 2 and includes the loop-in and loop-out of the 5-breaker station with the cut-in of the Wolf Creek to Blackberry 345 kV circuit (approximately 0.50 miles) and interconnection facilities line (approximately 0.10 miles).

All transmission line components are designed and installed to support the combined 404.3 MW capacity of both projects.

**4.1.** The new interconnection facilities line (single line with a combined capacity of 404.3 MW or higher) will route to a Point of Change of Ownership (POCO) structure located approximately 0.10 miles from the new switchyard. The Generator will be responsible for installing the final span into the new collection substation. (See Figure A1: Point of Change of Ownership (POCO) Detail).

## 5. Point of Change of Ownership (POCO)

This study will not represent or outline the Customer facilities required for the interconnection other than the physical Point of Change of Ownership (POCO) between the generating facilities and the interconnection facilities.

The Generator shall be responsible to extend its 345 kV generation tie line and, at a minimum, 96 count optical ground wire (OPGW) from the POCO to the Generator's facility. The generator tie line for Bourbon 1 Solar must be rated adequately to accommodate the combined power output of 404.3 MW from both Bourbon Solar 1 and Bourbon 2 Solar.

The Generator shall extend the OPGW to the Generator's provided splice can, which is to be mounted by the Generator on the Generator's interconnecting dead-end structure, where the Generator will terminate the fibers and route back to its control house in the Generator's station.

The Generator shall acquire easement, or similar, rights allowing for installation of the Generator's assets to the defined POCO structure.

## 6. Construction Schedule

Bourbon 2 Solar does not have a separate construction schedule, as the equipment and components required for its interconnection are constructed under the Bourbon 1 Solar construction schedule as outlined in the Bourbon 1 Solar Facility Study.

The relay setting adjustments for Bourbon 2 Solar will be coordinated to align with the overall project commissioning timeline.

## 7. Cost Estimate

| **GEN-2022-054 Estimated Costs Non-Shared Network Upgrades (NSNU)** | **Current Year $** |
|---|---|
| | |

| | |
|---|---|
| The addition of Bourbon 2 Solar to the shared generator tie line and POI station necessitates relay setting adjustments to ensure proper protection coordination between the POI station and the Bourbon 2 Solar substation.<br><br>The scope of work includes, but is not limited to, fiber modifications, OPGW fiber patch panel splicing, setup of a three-terminal differential scheme, relay setting modifications and modeling requirements, relay end-to-end testing and commissioning, and efforts associated with the protection scheme modifications. | $250,000+/-30% |
| **GEN-2022-054 NSNU Total Costs** | **$250,000+/-30%** |

| **GEN-2022-054 Estimated Costs TOIF Network Upgrades** | **Current Year $** |
|---|---|
| **GEN-2022-054 Total TOIF Cost** | **$0** |

| | |
|---|---|
| **Total Interconnection Cost (NSNU+TOIF)** | **$250,000+/-30%** |

## 8. Disclaimer

The facility study assumes the work will be performed by an EPC service provider. This information will allow the Generator to evaluate the necessary work required, project duration, and ability to negotiate a generation interconnection agreement with the Transmission Owner to construct the facilities. In performing the Facility Study, data/information provided by third parties was used, and assumptions/information regarding the state of the SPP's system, considered reasonable and valid at the time this report was prepared, were leveraged.

## Appendix A: Project drawings

The project drawings provided are combined for both Bourbon 1 Solar 1 and Bourbon 2 Solar, reflecting the shared configuration.

- **Figure A1: Point of Change of Ownership (POCO)**
- **Figure A2: Conceptual One-line Diagram**
- **Figure A3: Overall Electrical Plan (General Arrangement)**

