



INTERCONNECTION FACILITIES STUDY REPORT

GEN-2015-055
(IFS-2015-002-25)

Published December 2019

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
4/17/2017	SPP	Initial draft report issued.
5/29/2018	SPP	Revised draft report issued due to DISIS-2015-002-5 results.
7/3/2018	SPP	Final report issued. Removed Previous Network Upgrade in Table 4 that was completed.
12/19/2018	SPP	Final revised report issued. Revised network upgrade configuration and cost in Table 2. Revised Table 5 total summary.
5/10/2019	SPP	Final report revision 2 issued. Shared Network Upgrades Table 3 updated per DISIS-2015-002-7.
12/12/2019	SPP	Final report revision 3 issued. Shared Network Upgrades in Table 3 removed per DISIS-2015-002-10.

CONTENTS

Revision History.....	i
Summary.....	1
Introduction	1
Phase(s) of Interconnection Service	1
Credits/Compensation for Amounts Advanced for Network Upgrade(s).....	1
Interconnection Customer Interconnection Facilities	2
Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s).....	3
Shared Network Upgrade(s)	4
Previous Network Upgrade(s).....	4
Conclusion.....	5
Appendices.....	6
A: Transmission Owner’s Interconnection Facilities Study Report.....	7

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2015-055/IFS-2015-002-25 is for a 40.00 MW generating facility located in Beckham County, Oklahoma. The Interconnection Request was studied in the DISIS-2015-002 Impact Study and Restudies for Energy Resource Interconnection Service (ERIS) only. The Interconnection Customer's requested in-service date is May 1, 2017.

The interconnecting Transmission Owner, Western Farmers Electric Cooperative (WFEC), 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, Non-Shared Network Upgrade(s), Shared Network Upgrade(s), and Previous Network Upgrade(s) 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, 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 capacity-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 eighty (80) 0.5 MW Advanced Energy (A.E.) 500NX solar inverters for a total generating nameplate capacity of 40.00 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 138 kV transformation substation with associated 34.5 kV and 138 kV switchgear;
- One (1) 138/34.5 kV 24/32/40 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation.
- A one (1) mile overhead 138 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 138 kV bus at existing WFEC substation ("Erick") that is to be 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 power factor at the POI between 95% lagging and 95% leading, including approximately 1.8 Mvars¹ of reactors to compensate for injection of reactive power into the transmission system under no/reduced generating conditions. The Interconnection Customer may use inverter 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.

The Interconnection Customer shall coordinate relay, protection, control, and communication system configurations and schemes with the Transmission Owner.

¹ This approximate minimum reactor amount is needed for the current configuration of GEN-2015-055 as studied in the DISIS-2015-002 Impact Study and restudies.

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 %	Allocated Cost Estimate (\$)	Estimated Lead Time
WFEC Erick Interconnection Substation: Construct one (1) 138 kV line terminal, line switches, dead end structure, line relaying, communications, revenue metering, line arrester, and all associated equipment and facilities necessary to accept transmission line from Interconnection Customer’s Generating Facility.	\$300,000	100%	\$300,000	18 Months
Total	\$300,000	100%	\$300,000	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	Z2 Type²	Total Cost Estimate (\$)	Allocated %	Allocated Cost Estimate (\$)	Estimated Lead Time
WFEC Erick Interconnection Substation: Construct a four (4) breakers ring bus at 138kV with 2000 continuous ampacity breakers, control panels, line relaying, disconnect switches, structures, foundations, conductors, insulators, and all other associated work and materials.	non-creditable	\$2,000,000	100%	\$2,000,000	18 Months
Total		\$2,000,000	100%	\$2,000,000	

² 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 Upgrades

Shared Network Upgrades Description	Z2 Type	Total Cost Estimate (\$)	Allocated %	Allocated Cost Estimate (\$)	Estimated Lead Time
None	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.

PREVIOUS NETWORK UPGRADE(S)

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

Table 4: Interconnection Customer Previous Network Upgrade(s)

Previous Network Upgrade(s) Description	Current Cost Assignment	Estimated In-Service Date
None	\$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 Previous Network Upgrades.

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 40.00 MW can be granted. Interconnection Service will be delayed until the Transmission Owner Interconnection Facilities, Non-Shared Network Upgrade(s), Shared Network Upgrade(s), and Previous Network Upgrade(s) are completed. The Interconnection Customer’s estimated cost responsibility for Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades is summarized in the table below.

