

INTERCONNECTION FACILITIES STUDY REPORT

GEN-2016-111 (IFS-2016-002-18)

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By Spp Generator Interconnections Department

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
09/10/2020	SPP	Initial draft report issued.
09/11/2020	SPP	Updated Table 2 and Table 3 to reflect elimination of Z2 credits.
10/08/2020	SPP	Final report issued. No change.
12/10/2020	SPP	Updated final report. Revised Facility Study for 'Hoyt to JEC' Upgrade
01/08/2021	SPP	Updated final report issued. Updated cost allocation in Tables 1, 2, 3 and 6 based on DISIS Power Flow Reposting
07/28/2021	SPP	Updated final report issued. Updated Tables 3 and 6 based on DISIS Power Flow Reposting
01/06/2022	SPP	Updated final report issued. Updated Tables 1 and 2 based on withdrawn requests sharing Reno – Summit interconnection substation

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request <u>GEN-2016-111/IFS-2016-002-18</u> is for a <u>302 MW</u> generating facility located in <u>McPherson, KS</u>. The Interconnection Request was studied in the <u>DISIS-2016-002 Impact Study for Energy Resource Interconnection Service</u> (ERIS) and Network Resource Interconnection Service (NRIS). This request was restudied in the <u>DISIS-2016-002-2 Impact Study for ERIS</u>. The Interconnection Customer's requested in-service date is <u>December 31st, 2019</u>.

The interconnecting Transmission Owner, <u>Evergy Kansas Central (WERE)</u>, 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 <u>one-hundred fifty-one (151) GE 2.0 MW Wind</u> <u>Turbine Generation Systems</u> for a total generating nameplate capacity of <u>302 MW</u>.

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 collectioncircuits;
- 34.5 kV to 302 kV transformation substation with associated 34.5 kV and 302 kVswitchgear;
- One 345/34.5 kV 204/272/340 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the InterconnectionCustomer's substation;
- A 20 mile 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 ("Reno Summit 345 kV") that is owned and maintained byTransmissionOwner;
- 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.

Transmission Owner Interconnection Facilities (TOIF)	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
Reno – Summit 345kV GEN-2016-111 (TOIF) (WERE) (122614): Construct one (1) breaker, four (4) switches, three (3) CTs, and three (3) PTs to accept a transmission line from the Interconnection Customer's Generating Facility.	\$1,593,919	100%	\$1,593,919	36 Months
Total	\$1,593,919		\$1,593,919	

Table 1: Transmission Owner Interconnection Facilities (TOIF)

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
Reno – Summit 345kV GEN-2016- 111 Interconnection (Non-Shared NU) (WERE) (122615): Construct two (2) breakers, eight (8) switches, two (2) wavetraps, three (3) CCVts, six (6) PTs, and one (1) control panel. Additional line work to include .15 miles of two (2) new bundles 1590 Lapwing ASCR lines with two (2) 64mm OPGW static wires, two (2) three pole steel dead-end structures, and no distribution overbuild.	Not Eligible	\$21,495,865	100%	\$21,495,865	N/A
Total		\$21,495,865		\$21,495,865	

SHARED NETWORK UPGRADE(S)

The Interconnection Customer's share of costs for Shared Network Upgrades is estimated in Table 3 below.

Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
None:	N/A	\$0	N/A	\$0	N/A
Total		\$0		\$0	

Table 3: Interconnection Customer Shared Network Upgrade(s)

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.

Contingent Network Upgrade(s) Description	Current Cost Assignment	Estimated In- Service Date
None	\$0	N/A
Total	\$0	

Table 4: Interconnection	n Customer	Contingent	Network	Upgrade(s	5)
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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.

Southwest Power Pool, Inc.

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 (\$)
None	\$0	N/A	\$0
Total	\$0		\$0

Southwest Power Pool, Inc.

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for [Insert Interconnection Amount] 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 [Insert all upgrades (TOIF, non-shared NU, shared NU, affected system, etc)] that is required for full interconnection service is summarized in the table below.

Table 6: Cost Summary

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilitie Upgrade(s)	\$1,593,919
Non-Shared Network Upgrade(s)	\$21,495,865
Shared Network Upgrade(s)	\$0
Affected System Upgrade(s)	\$0
Total	\$23,089,784

*Use the following link for Quarterly Updates on upgrades from this report: <u>https://spp.org/spp-documents-filings/?id=18641</u>

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).



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 Facility Study

For

Generation Interconnection Request GEN-2016-111

November 2021

Introduction

This report summarizes the scope of the Generation Interconnection Facility Study to evaluate the Generation Interconnection Request for GEN-2016-111. GEN-2016-111 is proposing to build a 302.0 MW wind-powered generation facility which will interconnect at a new 345kV interconnection substation tapping the Reno County-Summit 345kV line with an expected commercial date of operation on January 15, 2024.

Southwest Power Pool Generation Interconnection Request:

Southwest Power Pool (SPP) GI requested Evergy to perform an Interconnection Facility Study (IFS).

GI Request #	Upgrade ID	Point of Interconnection	Capacity (MW)	Fuel Type
GEN-2016-111	122614, 122615	Reno County-Summit 345kV line	302	Wind

Estimated Costs for TOIF and Network Upgrades

Transmission Owner Interconnection Facilities (TOIF)

The estimated cost is for one (1) breaker, four (4) switches, three (3) CTs and three (3) PTs.

345kV Transmission Line Work (Network Upgrade)

The estimated cost is for approximately 0.15 miles of two (2) new bundled 1590 Lapwing ACSR lines with two (2) 64mm OPGW static wires, two (2) three pole steel dead-end structures, and no distribution underbuild.

345kV Substation Work (Network Upgrade)

The estimated cost is for two (2) breakers, eight (8) switches, two (2) wavetraps, three (3) CCVTs, six (6) PTs and one (1) control panel.

The total cost estimate for GEN-2016-111 for the required Transmission Owner Interconnection Facilities (TOIF) and the Network Upgrades:

\$ 1,589,152	TOIF (Substation)
\$ 4,767	TOIF (AFUDC)
\$ 699,981	Transmission Line Work
\$ 20,594,951	345 kV Substation Work
\$ 64,294	AFUDC
\$ 136,639	Contingency
\$ 23,089,784	Total

These estimates are 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 significant and the accuracy of this estimate at the time of actual settings cannot be assured.

<u>**Time Estimate</u>** Time estimates are based on current version of the project schedule and some processes of each</u> category run concurrently.

Engineering Time	8	Months
Procurement Time	12	Months
Construction Time	24	Months
Total Project Length	36	Months

Interconnection Map



The map shows an approximate location of the interconnection project

Results of Short Circuit Analysis

As a part of this Interconnection Facility Study, a short circuit study was performed to determine the available fault current at the new interconnection bus using PSS/E's activity ASCC. The 2026 Summer Peak case from the 2021 MDWG Final Max Fault Short-Circuit model was used. GEN-2016-111 was taken out of service for this analysis, and all other transmission facilities were in service. As a result, the numbers generated represent the available utility interconnection fault current.

2026 Summer:

3-PH FAULT		1-PH FAULT		THEVENIN IMPEDANCE (PU on 100 MVA and bus base KV)		
AMP	MVA	AMP	MVA	Positive Sequence	Negative Sequence	Zero Sequence
9657.2	5770.70	8357.2	4993.93	0.001229+j0.017285	0.001306+j0.017369	0.004647+j0.024987