



**Facility Study
For
Generator Interconnection
Request
GEN-2013-019**

***SPP Generator
Interconnection Studies***

(#GEN-2013-019)

March 2015

Revision History

Date	Author	Change Description
6/13/2014	SPP	Facility Study Report Issued
11/25/2014	SPP	Facility Study Revised and Report updated for latest DISIS-2013-002-2 restudy results
2/18/2015	SPP	Facility Study Revised and Report updated for GEN-2013-002 Facility restudy results
3/4/2015	SPP	Updated and changed for corrections

Summary

Lincoln Electric System (LES) performed a detailed Facility Study at the request of Southwest Power Pool (SPP) for Generation Interconnection request GEN-2013-019 (73.6 MW/Wind) located in Lancaster and Gage Counties, Nebraska. In addition, Nebraska Public Power District (NPPD) has reviewed their facilities at the Sheldon Substation for the addition of this request. SPP has proposed the in-service date will be after the assigned Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades that are assigned to GEN-2013-002 are completed. Full Interconnection Service will require the Network Upgrades listed in the "Other Network Upgrades" section. 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.

Phases of Interconnection Service

It is not expected that interconnection service will require phases however, interconnection service will not be available until all interconnection facilities and network upgrades can be placed in service.

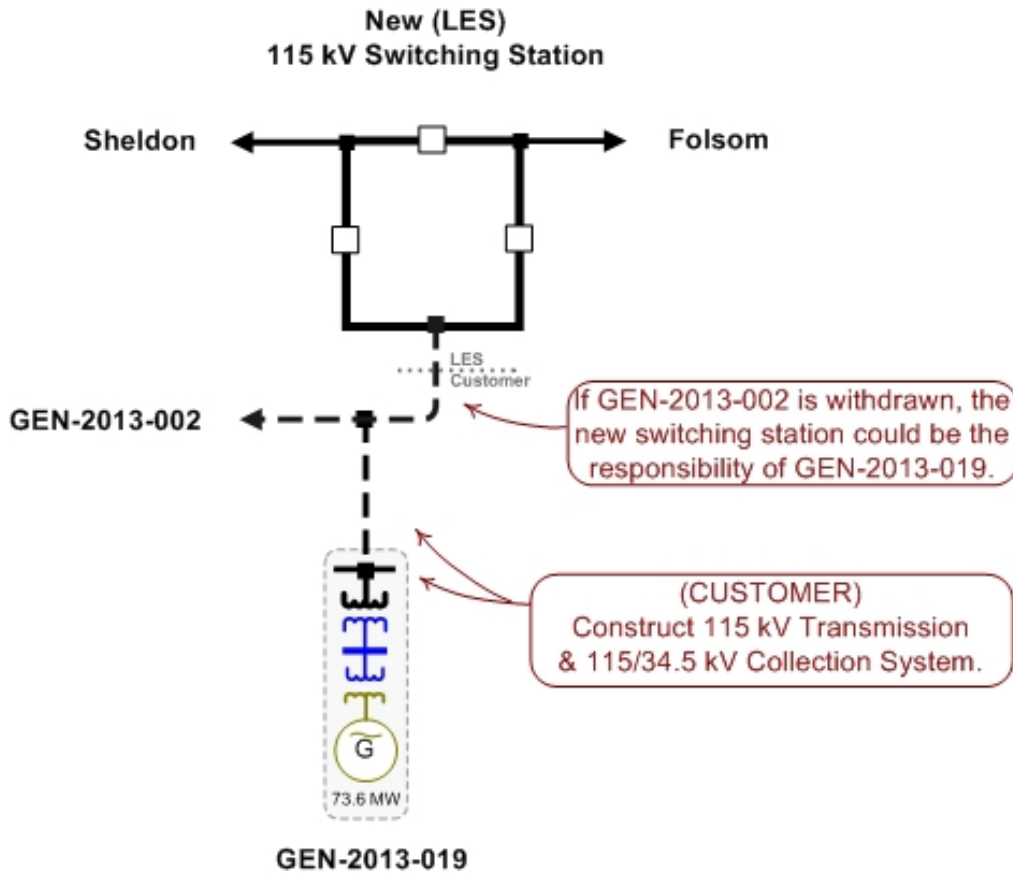
Interconnection Customer Interconnection Facilities

The Interconnection Customer will be responsible for all of the transmission facilities connecting the customer owned substation to the Point of Interconnection (POI), at a new Lincoln Electric System (LES) owned 115kV substation. The new LES 115kV substation will be a tap on the Sheldon Station – Folsom 115kV circuit. The new LES 115kV substation is currently the cost responsibility of GEN-2013-002. The Interconnection Customer will also 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.

Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades

To allow interconnection the Transmission Owner will need construct a three breaker ring bus along with associated terminal equipment that is acceptable for the addition of the Interconnection Customer's Interconnection Facilities. Currently, the three break ring bus, associated terminal equipment, and NPPD protective relay and communication equipment replacement are the cost responsibility of GEN-2013-002. If the GEN-2013-002 Interconnection Request is withdrawn or has its Generator Interconnection Agreement terminated, then the estimated \$3,230,685 cost for the three break ring bus and associated terminal equipment for the new LES 115kV substation along with NPPD protective relay and communication equipment replacement will be assigned to GEN-2013-019. At this time GEN-2013-019 is responsible for \$0 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades. Figure 1 is a one-line diagram for the GEN-2013-019 interconnection configuration.