Table 5: Cost Summary

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilities	\$300,000
Network Upgrades	\$2,000,000
Total	\$2,300,000

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

See next page for the Transmission Owner's Interconnection Facilities Study Report.

wfec
western farmers
electric cooperative

A Touchstone Energy® Cooperative 

FACILITY STUDY

for

Generation Interconnection Request 2015-055

40MW Solar Generation in Beckham County near Erick, OK.

December 2018

SUMMARY

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Western Farmers Electric Cooperative (WFEC) performed the following facility Study to satisfy the Facility Study agreement executed by the requesting customer for SPP Generation Interconnection request Gen-2015-055. The request for interconnection was placed with SPP in accordance with SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system. The requirements for interconnection consist of expanding Erick Switch Station 138kV to a 4-breaker ring bus configuration. The total cost for WFEC to expand Erick Switch Station to accommodate the interconnection request is \$2,300,000.

Table of Contents

Introduction	4
Interconnection Facilities.....	5
Interconnection Cost.....	7
Short Circuit Duty Evaluation.....	7

Introduction

The Southwest Power Pool has requested a facility Study for the purpose of interconnecting 40MW of solar generation within the service territory of WFEC in Beckham County, Oklahoma. The proposed 138kV interconnection is at Erick Switch Station. This station is owned by WFEC.

The cost for adding a new 138kV terminal to the switch station, the required interconnection facility, is estimated at \$2,300,000.

Network constraints within SPP may be verified with a transmission service request and associated studies.

Interconnection Facilities

The primary objective of this study is to identify interconnection facilities. The existing Erick Switch 138kV station is a single breaker configuration as shown below in Figure 1.

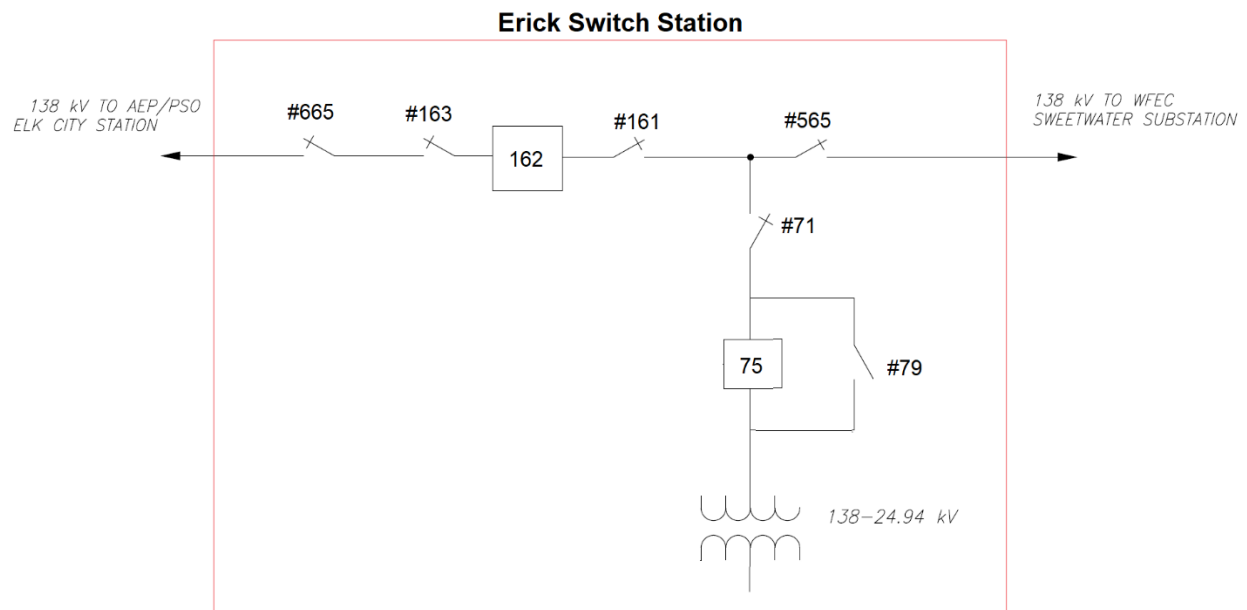


Figure 1: Erick Switch Station (Existing)

Expanding Erick Switch with an additional terminal for the solar farm generator interconnect will require an expansion of the site to a multiple breaker ring bus configuration. WFEC will install new steel structures, breakers, switches, buss work, and relaying at Erick Switch. WFEC will require the customer to install OPGW for communications from Customer's solar farm collector sub to WFEC's switch station.