**Figure A1: Point of Change of Ownership (POCO)**

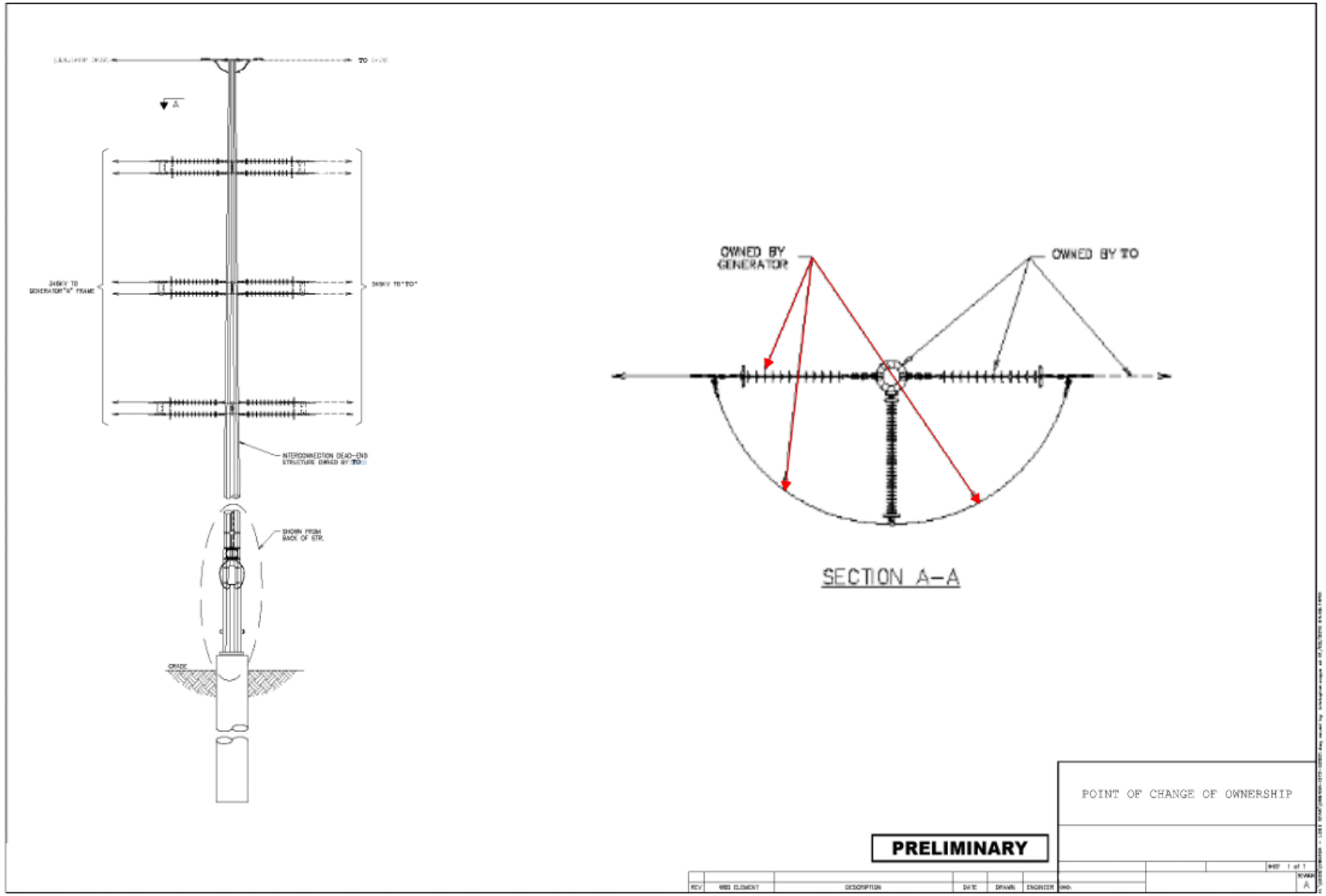