Figure 1: Interconnection Configuration for GEN-2013-019



Shared Network Upgrades

The Interconnection Customer was studied within the DISIS-2013-002 Impact Study. At this time, the Interconnection Customer is allocated \$0 for Shared Network Upgrades. If higher queued interconnection customers 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 requests and the upgrades associated with those higher queued interconnection requests being placed in service. At this time, the Interconnection Customer is allocated the following cost for Shared Network Upgrade:

Share Network Upgrade Description	Allocated Cost	Total Cost
None	\$0.00	\$0.00
Total	\$0.00	

Other Network Upgrades

At this time there are no Other Network Upgrades that are currently the cost responsibility of the Customer.

Depending upon the status of higher or equally queued customers, the Interconnection Customer'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 GEN-2013-019 will be delayed until the Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades that are assigned to GEN-2013-002 are constructed. The Interconnection Customer is responsible for \$0 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades. If GEN-2013-002 terminates its Interconnection Service Request, then the estimated \$3,230,685 cost of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades will be assigned to GEN-2013-019. 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 73.6 MW, as requested by GEN-2013-019, can be allowed. At this time the total allocation of costs assigned to GEN-2013-019 for Interconnection Service are estimated at \$0.



Lincoln Electric System

February, 2015

Generation Interconnection Facility
Study (Revised)

For

Generation Interconnection Request
GEN-2013-019

73.6 MW Wind Generation Facilities

Prepared by:
Resource & Transmission Planning Department
Lincoln Electric System
1040 O Street
Lincoln, NE 68501-0869
p: 402.475.4211
www.les.com

Table of Contents

Executive Summary	3
Introduction	4
Interconnected Facilities	5
Schedule	5
Steady-State Evaluation	6
Stability Analysis.....	6
Short Circuit Fault Duty Evaluation	6

Executive Summary

At the request of the Southwest Power Pool (SPP), Lincoln Electric System (LES) performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting Customer for SPP Generation Interconnection request GEN-2013-019 (GEN-2013-002 Addition). 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.

There were no additional facilities needed for the generation interconnection of Phase II (GEN-2013-019). The facilities needed for the generation interconnection of Phase I (GEN-2013-002), which consisted of adding three 115-kV breakers in a new substation, were also adequate for Phase II. The total cost for LES to construct the new Phase I 115-kV substation in a three terminal ring bus configuration, including a terminal for the Customer's wind farm interconnection, is estimated at \$3,138,685. This estimate does not include the cost of land, which is to be provided by the Interconnection Customer.

SPP's Definitive Interconnection System Impact Study (DISIS) did not identify any short circuit, stability, or power flow issues that required further study.

Introduction

The Southwest Power Pool has requested a Facility Study for the purpose of interconnecting the Phase II wind generation (73.6 MW) to the portion of the Bulk Electric System owned by Lincoln Electric System (LES). The proposed 115-kV point of interconnection will be at a new substation connected to the 16-mile, Sheldon to Folsom & Pleasant Hill 115-kV transmission line (LN-1197). This is the same substation specified to interconnect the Phase I wind generation. This substation will be owned by LES. The Customer's wind turbines would be located in Lancaster and Gage Counties, Nebraska.

Interconnected Facilities

There are no new facilities required for interconnection of the Customer's Phase II generation facilities (GEN-2013-019) since the requirements for interconnection of the Customer's Phase I generation facilities (GEN-2013-002) were adequate for both Phase I and Phase II.

This Facility Study does not address the availability of transmission service necessary to deliver the Customer generation to any specific point inside or outside the Southwest Power Pool (SPP) transmission system. The Customer must request firm transmission service under the SPP Open Access Transmission Tariff to determine Network Upgrades or new construction required to provide transmission service under the SPP OATT.

Schedule

The Customer has requested a commercial operation date of either December, 2016 or December, 2017, and LES projects a lead time of roughly 12 months to construct and commission this facility. The LES schedule to construct and commission this facility does not include procurement of the land by the Interconnection Customer.

Should the project be delayed, LES may need to revise the lead time estimate to reflect variances in work load and other construction projects.

Steady-State Evaluation

Power flow analysis has indicated, for the power flow cases that LES studied, it is possible to interconnect the Customer's Phase I (50.6 MW) and the Phase II (73.6 MW) generation facilities to a new LES owned substation that is connected to its transmission line LN-1197. There are additional requirements for interconnection that are described in the LES document entitled "Requirements for Transmission System Interconnection to Generation, Transmission and End-User Facilities."

Stability Analysis

The Stability Analysis, performed by Mitsubishi Electric on behalf of SPP, determined that there was no wind turbine tripping that occurred from interconnecting the wind farm at 100% of nameplate capacity, and there were no voltage recovery or stability issues observed under the studied conditions. The study cases included the 2014 Winter Peak, 2014 GGSSI Winter Peak, 2015 Summer Peak, 2015 GGSSI Summer Peak, and the 2014 Future Summer Peak.

Short Circuit Fault Duty Evaluation

It is standard practice for LES to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating. For this generator interconnection, LES determined that no existing LES breakers were found to exceed their interrupting capability after addition of the Customer's Phase I 50.6 MW and the Phase II 73.6 MW generation facilities. Therefore, there is no short circuit upgrade costs associated with the GEN-2013-002 and the GEN-2013-019 interconnections.