Interconnection Facilities Study
For
Generator Interconnection Request
GEN-2013-027
(IFS-2014-002-02)

SPP Generator Interconnection Studies

(#GEN-2013-027)
(#IFS-2014-002-02)

March 2016

Revision History

Date	Author	Change Description
9/15/2015	SPP	Draft Interconnection Facilities Study Report Revision 0 Issued
11/4/2015	SPP	Final Interconnection Facilities Study Report Revision 1 Issued
2/2/2016	SPP	Facilities Study Report Revised for changes in Shared Network Upgrades
3/11/2016	SPP	Facilities Study Report Revised for changes in Shared Network Upgrade Cost

Summary

Southwestern Public Service Company (SPS), an operating company subsidiary of Xcel Energy Inc., performed a detailed Interconnection Facilities Study (IFS) at the request of Southwest Power Pool (SPP) for Generator Interconnection request GEN-2013-027/IFS-2014-002-02 (150.00 MW/Wind) located in Bailey County, Texas. The Interconnection Customer's originally proposed in-service date for GEN-2013-027/IFS-2014-002-02 is March 31, 2016. SPP has proposed the full interconnection service in-service date will be after the assigned Transmission Owner Interconnection Facilities, Non-Shared Network Upgrade(s), and Shared Network Upgrade(s) are completed. Full Interconnection Service will require the Network Upgrade(s) 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's generation facility consists of sixty-five (65) Siemens 2.3 MW wind turbines with four (4) of the sixty-five (65) Siemens 2.3 MW wind turbines including an additional wind turbine vendor "Power Boost" feature that will increase generator nameplate rating from 2.3 MW to 2.415 MW. The total nameplate rating for GEN-2013-027/IFS-2014-002-02 is 149.96 MW. The 34.5kV collector system for this wind facility is planned to be connected to one (1) 230/34.5kV Interconnection Customer owned and maintained transformer at the Interconnection Customer owned substation. An approximate three (3) mile overhead 230kV transmission circuit will connect GEN-2013-027/IFS-2014-002-02 to the Point of Interconnection (POI) at a new SPS owned switching station (Needmore) tapping and looping into the existing SPS owned Tolk – Yoakum 230kV transmission circuit. This new switching station, Needmore, will be location approximately seventeen (17) miles from Tolk Substation along the Tolk – Yoakum 230kV transmission circuit. The Interconnection Customer will be responsible for all of the transmission facilities connecting the Interconnection Customer owned substation to the POI.

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 6.4 Mvar[1] of reactors to compensate for injection of reactive power from GEN-2013-027/IFS-2014-002-02 Interconnection Customer Facilities into the transmission system under reduced generating conditions. Also, the Interconnection Customer will need to coordinate with the Transmission Owner for relay, protection, control, and communication system configurations.

[1] This approximate amount of reactors is an approximate minimum amount needed for the configuration of the wind farm studied in DISIS-2014-002 Group 06 reduced generation analysis.

Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s)
To allow interconnection the Transmission Owner will construct a new three breaker ring bus switching station (Needmore) with three (3) 3000A continuous ampacity 230kV circuit breakers and associated terminal equipment for acceptance of the Interconnection Customer's Interconnection Facilities. Currently, SPS estimates an Engineering and Construction (E&C) lead time of approximately thirty-six (36) 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, GEN-2013-027/IFS-2014-002-02 is responsible for $6,004,592 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s). **Table *1*** displays the estimated costs for Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s).

Table 1: GEN-2013-027/IFS-2014-002-02 TOIF and Non-Shared Network Upgrade(s)

Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades Description	Allocated Cost ($)	Allocated Percent (%)	Total Cost ($)
Interconnection Substation - Transmission Owner Interconnection Facilities 230kV Substation work for a new line terminal position, line switch, dead end structure, communications, revenue metering, and line arrestors	$260,000	100%	$260,000
Interconnection Substation - Network Upgrade(s) 230kV Substation work for a new 3-breaker ring configuration switching station, build three (3) 3000A continuous ampacity 230kV circuit breakers and associated switches, structures, other terminal equipment.	$5,744,592	100%	$5,744,592
Total	$6,004,592	100%	$6,004,592

Full Study Detail
For the full Interconnection Facilities Study performed by Xcel Energy/SPS for the Interconnection Substation, please refer to the 2nd revision of this study. The link for the 2nd revision can be found here.

http://sppoasis.spp.org/documents/swpp/transmission/studies/files/2013_Generation_Studies/GEN-2013-027-IFS-2014-002-02_FacilityStudy-R1_final_Redacted.pdf

Shared Network Upgrade(s)
The Interconnection Customer was studied within the DISIS-2014-002 Impact Study, and its subsequent restudies, the latest iteration being DISIS-2014-002-6, with Energy Resource Interconnection Service (ERIS) only. At this time, the Interconnection Customer is allocated $5,964,486 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:

Table 2: GEN-2013-027/IFS-2014-002-02 Shared Network Upgrade(s)

Shared Network Upgrades Description	Allocated Cost ($)	Allocated Percent (%)	Total Cost ($)
Tolk – Plant X 230kV Circuit #1 & #2: Rebuild Tolk – Plant X circuits #1 and #2	$4,571,447	46.1	$9,921,693
TUCO Substation 345/230kV Transformer replacement: Replace existing 345/230kV 560MVA transformer with unit with emergency ratings of 644MVA(summer)/700MVA(winter)	$1,393,039	41.3	$3,374,036
Total	$5,964,486		$13,295,729

Other Network Upgrades

Certain Other Network Upgrades are currently not the cost responsibility of the Customer but will be required for full Interconnection Service. Currently, the following Other Network Upgrades are assigned to GEN-2013-027/IFS-2014-002-02:

- China Draw 115kV Reactive Power Support build assigned in 2015 Integrated Transmission Plan Near Term Assessment (ITPNT) per SPP-NTC-C-200324
- Potash Junction Project 230/115kV assigned in High Priority Increment Load Study (HPILs) per SPP-NTC-200282 with current on schedule 12/1/2015 in-service
- Road Runner 115kV Reactive Power Support assigned in 2015 Integrated Transmission Plan Near Term Assessment (ITPNT) per SPP-NTC-C-200324

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-2013-027/IFS-2014-002-02 will be delayed until the Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades are constructed. The Interconnection Customer is responsible for $6,004,592 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades. At this time, the Interconnection Customer is allocated $5,964,486 for Shared Network Upgrades. After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 150.00 MW, as requested by GEN-2013-027/IFS-2014-002-02, can be allowed.

At this time the total allocation of costs assigned to GEN-2013-027/IFS-2014-002-02 for interconnection Service are estimated at $11,969,078.