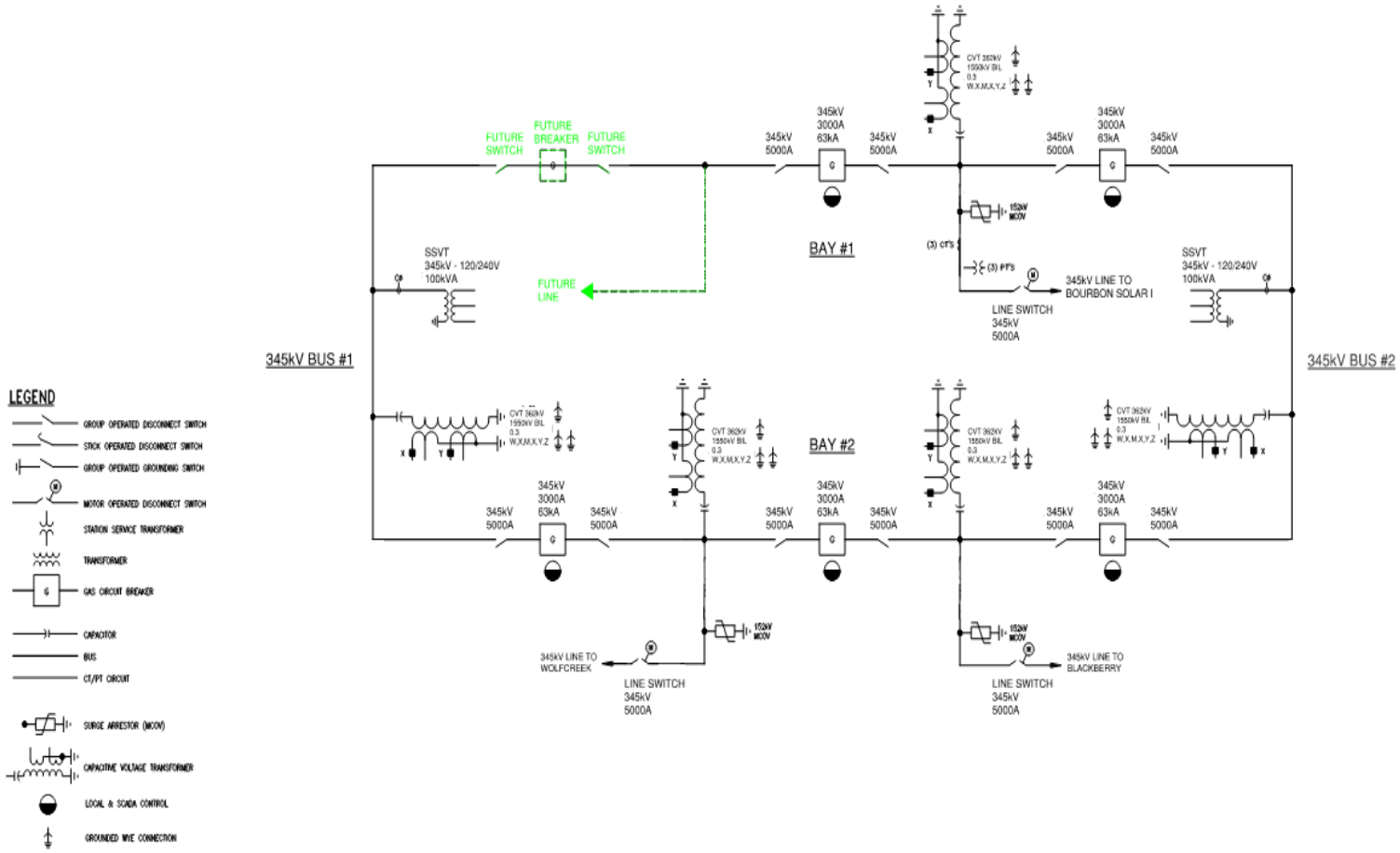
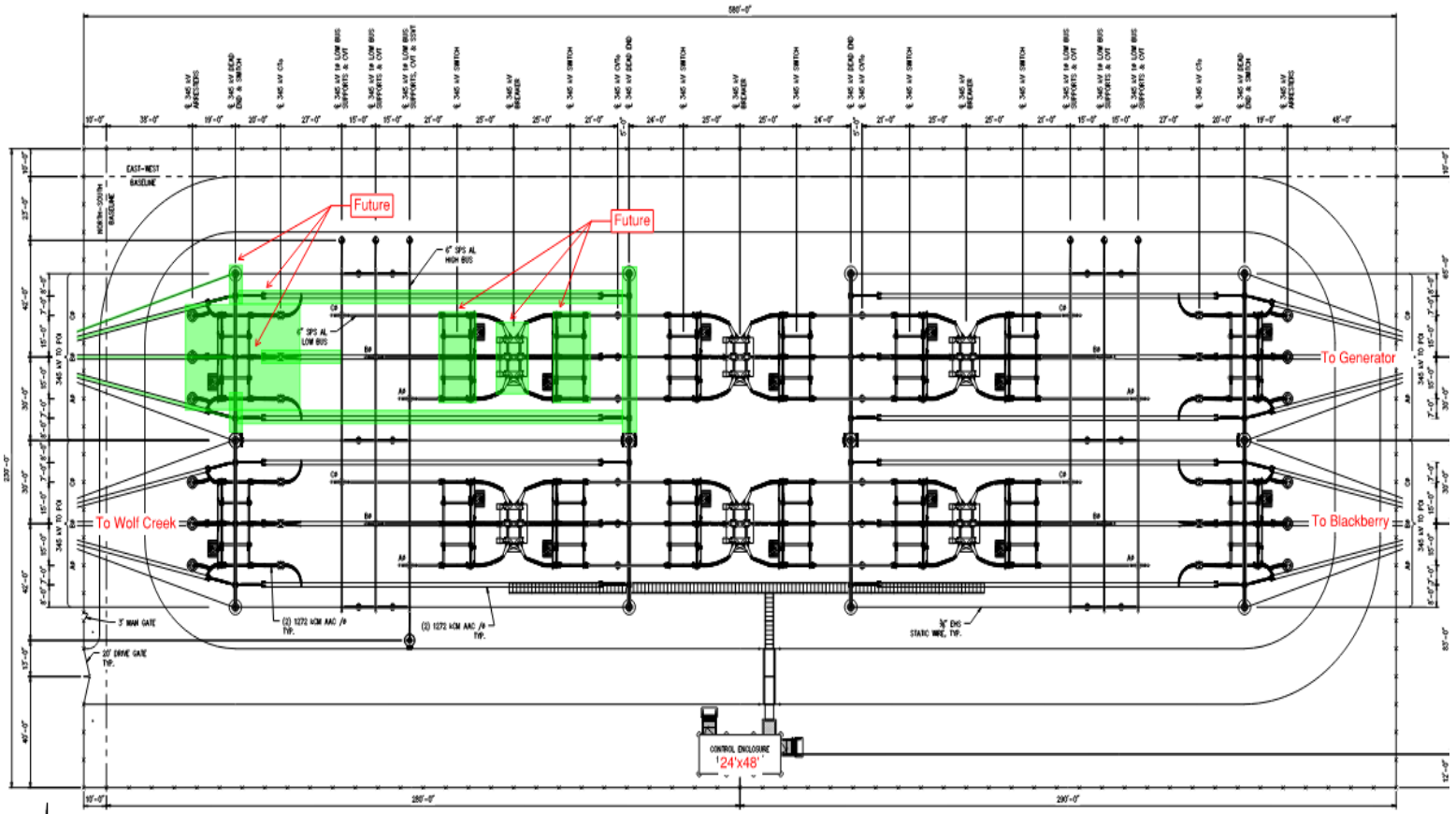



