



Interconnection Facilities Study

**GEN-2015-013
(IFS-2015-001-18)**

July 2016

Generator Interconnection



Revision History

Date	Author	Change Description
4/25/2016	SPP	Draft Interconnection Facilities Study Report Revision 0 Issued
5/26/2016	SPP	Final Interconnection Facilities Study Report Revision 0 Issued
7/29/2016	SPP	Final Interconnection Facilities Study Report Revision 1 Issued to account cost allocation changes for rating upgrades and Engineering and Construction lead times updates

Table of Contents

Revision History **ii**

Table of Contents..... **iii**

Interconnection Facilities Study Summary **1**

 Interconnection Facilities Study Introduction.....1

 Phase(s) of Interconnection Service.....1

 Credits/Compensation for Amounts Advanced for Network Upgrade(s).....1

 Interconnection Customer Interconnection Facilities1

 Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s)2

 Shared Network Upgrade(s).....3

 Other Network Upgrade(s).....3

 Conclusion3

Appendices **4**

 A : WFEC Transmission Owner Interconnection Facilities Study ReportA-0

Interconnection Facilities Study Summary

Interconnection Facilities Study Introduction

This Interconnection Facilities Study (IFS) for GEN-2015-013/IFS-2015-001-18 (Interconnection Request) is for a 120.00 MW solar farm facility located in Kiowa County, Oklahoma. The Interconnection Request was studied in the DISIS-2015-001 Impact Study and DISIS-2015-001-1 Impact Restudy as an Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS) request. The Interconnection Request was provided updated Cost Allocation in DISIS-2015-001-2 Impact Restudy. Since the posting of the DISIS-2015-001 Impact Study the Interconnection Customer has executed the Interconnection Facilities Study Agreement per Appendix 4 or Appendix 4A and provided deposit securities as required by the Section 8.9 of the Generator Interconnection Produce (GIP) to proceed to the Interconnection Facilities Study. The GIP is covered under Attachment V of the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT). The request for interconnection was placed with SPP by the requesting customer (Interconnection Customer) in accordance with OATT, which covers new generation interconnections on SPP's transmission system.

Western Farmers Electric Cooperative (WFEC) performed a detailed Interconnection Facilities Study at the request of SPP for the Interconnection Request. Interconnection Customer's original in service date for the Interconnection Request is December 1, 2016. SPP has proposed the full Interconnection Service will be available after the assigned Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s) are completed. Full interconnection service will require Network Upgrade(s) listed in the "Other Network Upgrade(s)" section.

The primary objective of the Interconnection Facilities Study (IFS) is to identify necessary Transmission Owner Interconnection Facilities, network upgrade(s), other direct assigned upgrade(s), and associated upgrade lead times needed for the additional of the requested Interconnection Service into the SPP Transmission System at the specific Point of Interconnection (POI).

Phase(s) of Interconnection Service

It is not expected that Interconnection Service will occur in phases. However, 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 either credits or potentially Long Term Congestion Rights (LTCR), otherwise known as compensation, in accordance with Attachment Z2 of the SPP Tariff for any Network Upgrades, including any tax gross-up or any other tax-related payments associated with the Network Upgrades, and not refunded to the Interconnection Customer.

Interconnection Customer Interconnection Facilities

The Interconnection Request's Generation Facility is currently proposed to consist of seventy-two (72) 1.666 MW Eaton Power Xpert Solar Inverters for a total generating nameplate of 119.952 MW. The 34.5kV collector system for this solar farm is planned to be connect to one (1) 138/34.5kV

81/108/135 MVA (ONAN/ONAF/ONAF) Interconnection Customer owned and maintained transformer at the Interconnection Customer owned substation. A short (<1) mile 795MCM ACSR conductor overhead 138kV transmission circuit will connect the Generating Facility from the Interconnection Customer owned substation to the Point of Interconnection (POI) at the existing Western Farmers Electric Cooperative (WFEC) owned and maintained 138kV bus at the Snyder Substation. The Interconnection Customer will be responsible for all of the transmission facilities connecting the Interconnection Customer owned substation to the Point of Interconnection (POI).

The Interconnection Customer will be responsible for any equipment necessary to design the Generating Facility to maintain a power factor of 0.95 lagging and 0.95 leading at the POI. Also, the Interconnection Customer will need to coordinate with the Transmission Owner for relay, protection, control, and communication system configurations.

Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s)

To facilitate interconnection, the interconnecting Transmission Owner, WFEC, will need to expand the existing Snyder 138kV ring bus and construct a new line terminal which includes one (1) 2000A continuous ampacity rated 138kV circuit breaker, disconnect switches, structure, and any associated terminal equipment for the acceptance of the Interconnection Customer's Interconnection Facilities. Currently, WFEC estimates an Engineering and Construction (E&C) lead time of approximately twelve (12) months after a fully executed Generator Interconnection Agreement (GIA) for the completion of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades.

At this time, Interconnection Customer is responsible for \$1,700,000 of WFEC Transmission Owner Interconnection Facilities (TOIF) and Non-Shared Network Upgrade(s). **Table 1** displays the estimated costs for TOIF and Non-Shared Network Upgrade(s).

Table 1: Interconnection Customer TOIF and Non-Shared Network Upgrade(s)

TOIF and Non-Shared Network Upgrades Description	Allocated Cost (\$)	Allocated Percent (%)	Total Cost (\$)
WFEC Snyder Interconnection Substation: Transmission Owner Interconnection Facilities 138kV Substation work for one (1) new line terminal, line switch, dead end structure, line relaying, communications, revenue metering, and line arrester	\$300,000	100%	\$300,000
WFEC Snyder Interconnection Substation - Non-Shared Network Upgrades 138kV Substation work for the existing 138kV ring bus, one (1) new line terminal, one (1) 2000A circuit breaker, control panel replacement, line relaying,	\$1,400,000	100%	\$1,400,000

disconnect switches, and associated equipment.			
Total	\$1,700,000	100%	\$1,700,000

Shared Network Upgrade(s)

The Interconnection Request was studied in the DISIS-2015-001 Impact Study and DISIS-2015-001-1 Impact Restudy as an Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS) request. The Interconnection Request was provided updated cost allocation in DISIS-2015-001-2 Impact Restudy. At this time, the Interconnection Customer is allocated \$0 for Shared Network Upgrades. If higher queued Interconnection Request(s) withdraw from the queue, suspend or terminate their GIA, restudies will have to be conducted to determine the Interconnection Customers’ allocation of Shared Network Upgrades. All studies have been conducted on the basis of higher queued Interconnection Request(s) and the Network Upgrade(s) associated with those higher queued Interconnection Requests being placed in service. At this time, the Interconnection Customer is allocated the following cost listed in **Table 2** for Shared Network Upgrade.

Table 2: Interconnection Customer Shared Network Upgrades

Shared Network Upgrades Description	Allocated Cost (\$)	Allocated Percent (%)	Total Cost (\$)
Currently not allocated Shared Network Upgrades	\$0	n/a	\$0
Total	\$0	n/a	\$0

Other Network Upgrade(s)

Certain Other Network Upgrades are currently not the cost responsibility of the Interconnection Customer but will be required for full Interconnection Service.

- 1) Woodward EHV Phase Shifting Transformer circuit #1 assigned to DISIS-2011-001 Interconnection Customer(s).

Depending upon the status of higher or equally queued customers, the Interconnection Request’s in-service date is at risk of being delayed or their Interconnection Service is at risk of being reduced until the in-service date of these Other Network Upgrades.

Conclusion

Interconnection Service for the Interconnection Request will be delayed until the Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades are constructed. The Interconnection Customer is responsible for \$1,700,000 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades. At this time, the Interconnection Customer is allocated \$0 for Shared Network Upgrades. After all Interconnection Facilities and Non-Shared Network Upgrades have been placed into service, Interconnection Service for 120.00 MW, as requested by the Interconnection Customer can be allowed.

At this time the total allocation of costs assigned to Interconnection Customer for interconnection Service are estimated at \$1,700,000.

Appendices

A: WFEC Transmission Owner Interconnection Facilities Study Report

See next page for WFEC Interconnection Facilities Study Report.

1. Introduction

<OMITTED TEXT> (Interconnection Customer) has requested an Interconnection Facilities Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for interconnecting a 120.00 MW solar generation facility in Kiowa County, Oklahoma to the transmission system of Western Farmers Electric Cooperative (WFEC). The generator facility, GEN-2015-013, is comprised of seventy-two (72) 1.666 MW Eaton Power Xpert Solar Inverters for a total generating nameplate of 119.952 MW.

