



INTERCONNECTION FACILITIES STUDY REPORT

GEN-2014-001
(IFS-2014-001-8)

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By SPP Generator Interconnections Dept.

REVISION HISTORY

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2014-001/IFS-2014-001-8 is for a 198.88 MW generating facility located in Marion County, Kansas. The Interconnection Request was deemed non-material and no further analysis from SPP was required. The Interconnection Customer's requested commercial operation date is October 1st, 2021.

The interconnecting Transmission Owner, Evergy, 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.

CREDITS/COMPENSATION FOR AMOUNTS ADVANCED FOR NETWORK UPGRADE(S)

Interconnection Customer shall be entitled to compensation in accordance with Attachment Z2 of the SPP OATT for the cost of SPP creditable-type Network Upgrades, including any tax gross-up or any other tax-related payments associated with the Network Upgrades, that are not otherwise refunded to the Interconnection Customer. Compensation shall be in the form of either revenue credits or incremental Long Term Congestion Rights (iLTCR).

INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES

The Generating Facility is proposed to consist of 64 GE 2.82 MW Wind Turbine Generation Systems and 8 GE 2.3 MW Wind Turbine Generation Systems for a total generating nameplate capacity of 198.88 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 (2) 345/34.5 kV 67/89/112 MVA (ONAN/ONAF/ONAF) step-up transformers to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An overhead 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 ("Burns 345 kV 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 turbine 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>Transmission Owner Burns 345 kV Interconnection Substation:</u> Construct three (3) 345 kV arrestors, one (1) 345 kV full tension dead-end structure, three (3) 345 kV VTs, three (3) 345 kV CTs, bus work, and revenue interconnection metering plus all associated yard and conduit work.	\$1,102,841	100%	\$1,102,841	24 Months
Total	\$1,102,841		\$1,102,841	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	Z2 Type ¹	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
<u>Transmission Owner Burns 345 kV Interconnection Substation:</u> Convert ring bus configuration to breaker-and-a-half configuration to include two (2) 345 kV breakers, four (4) 345 kV switches, bus work, and all associated yard and conduit work.	Non-Creditable	\$3,106,483	100%	\$3,106,483	24 Months
Total		\$3,106,483		\$3,106,483	

¹ Indicates the method used for calculating credit impacts under Attachment Z2 of the Tariff.

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	Z2 Type	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
<u>None</u>	N/A	\$0	N/A	\$0	N/A
Total		\$0		\$0	

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>None</u>	\$0	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 MISO 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 Share (%)	Allocated Cost Estimate (\$)
<u>None</u>	\$0	N/A	\$0
Total	\$0		\$0

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 198.88 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 Facilitie(s)	\$1,102,841
Non-Shared Network Upgrade(s)	\$3,106,483
Shared Network Upgrade(s)	\$0
Affected System Upgrade(s)	\$0
Total	\$4,221,951

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 Facility Study

Generation Interconnection Request GEN-2014-001

June 2020

Introduction

This report summarizes the results of a Generation Interconnection Facility Study performed for the Southwest Power Pool (SPP) by Evergy to evaluate a generation interconnection request by Expedition Wind, LLC for 200 MW of wind-powered generation to the Evergy transmission system. The proposed interconnection is on the Wichita – Emporia Energy Center 345 kV line near Burns, Kansas. A System Impact Study has been completed and the requested in-service date of the generating facility is October 1, 2021.

Project Location and Existing Facilities

The project is located in Marion County in central Kansas. The interconnection will be at Evergy’s new Burns 345 kV substation on the Wichita – Emporia Energy Center 345 kV line in Butler County near Burns, Kansas. Figure 1 shows the Transmission Facilities in the area.

Interconnection Facilities

Interconnection to the Evergy transmission system will be at Evergy’s new Burns 345 kV substation. The new 345kV substation terminal will look towards the Interconnection Customer’s facilities.

Network Upgrades

- **345kV Burns Substation Work**

The estimated cost includes extension of the bus north to add another rung to the bus, converting from ring to breaker and half. Equipment includes two (2) 345 kV breakers, four (4) 345 kV switches, bus work, and all associated yard and conduit work.

Network Upgrades: \$3,106,483

Transmission Owner Interconnection Facilities (TOIF)

- **345 kV Interconnection Revenue Metering**

The estimated cost includes three (3) 345 kV arresters, one (1) 345 kV full tension dead-end structure, three (3) 345 kV VTs, three (3) 345 kV CTs, bus work, and revenue interconnection metering plus all associated yard and conduit work.