**Figure A2: Conceptual One Line Diagram**




PRELIMINARY
NOT FOR CONSTRUCTION

**Figure A3: Overall Electrical Plan - General Arrangement**





## STRUCTURE DESIGN CRITERIA

345 kV CLEARANCE: (1300 kV BIL)

LINE PARTS: MIN 8'-0"+10%"
MIN 8'-8+119"

TO GRADE: 18'-0" (BUS)
35'-0" (DRIVEWAY)

## LEGEND

- BASELINE MARKER
- BASELINE
- SUBSTATION FENCE
- MOTOR OPERATED DISCONNECT SWITCH
- STRUCTURE MOUNTED YARD LIGHTING
- INDICATES ELEVATION A
- INDICATES DRAWING ON WHICH ELEVATION APPEARS "DEN-P004-01"

**CONCEPTUAL**
NOT FOR CONSTRUCTION

# Current Study

# Costs associated with
# DISIS-2022-001
# Build a new EMPEC-Gen-2021-096
# 345kV Line 1 to 1180 MVA
# October 2025

## 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-2022-001 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 | DISIS Cost Estimate | DISIS Lead Time |
|---|---|---|---|---|
| Current Study | 170692 | Build a new EMPEC-Gen-2021-096 345kV Line 1 to 1180 MVA | $ 97,742,347.00 | 56 Months |

## Build a new EMPEC-Gen-2021-096 345kV Line 1 to 1180 MVA

### 345kV Line

Network Upgrades to build a new 345kV line from Emporia Energy Center-Gen-2021-096 Line 1 to a minimum of 1180 MVA. This upgrade includes substation upgrades, for both GEN-2021-096 345kV substation and Emporia Energy Center 345kV and new line between the two substations. GEN-2021-096 345kV substation will be converted to a breaker and half configuration with a new rung for a new line terminal. Emporia Energy Center 345kV substation will add a new rung and a new line terminal for the additional line. The transmission line estimates include a 25 mile long greenfield 345kV circuit, built to a 3000 amp standard. New easements, routing study and KCC siting application will be required. UID 170692

### Total Cost

The total cost estimate for this Network Upgrade is:

| | | |
|---|---|---|
| $ | 75,456,000 | Transmission Line |
| $ | 20,255,654 | Substation |
| $ | 286,349 | AFUDC |
| $ | 1,744,344 | Contingency |
| $ | 97,742,347 | 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 1 – Build a new line from Emporia Energy Center-GEN-2021-096 345kV Line 1**