



AFFECTED SYSTEM INTERCONNECTION FACILITIES STUDY REPORT

ASGI-2016-002

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By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
7/12/2019	SPP	Draft Report Issued
8/6/2019	SPP	Updated the costs for Table 3: Interconnection Customer Shared Network Upgrades and Table 6: Cost Summary.
8/12/2019	SPP	Final report issued.
1/6/2020	SPP	Revised final report. Removed Shared NUs and Previous NUs in Table 3 & 4 per DISIS-2016- 001-5 report.

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SUMMARY

INTRODUCTION

This Affected System Interconnection Facilities Study (ASIFS) for Affected System Generator Interconnection (ASGI) Request ASGI-2016-002 is for a 0.35 MW uprate to ASGI-2015-002 generating facility located in Lubbock County, Texas. The Interconnection Request was studied in the DISIS-2016-001 Impact Study and Restudies for Energy Resource Interconnection Service (ERIS). The Interconnection Customer's original Commercial Operation Date is 7/31/2016 and was revised to 4/1/2017 in the Facility Study Agreement.

The impacted Transmission Owner, Southwestern Public Service Company (SPS) 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 (TOIF), Non-Shared Network Upgrades, Shared Network Upgrades, Previous Network Upgrades, and Affected System Upgrades that are required for full interconnection service are completed.

The primary objective of the ASIFS 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, full 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 creditable-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).

AFFECTED SYSTEM INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES

The Generating Facility is proposed to consist of one (1) GE 2.3 MW wind turbine being uprated 0.35 MW to a total generating nameplate capacity of 2.65 MW.

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 Facilities Construction Agreement has been fully executed.

Table 1: Transmission Owner Interconnection Facilities (TOIF)

Transmission Owner Interconnection Facilities (TOIF)	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
SPEC Yuma 115 kV Interconnection Substation: Revenue meter replaced with bi-directional revenue meter.	\$21,750	100%	\$21,750	TBD
Total	\$21,750		\$21,750	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	Z2 Type ¹	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
None	N/A	\$0	N/A	\$0	N/A
Total		\$0		\$0	

¹ 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 Upgrade(s)

Shared Network Upgrades Description	Z2 Type	Total Cost Estimate (\$)	Allocated Percent (%)	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.

AFFECTED SYSTEM UPGRADE(S)

To facilitate interconnection, the Affected System Transmission Owner will be required to perform the facilities study work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities. **Table 5** displays the current impact study costs as part of the Affected System Impact review. The Affected System facilities study could provide revised costs and will provide each Interconnection Customer's allocation responsibilities for the upgrades.

Table 5: Interconnection Customer Affected System Upgrade(s)

Affected System Upgrades Description	Total Cost Estimate (\$)	Allocated Share (%)	Allocated Cost Estimate (\$)
None	\$0	N/A	\$0
Total	\$0		\$0

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 0.35 MW can be granted. Full Interconnection Service will be delayed until the transmission owner interconnect facilities (TOIF), non-shared network upgrades, shared network upgrades, previously allocated, and affected system upgrades that are required for full interconnection service are completed. The Interconnection Customer's estimated cost responsibility is summarized in the table below.

Table 6: Cost Summary

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilities	\$21,750
Network Upgrades	\$0
Total	\$21,750

A draft Facilities Construction Agreement will be provided to the Interconnection Customer consistent with the final results of this ASIFS report. The Transmission Owner and Interconnection Customer will negotiate the terms of the agreement consistent with the SPP Open Access Transmission Tariff (OATT).

APPENDICES

A: AFFECTED SYSTEM TRANSMISSION OWNER'S INTERCONNECTION FACILITIES STUDY REPORT AND NETWORK UPGRADES REPORT(S)

See next page for the Affected System Transmission Owner's Interconnection Facilities Study Report and Network Upgrades Report(s).



