# INTERCONNECTION FACILITIES STUDY REPORT

GEN-2015-057

(IFS-2015-002-33)

Published March 2017

By SPP Generator Interconnections Dept.

# REVISION HISTORY

| DATE OR VERSION NUMBER | AUTHOR | CHANGE DESCRIPTION | COMMENTS |
|---|---|---|---|
| 2/2/2017 | SPP | Initial draft report issued. | |
| 3/28/2017 | SPP | Initial final report issued. | |
| | | | |

# CONTENTS

# SUMMARY

## *INTRODUCTION*

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2015-057/IFS-2015-002-33 is for a 100.00 MW generating facility located in Grady County, Oklahoma. The Interconnection Request was studied in the DISIS-2015-002 Impact Study for Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS). Prior to an executed IFS agreement, the Interconnection Customer requested to withdraw NRIS per Section 4.4.1 of the Southwest Power Pool (SPP) Generator Interconnection Procedures (GIP), therefore ERIS-only was analyzed for this request in the DISIS-2015-002-1 Impact Restudy and DISIS-2015-002-2 Impact Restudy. The Interconnection Customer's requested in-service date is December 31, 2017.

The interconnecting Transmission Owner, Oklahoma Gas and Electric Company (OKGE), 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 and Non-Shared Network Upgrade(s) are completed.

The primary objective of the IFS is to identify necessary Transmission Owner Interconnection Facilities, Network Upgrade(s), other direct assigned upgrade(s), and associated upgrade lead times needed to grant the requested Interconnection Service at the specified 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 compensation in accordance with Attachment Z2 of the SPP OATT for the cost of SPP 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 fifty (50) 2.0 MW General Electric (G.E.) wind generators for a total generating nameplate capacity of 100.00 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:

- A 34.5kV collector system;
- one (1) 345/34.5kV 72/96/120 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 345kV transmission line will connect the Interconnection Customer's substation to the Point of Change of Ownership (PCO) to GEN-2014-056/IFS-2014-002-21 345kV substation; utilize the GEN-2014-056/IFS-2014-002-21 twelve (12) mile 345kV overhead 345kV to the GEN-2011-010 and GEN-2014-005/IFS-2014-001-05 345kV substation PCO. The Interconnection Request will utilize the GEN-2011-010 and GEN-2014-005/IFS-2014-001-05 ten (10) mile 345kV overhead generator lead to the POI at the existing 345kV bus at the Minco Substation owned and maintained by OKGE;
- 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 2.4Mvars[1] of reactors to compensate for injection of reactive power into the transmission system under no/reduced generating conditions. The Interconnection Customer may use wind 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.

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

The Interconnection Customer has recently requested a modification review for determination of impacts. If the modification review is deemed as material, then this IFS could be revised and updated to include the requirements for the latest wind farm configuration and connection to the POI.

[1] This approximate minimum reactor amount is needed for the current configuration of the wind farm as studied in the DISIS-2015-002 Impact Study. This amount is accounting for GEN-2015-057/IFS-2015-002-33 facilities' charging contribution to the total reactor size of 35.9Mvars identified the DISIS-2015-002 Impact Study report as required for GEN-2011-010, GEN-2014-005/IFS-2014-001-05, and GEN-2014-056/IFS-2014-002-2, and GEN-2015-057/IFS-2015-002-33 facilities.

## *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** 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: Interconnection Customer TOIF and Non-Shared Network Upgrade(s)*

| TOIF and Non-Shared Network Upgrades Description | Allocated Cost Estimate ($) | Allocated Percent (%) | Total Cost Estimate ($) | Estimated Lead Time |
|---|---|---|---|---|
| **OKGE Minco Substation: Transmission Owner Interconnection Facilities** | $0 | 100% | $0 | |
| **OKGE Minco Substation - Non-Shared Network Upgrades** Update relay settings, electrical modeling, and records | $20,000 | 100% | $20,000 | 1 Month |
| **Total** | **$20,000** | **100%** | **$20,000** | |

A Shared Facilities Usage Agreement for the shared facilities with GEN-2011-010, GEN-2014-005/IFS-2014-001-05, and GEN-2014-056/IFS-2014-002-21 shall be required for Generator Interconnection Service. Shared Facilities Usage Agreement details will be determined during the negotiation phase of the GIA.

## *SHARED NETWORK UPGRADE(S)*

The Interconnection Customer's share of costs for Shared Network Upgrades is estimated in **Table 2** below.

Table 2: Interconnection Customer Shared Network Upgrades

| Shared Network Upgrades Description | Allocated Cost ($) | Allocated Percent (%) | Total Cost ($) |
|---|---|---|---|
| Currently none | $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) Currently None

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 Other Network Upgrades.

## CONCLUSION

After all Interconnection Facilities and Non-Shared Network Upgrades have been placed into service, Interconnection Service for 100.00 MW can be granted. Full Interconnection Service will be delayed until the Transmission Owner Interconnection Facilities and Non-Shared 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 3: Cost Summary*

| Description | Allocated Cost Estimate |
|---|---|
| Transmission Owner Interconnection Facilities | $0 |
| Network Upgrades | $20,000 |
| **Total** | **$20,000** |

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: OKGE TRANSMISSION OWNER INTERCONNECTION FACILITIES STUDY REPORT

See next page for OKGE Interconnection Facilities Study Report.

# FACILITY STUDY

# for

# Generation Interconnection Request 2015-057

100MW Wind Generating Facility
In Grady County
Oklahoma

January 13, 2016

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**OG&E Electric Services**

## Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Oklahoma Gas and Electric (OG&E) performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting customer for SPP Generation Interconnection request Gen-2015-057. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system. The request is for adding a new 100 MW wind facility to an existing Point of Interconnection. No new or additional facilities are necessary to accommodate the additional generation. The new generating facility will require updated relay settings and electrical modeling work estimated at $20,000.

## Table of Contents

## Introduction

The Southwest Power Pool has requested a Facility Study for the purpose of interconnecting 100 MW of new wind generation to an existing Point of Interconnection within the service territory of OG&E Electric Services (OKGE) in Grady County Oklahoma. The proposed 345kV point of interconnection is at the existing Minco Substation in Grady County. This substation is owned by OKGE. The proposed in-service date for the additional generation is unknown.

Network Constraints in the American Electric Power West (AEPW), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

## Interconnection Facilities

The primary objective of this study is to identify attachment facilities. There are no requirements for additional interconnection facilities at the existing Minco Substation.

This Facility Study does not guarantee the availability of transmission service necessary to deliver the additional generation to any specific point inside or outside the Southwest Power Pool (SPP) transmission system. The transmission network facilities may not be adequate to deliver the additional generation output to the transmission 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.

The costs of interconnecting the facility to the OKGE transmission system are listed in Table 1.

Short Circuit Fault Duty Evaluation

It is standard practice for OG&E to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating with recloser 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 100 MW generation and related facilities. OG&E found no breakers that exceeded their interrupting capabilities on their system. Therefore, there is no short circuit upgrade costs associated with the Gen-2015-057 interconnection.

**Table 1: Required Interconnection Network Upgrade Facilities**

| Facility | ESTIMATED COST (2016 DOLLARS) |
|---|---|
| OKGE – **Interconnection Facilities**- No new interconnection facilities necessary | **$0** |
| OKGE – **Network Upgrades** Update relay settings and records. | **$20,000** |
| OKGE - Right-of-Way for 345kV terminal addition | No Additional ROW |
| **Total** | **$20,000** |

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# Minco Substation