The total cost for WFEC to add a new 138kV terminal in the existing switch station for the interconnection is estimated at \$2,300,000. This cost does not include the construction of the 138kV line from the customer substation into the new terminal at Erick Switch Station. The customer is responsible for this 138kV line up to the point of interconnection. This cost does not include the Customer's 138/34.5kV substation and the cost estimate should be determined by the Customer.

Figure 2 below shows the one-line diagram of the proposed interconnection with existing and proposed facilities highlighted.

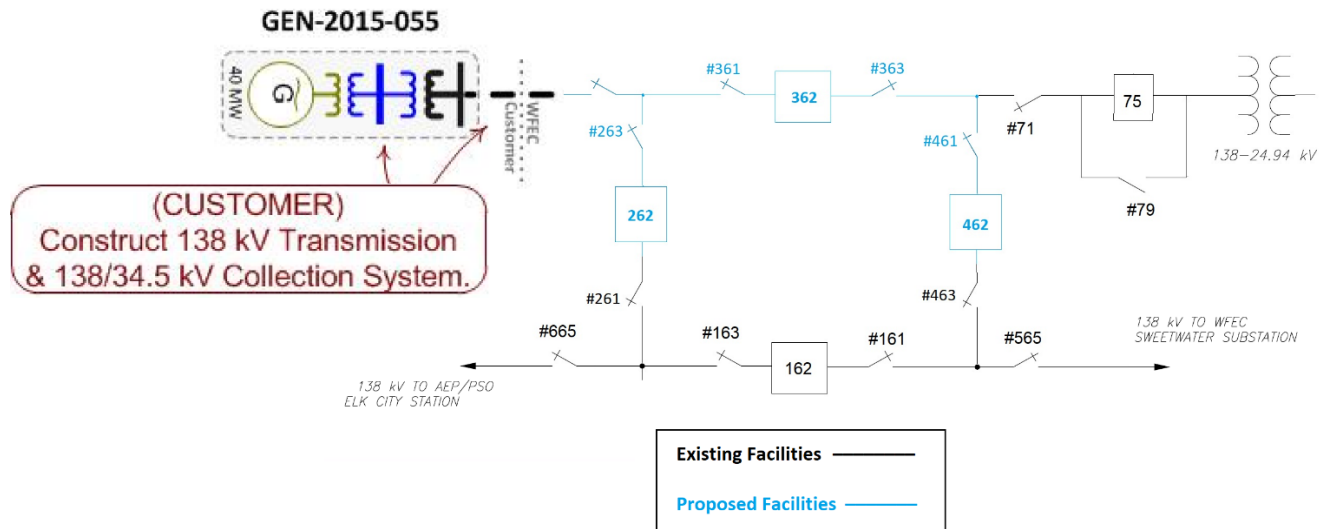


Figure 2: One-Line Diagram of Proposed Interconnection

This facility study does not guarantee the availability of transmission service necessary to deliver additional generation to any specific point inside or outside of the SPP transmission system. The transmission network facilities may not be adequate to deliver any additional generation output to the system. If the customer requests firm transmission service under the SPP open access transmission tariff at a future date, Network Upgrades or other new construction may be required to provide the service requested under the SPP OATT.

Interconnection Cost

Table 1: Required Interconnection Network Upgrade Facilities

Facility	Estimated Cost (2018 Dollars)
WFEC Erick Interconnection Substation: Transmission Owner Interconnection Facilities Construct one (1) 138 kV line terminal, line switches, dead end structure, line relaying, communications, revenue metering, line arrestor, and all associated equipment and facilities necessary to accept transmission line from Interconnection Customer's Generating Facility.	\$300,000
WFEC - Interconnection Facilities - Construct a four (4) breaker ring bus at 138 kV with 2000 continuous amp capability, control panels, line relaying, disconnect switches, structures, foundations, conductors, insulators, and all other associated work.	\$2,000,000
Total	\$2,300,000

Short Circuit Duty Evaluation

It is standard practice for WFEC to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating with re-closer de-rating applied, as determined by the ANSI/IEEE C37.5-1979, C37.010-1979 & C37.04-1979 breaker rating methods.

For this generator interconnection, no breakers were found to exceed their interrupting capability after the addition of the Customer's generation and related facilities. Therefore, there is no short circuit upgrade costs associated with the GEN-2015-055 interconnection.