**Affected System Facilities Study For
Southwest Power Pool (SPP)**

2.65 MW Wind
Lubbock County, Texas
SPP #ASGI-2016-002

September 13, 2017

Transmission Planning South
Xcel Energy Services

Executive Summary

The Interconnection Customer requested in 2015 the interconnection of a 2.65 MW wind energy facility located in Lubbock County, Texas to the South Plains Electric Cooperative which connects to Southwestern Public Service Company (SPS), transmission network. SPS is a New Mexico Corporation and wholly owned subsidiary of Xcel Energy Inc. The Interconnection Customer's facility will connect to South Plains Electric Cooperative's (SPEC) Hurlwood substation; which is served out of SPEC's Yuma Substation, which is served off of SPS' T71/T72 115 kV transmission line between SPS' Carlisle and Wolfforth substations.

The Southwest Power Pool ("SPP or Transmission Provider") evaluated ASGI-2016-002 to interconnect the wind farm facility to the SPS transmission system in Definitive Interconnection System Impact Study (DISIS)-2016-001. The customer is required to comply with SPP, Generation Interconnection Agreement and OATT power factor requirements, which are 0.95 leading to 0.95 lagging at the POI.

SPP requires that each generator shall implement Automatic Under Frequency Load Shedding (UFLS) according to the SPP UFLS Plan at the following link: http://www.xcelenergy.com/Energy_Partners/Generation_Owners/Interconnections_for_Transmission. To fulfill this requirement, coordination with Xcel Energy is required during the under-frequency relay-setting phase for the generation. The Interconnection Customer is required to report their generation off-nominal frequency tripping relay settings to SPP and SPS. SPS specifies that generators shall not trip at frequencies above 58.5 Hz unless exceptions in the Transmission Provider Criteria are met. The Interconnection Customer agrees that the energy generating units installed at this interconnection will not be tripped for under-frequency conditions above 58.5 Hz in compliance with Transmission Provider criteria. This means that the generation subject to this Interconnection Agreement may not trip for under-frequency conditions on the transmission system until all under-frequency load shedding relays have operated. SPS will also require that the Interconnection Customer be in compliance with all applicable criteria, guidelines, standards, requirements, regulations, and procedures issued by the North American Electric Reliability Corporation (NERC), SPP, and the Federal Energy Regulatory Commission (FERC) or their successor organizations.

This facilities study addresses the requirements that the interconnection customer must meet to interconnect on a third party transmission system or distribution system and provide the appropriate information to the SPS/SPP transmission operator for reliability and operating purposes. This study may require upgrades to communications equipment, data monitoring equipment, transmission element protective equipment, and may also reflect any allocation of shared network upgrades as determined by SPP. This facility study does not address any data requirements, communications requirements, or any other requirements for registration or operation in the SPP energy market. Those requirements are the sole responsibility of the generation developer and/or their energy purchaser.

The shared network upgrades will be determined at a later date by SPP and may impact the total costs for interconnection for the Interconnection Customer.

Table 1, Cost Summary¹

Shared Network Upgrades	\$	TBD
Network Upgrades:	\$	TBD
Transmission Owner Interconnection Facilities:	\$	21,750.00
Total:	\$	TBD

¹ The cost estimates are 2017 dollars with an accuracy level of $\pm 20\%$.

General Description of SPS Facilities²

1. Metering Facilities:

1.1 Revenue Metering: A bi-directional revenue metering will be required to connect ASGI-2016-001 request. SPS assumes installing primary metering equipment if the South Plains Electric Cooperative (SPEC) primary metering equipment is not available. The SPS revenue metering will be installed alongside SPEC's metering equipment should SPS decide to use SPEC primary metering equipment. SPS will require meter data in real time from SPEC if available.