TOIF: \$1,102,841

The total cost estimate for Transmission Owner Interconnection Facilities (TOIF) and Network Upgrades is:

\$	3,106,483	Network Upgrades
\$	1,102,841	TOIF
\$	12,627	AFUDC
\$	0	Contingency
<hr/>		
\$	4,221,951	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	8 Months
Procurement Time	9 Months
Construction Time	12 Months
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Total Project Length	18-24 Months

Evergy also maintains its own Facility Connection Requirements, which may be found at (<http://www.oasis.oati.com/WR/index.html>).

Figure 1 – Evergy Regional Transmission System

The proposed interconnection is 45 miles from Wichita 345 kV substation

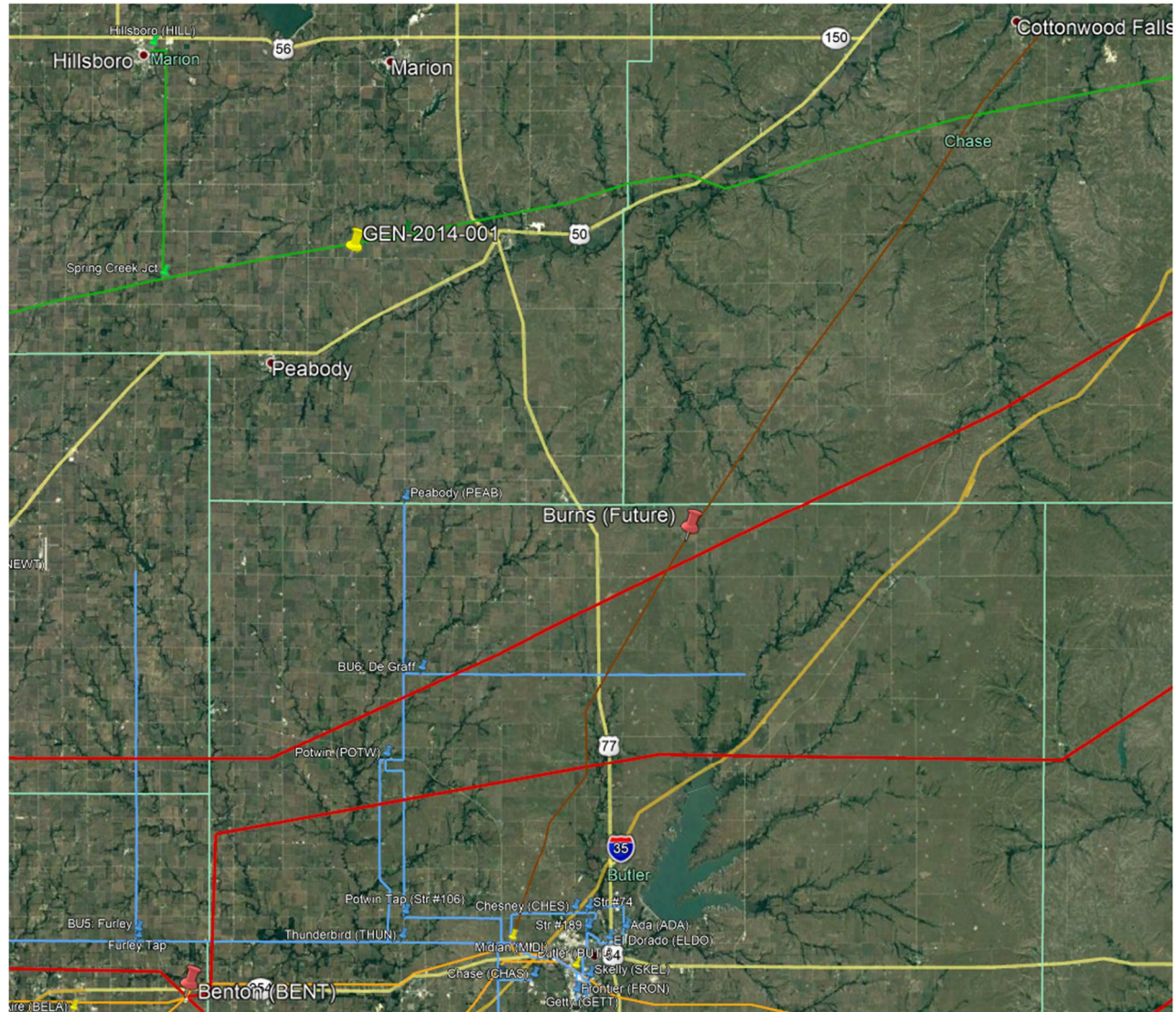
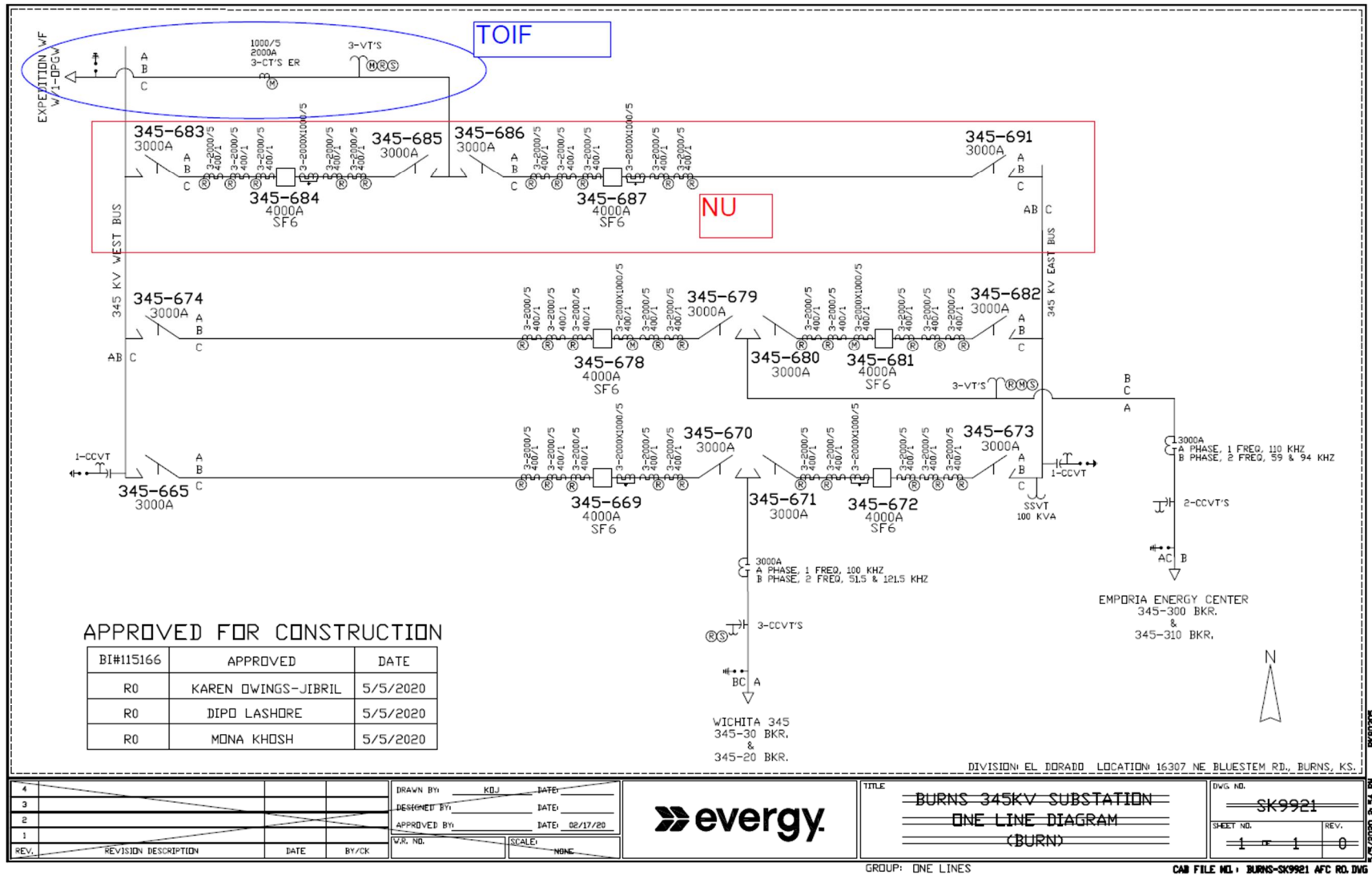


Figure 2 – Interconnection Substation Preliminary One-Line



[illegible]

Results of Short Circuit Analysis

As a part of this Facility Study, a short circuit study was performed to determine the available fault current at the interconnection bus using PSS/E's activity SCMU. The interconnection bus was modeled as a tap on the Wichita-Emporia Energy Center 345 kV line approximately 42 miles out of Wichita 345 kV substation. The 2015 and 2025 Summer Peak 2014 Series MDWG Final Reduced cases were used in the study. No GEN-2014-001 Wind Farm generation was in service for this analysis. As a result, the numbers generated represent the available utility interconnection fault current:

2015 Summer:

- For a 3-Phase fault at the GEN-2014-001 interconnection, the fault current is estimated to be 9819 Amps.
- For a Phase-to-Ground fault at the GEN-2014-001 interconnection, the fault current is estimated to be 6141 Amps.

2025 Summer:

- For a 3-Phase fault at the GEN-2014-001 interconnection, the fault current is estimated to be 9929 Amps.
- For a Phase-to-Ground fault at the GEN-2014-001 interconnection, the fault current is estimated to be 6180 Amps.