



# **INTERCONNECTION FACILITIES STUDY REPORT**

GEN-2016-153  
(IFS-2016-002-11)

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By SPP Generator Interconnections Dept.

## REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
09/15/2020	SPP	Initial draft report issued.
10/15/2020	SPP	Updated final report issued and updated ILTCR eligibility.
01/11/2021	SPP	Updated final report issued. Updated cost allocation in Tables 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
08/03/2021	SPP	Updated final report issued. Updated Tables 3 and 6 to correct cost allocation.
12/22/2021	SPP	Updated final report issued. Updated introduction and interconnection customer interconnection facilities to include GEN-2021-SR8 results

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## SUMMARY

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### INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2016-153/IFS-2016-002-11 is for a 134 MW generating facility located in Harper County, KS. The Interconnection Request was studied in the DISIS-2016-002 Impact Study for Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS). This request was restudied in the DISIS-2016-002-2 Impact Study for ERIS. GEN-2021-SR8 is an additional study performed on this request in which 42 MW of surplus interconnection service was granted not to exceed 134 MW. The Interconnection Customer's requested in-service date is December 1st, 2019.

The interconnecting Transmission Owner, Evergy Kansas Central (WERE), 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 sixty-seven (67) Vestas V110 2.0 MW wind turbine generation systems and twelve (12) SMA SC4000-UP 3.76 MW inverters for a total limited capacity of 134 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;
- One 345/34.5 kV 84/112/140 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- A 2.2 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 ("Viola 345 kV") 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 communications 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
<b><u>GEN-2016-153 Interconnection (TOIF) (WERE) - 122672:</u></b> No interconnection facilities needed.	\$0	N/A	\$0	N/A
<b>Total</b>	<b>\$0</b>		<b>\$0</b>	

\*No interconnection facilities needed. Request is tapping into the existing Flat Ridge 345 kV transmission line.

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
<b><u>GEN-2016-153 Interconnection (Non-Shared NU) (WERE) - 122673:</u></b> Review relay settings and apply adjusted settings at Flat Ridge 2 East and Viola 345 kV substations. Install PMU at Viola substation.	Ineligible	\$90,000	100%	\$90,000	17 Weeks
<b><u>GEN-2016-153 Interconnection (Non-Shared NU) (OGE) - 122674:</u></b> At an existing EHV substation, update relay settings on an existing 345kV line to accommodate new protection settings.	Ineligible	\$15,000	100%	\$15,000	TBD
<b>Total</b>		<b>\$105,000</b>		<b>\$105,000</b>	

Table 2: Non-Shared Network Upgrade(s)

**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
<b><u>GEN-2016-119 Tap – Arcadia 345 kV (DISIS-2016-002-2) – 122791:</u></b> Build new terminal at new substation on Sooner to Spring Creek line being built for Gen-2016-119. Expand Arcadia Substation and re-route four transmission lines to allow for room for new transmission line to be brought in. Build approximately 47 miles of new 345kV line from new substation to Arcadia.	Eligible	\$67,234,906	2.92%	\$1,963,259	36 Months
<b><u>Viola 345/138 kV Transformer Ckt 2 (DISIS-2016-002-2) – 122792:</u></b> Install a new 345 kV terminal on a new rung consisting of two (2) breakers, four (4) switches, and two (2) control panels. Install a new 138 kV terminal on an existing rung consisting of one (1) breaker, three (3) switches, three (3) PTs, and one (1) 400/440 MVA 345-138 kV transformer with LTCs.	Eligible	\$9,204,587	49.29%	\$4,536,940	18 – 24 Months
<b><u>Sooner – Spring Creek (GEN-2016-119 Tap) 345kV Substation – 122627:</u></b> Construct a new EHV substation. Install 4-345 kV 3000A breakers, line relaying, disconnect switches, and associated equipment.	Ineligible	\$11,145,332	2.92%	\$325,443	14 Months
<b>Total</b>		<b>\$87,584,825</b>		<b>\$6,825,642</b>	

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
<b><u>Blackberry – Wolfcreek 345 kV Ckt1 (AECD) – 122765:</u></b> Build 86.15 miles of 345 kV line from Blackberry to Wolf Creek to achieve 1792/1792/1792/1792 (SN/SW/WN/WE) MVA ratings.	\$0	1/1/2026
<b><u>Viola 345/138 kV Transformer Ckt 1 – 50582:</u></b> Install new 345/138 kV transformer at Viola substation.	\$0	4/19/2018
<b><u>Clearwater – Viola 138 kV Ckt 1 – 50583:</u></b> Build new 21.8-mile 138 kV line from new Viola substation to Clearwater 138 kV substation.	\$0	11/16/2018
<b><u>Gill – Viola 138 kV Ckt 1 – 50584:</u></b> Build new 27.9-mile 138 kV line from new Viola substation to Gill 138 kV substation.	\$0	11/16/2018

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 (\$)
None	\$0	N/A	\$0
<b>Total</b>	<b>\$0</b>		<b>\$0</b>

## 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 Facilities Upgrade(s)	\$0
Non-Shared Network Upgrade(s)	\$105,000
Shared Network Upgrade(s)	\$6,825,642
Affected System Upgrade(s)	\$0
<b>Total</b>	<b>\$6,930,642</b>

\*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

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## **A: TRANSMISSION OWNER'S INTERCONNECTION FACILITIES STUDY REPORT AND NETWORK UPGRADES REPORT(S)**

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See next page for the Transmission Owner's Interconnection Facilities Study Report and Network Upgrades Report(s).