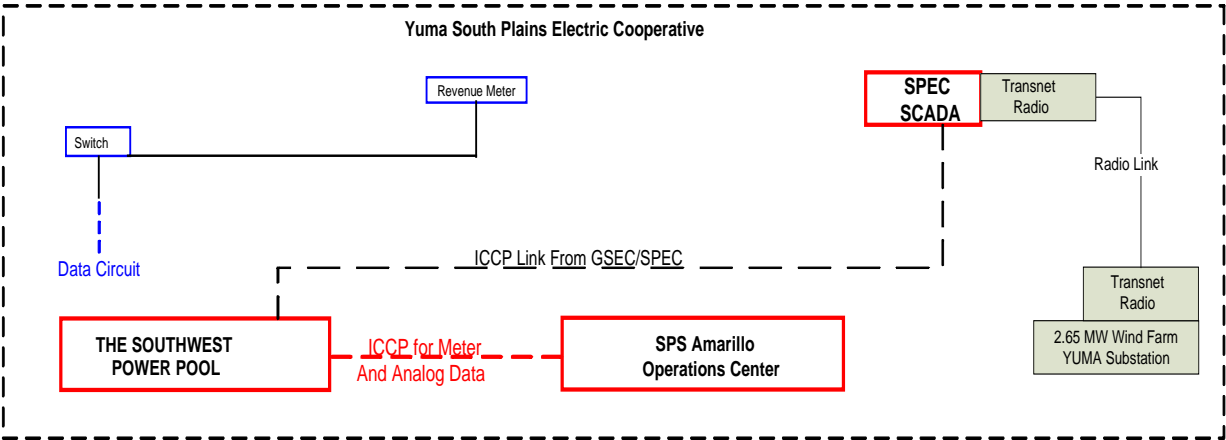
1.2 Generator Output Meters: Golden Spread Electric Cooperative (GSEC) will provide generator information to SPS over the GSEC-SPP Inter-Control Center Communications Protocol (ICCP) Link.

² All modifications to SPS facilities will be owned, maintained and operated by SPS.

1.3 Communications: To meet its communications obligations, the Interconnection Customer shall be responsible for making arrangements with SPEC and GSEC to provide analog data for output of their facility to SPS via the SPP ICCP Link.

The following communications schematic diagram, which includes communication equipment information for the Interconnection Customer, Transmission Provider and Transmission Owner, is provided to assist the Parties as a template.

A schematic outlining the proposed communications is provided below:



2. **Fault Current Study:** The available fault current at the interconnection location, without any contribution from the Wind Farm 2 facilities is shown in Table 2 below.

Table 2, - Available fault current at Point of Interconnection Location

Short Circuit Current at Yuma Tap without contribution from Wind Farm Facility (ASGI-2016-002).				
Fault Location	Fault Current (Amps)		Impedance (Ω)	
	Line-to-Ground	3-Phase	Z^+	Z^0
115 kV Bus	8,549	10,546	1.69 +j6.08	1.79 +j10.69

Estimated Construction Costs

The projects required for the interconnection of this 2.65 MW Wind Farm facility consist of the projects summarized in the table below.

Table 2, Required Interconnection Projects³

Project	Description	Estimated Cost
	Shared Network Upgrades	
1		\$ TBD
	Subtotal:	\$ TBD
	Network Upgrades (at the Interconnection Customer's expense)	
	Subtotal:	\$ 0.00
	Transmission Owner Interconnection Facilities (at the Interconnection Customer's expense)	
2	Revenue meter replaced with bi-directional revenue meter	\$ 21,750 ⁴
3	Communications ⁵	\$ See footnote
	Subtotal:	\$ 21,750 0
	Total Cost	\$ TBD

Engineering and Construction:

³ The cost estimates are 2017 dollars with an accuracy level of $\pm 20\%$.

⁴ This cost estimate could drop down to \$5,750 if SPEC allows SPS to use their Primary Metering equipment

⁵ It is the Requester's responsibility to provide both the data circuit and communication circuits, see Section 1.3.

All additional cost for work not identified in this study is the sole responsibility of the Interconnection Customer unless other arrangements are made.

Appendix A

Figure A- 1 One-line Diagram of GEN-2016-002 at Yuma Substation

