Interconnection Facilities Study

GEN-2015-030 (IFS-2015-001-09)

February 2016

Generator Interconnection

SPP Southwest Power Pool

Revision History

Date	Author	Change Description
1/26/2016	SPP	Draft Interconnection Facilities Study Report Revision 0 Issued
2/29/2015	SPP	Final Interconnection Facilities Study Report Revision 0 Issued

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Interconnection Facilities Study Summary

Interconnection Facilities Study Introduction

This Interconnection Facilities Study for GEN-2015-030/IFS-2015-001-09 (Interconnection Request) is for a 200.10 MW wind farm facility located in Noble 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) only request. 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.

Oklahoma Gas and Electric Company (OKGE) 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, 2017. 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 Generating Facility is currently proposed to consist of eighty-seven (87) 2.3 MW General Electric (G.E.) Wind Turbines for a total generating nameplate of 200.10 MW. The 34.5kV collector system for this wind farm is planned to be connect to one (1) 345/34.5kV Interconnection Customer owned and maintained transformer at the Interconnection Customer owned substation. A four (4) mile overhead 345kV transmission circuit will connect the Generating

Facility from the Interconnection Customer owned substation to the Point of Interconnection (POI). The Point of Change of Ownership (PCO) will be adjacent to the property fence of the Sooner 345kV substation. An OKGE owned dead-end structure will be required to be installed at the PCO location. The POI is at the existing OKGE owned and maintained 345kV bus at the Sooner Substation. The Interconnection Customer will be responsible for all of the transmission facilities connecting the Interconnection Customer owned substation to the Point of Change of Ownership (PCO).

The Interconnection Customer will be responsible for any equipment located at the Customer substation necessary to maintain a power factor of 0.95 lagging to 0.95 leading at the POI, including approximately 9.8 Mvar[1] of reactors or install and utilize an equivalent means to compensate for injection of reactive power into the transmission system under no/light wind conditions. 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, OKGE, will need to expand and construct the existing breaker-and-a-half 345kV bus configuration for an additional new 345kV rung along with one (1) new line terminal, two (2) 3000A continuous ampacity rated 345kV circuit breakers, disconnect switches, structure, and any associated terminal equipment for the acceptance of the Interconnection Customer's Interconnection Facilities. Currently, OKGE estimates an Engineering and Construction (E&C) lead time of approximately ten (10) 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 $3,369,366 of OKGE 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 ($)	Allocated Percent (%)	Total Cost ($)
OKGE Interconnection Substation: Transmission Owner Interconnection Facilities 345kV Substation work for building one (1) new line terminal, line switch, dead end structure, line relaying, and revenue metering.	$1,099,958	100%	$1,099,958
OKGE Interconnection Substation – PCO 345kV Transmission Line: Transmission Owner Interconnection Facilities 345kV transmission line to terminate generator lead outside of power plant property	$513,246	100%	$513,246
OKGE Interconnection Substation - Non-Shared Network	$1,756,162	100%	$1,756,162

[1] This approximate minimum reactor amount is needed for the current configuration of the wind farm as studied in the DISIS-2015-001 Impact Study.

Upgrades 345kV Substation work for expanding Sooner 345kV for an additional new rung, (1) new line terminal, two (2) 3000A circuit breaker, line relaying, disconnect switches, and associated equipment.			
Total	$3,369,366	100%	$3,369,366

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) only request. 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) 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 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 $3,369,366 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 Network Upgrades have been placed into service, Interconnection Service for 200.10 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 $3,369,366.

Appendices

A: OKGE Transmission Owner Interconnection Facilities Study Report

See next page for OKGE Interconnection Facilities Study Report.

FACILITY STUDY

for

Generation Interconnection Request 2015-030

Wind Generating Facility
In Noble County
Oklahoma

July 13, 2014

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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-2015-030. 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 requirements for interconnection consist of adding two breakers, a line terminal, and a 345kV transmission line to the point of change of ownership with the generator lead outside of Power Plant property at Sooner 345kV substation. The total cost for OKGE to add two breakers, a terminal, and 345kV line in Sooner substation property, the interconnection facility, is estimated at $3,369,366.

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Introduction

The Southwest Power Pool has requested a Facility Study for the purpose of interconnecting a wind generating facility within the service territory of OG&E Electric Services (OKGE) in Noble County Oklahoma. The proposed 345kV point of interconnection is at Sooner 345kV Substation in Noble County Oklahoma. This substation is owned by OKGE.

The cost for adding a new 345kV terminal to the Substation, the required interconnection facility, is estimated at $1,099,958.

Network Constraints in the Southwest Public Service (SPS), 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. The requirements for interconnection consist of adding a new 345kV terminal in Sooner Substation. This 345kV addition shall be constructed and maintained by OKGE. The Customer did not propose a route of its 345kV line to serve its 345kV facilities. It is assumed that obtaining all necessary right-of-way for the line into the new OKGE 345kV substation facilities will not be a significant expense.

The total cost for OKGE to add a new 345kV terminal in an existing EHV Substation, the interconnection facility, is estimated at $3,369,366. This cost does not include building the 345kV line from the Customer substation to the point of the change of ownership outside of power plant property. The Customer is responsible for this 345kV line up to the point of change of ownership. This cost does not include the Customer's 345-34.5kV substation and the cost estimate should be determined by the Customer.

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 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. 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-2015-030 interconnection.

Table 1: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2014 DOLLARS)
OKGE – **Interconnection Facilities**- Add a single 345kV line terminal to an existing EHV Substation. Dead end structure, line switch, line relaying, revenue metering including CTs and PTs	**$1,099,958**
OKGE –**Transmission Line-** Build 345kV Transmission line to terminate generator lead outside of Power Plant property.	**$513,246**
OKGE – **Network Upgrades** at an existing EHV sub, Install 2-345kV 3000A breaker, line relaying, disconnect switches, and associated equipment	**$1,756,162**
OKGE - Right-of-Way for 345kV terminal addition	No Additional ROW
Total	**$3,369,366**

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Sooner Substation