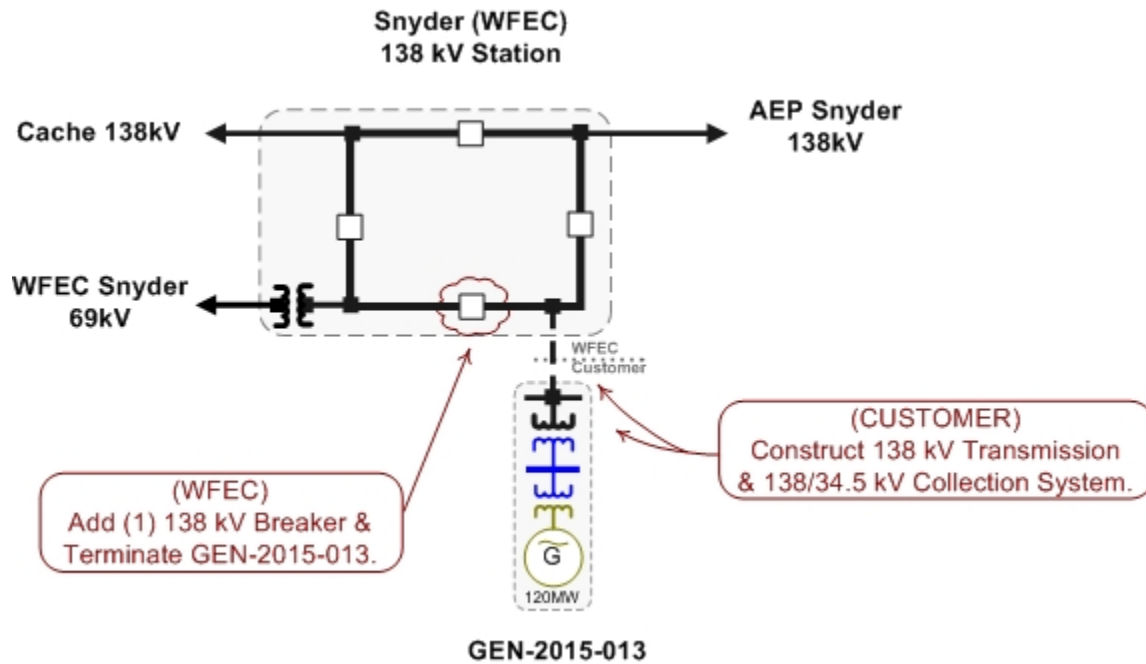
2. Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades

The cost for the Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades is listed below in **Table 1**. GEN-2015-013/IFS-2015-001-18 is planned to interconnect at the WFEC owned 138kV bus located at Snyder 138kV Substation. The estimated lead time for Transmission Owner Interconnection Facilities and Network Upgrades is six (6) months after a fully executed Generator Interconnection Agreement (GIA). The one-line diagram is shown in **Figure 1**.

Table 1: Required Transmission Owner Interconnection Facilities and Non Shared Network Upgrades

Description	Estimated Cost
Snyder Interconnection Substation: Transmission Owner Interconnection Facilities 138kV Substation work for a new line terminal position, one (1) 138kV circuit breaker, disconnect switches, line switch, dead end structure, communications, revenue metering, and line arrestors.	\$300,000
Snyder Interconnection Substation : Network Upgrades 138kV Substation work for the existing 138kV ring bus, control panel replacement, add one (1) new terminal position with one (1) 2000A breaker, associated switches, and associated structure.	\$1,400,000
Total:	\$1,700,000

Figure 1: Interconnection Configuration for GEN-2015-013



2.1. Interconnection Customer Facilities – The Interconnection Customer will be responsible for its Generating Facility and its one (1) 138/34.5 kV transformer that connect to the solar inverters to the Point of Interconnection. In addition, the Interconnection Customer will be required to install the following equipment in its facilities.

2.1.1. Reactive Power Equipment – The Customer will be responsible for reactive power compensation equipment to maintain 95% lagging (providing vars) and 95% leading (absorbing vars) power factor at the point of interconnection, which may be provided in part by the reactive power capability of the generators. Any capacitor banks installed by the Interconnection Customer shall not cause voltage distortion in accordance with Article 9.7.4 of the standard SPP Generator Interconnection Agreement.

3. Conclusion

The Interconnection Customer’s Interconnection Facilities and Non-Shared Network Upgrades are estimated at \$1,700,000.