



**AFFECTED SYSTEM
INTERCONNECTION
FACILITIES STUDY
REPORT**

ASGI-2015-002

Published February 2018

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION	COMMENTS
2/10/2017	SPP	Initial draft report issued.	
2/13/2018	SPP	Initial final revision 1 report issued.	Accounting for DISIS-2015-001-3

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SUMMARY

INTRODUCTION

This Affected System Interconnection Facilities Study (ASIFS) for Affected System Generator Interconnection (ASGI) Request ASGI-2015-002 is for a 2.00 MW wind farm facility located in Lubbock County, Texas. The Interconnection Request was studied in conjunction with the DISIS-2015-001 Impact Study for Energy Resource Interconnection Service (ERIS). After the posting of the Impact Study, the Interconnection Customer executed the ASIFS Agreement. The request for interconnection was placed with SPP by the requesting customer (Interconnection Customer) in accordance with the OATT, which covers new generation interconnections on SPP's transmission system.

This ASGI request is proposing interconnection to the facilities of South Plains Electric Cooperative (SPEC) which is connected with SPP Transmission Owner Southwestern Public Service Company (SPS). SPS performed a detailed ASIFS at the request of SPP. The full report is included in Appendix A. Interconnection Customer's requested in-service date is November 30, 2015. SPP has determined that full Interconnection Service will be available after the assigned Transmission Owner Interconnection Facilities, Shared Network Upgrade(s), and Non-Shared Network Upgrade(s) are completed. Full interconnection service will require completion of all Network Upgrade(s) listed in the "Other Network Upgrade(s)" section.

The primary objective of the ASIFS is to identify necessary Affected System Transmission Owner Interconnection Facilities, Network Upgrade(s), other direct assigned upgrade(s), and associated upgrade lead times needed to mitigate the impact of the requested Interconnection Service on the Transmission System of SPP.

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).

AFFECTED SYSTEM INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES

The Affected System Generation Facility is proposed to consist of one (1) 2.0 MW General Electric (G.E.) wind generator for a total generating nameplate capacity of 2.00 MW. The POI is at the 12.47 kV bus at the SPEC Hurlwood 69/12.47 kV Substation. The SPEC facilities interconnect with SPP at the SPEC Yum 69/115 kV Substation on the SPS Carlisle - Wolfforth 115kV transmission line.

AFFECTED SYSTEM NON-SHARED NETWORK UPGRADE(S)

Error! Reference source not found. lists the Interconnection Customer’s estimated cost responsibility for Non-Shared Network Upgrade(s) and provides an estimated lead time for completion of construction. The estimated lead time begins when the Construction Agreement has been fully executed.

Table 1: Non-Shared Network Upgrade(s)

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

AFFECTED SYSTEM SHARED NETWORK UPGRADE(S)

The Interconnection Customer’s share of costs for Shared Network Upgrades is estimated in **Error! Reference source not found.** below.

Table 2: Interconnection Customer Shared Network Upgrades

Shared Network Upgrades Description	Allocated Cost Estimate (\$)	Allocated Percent (%)	Total Cost Estimate (\$)
<u>AEP-PSO Oklaunion 345kV Capacitor Bank(s):</u> Install Oklaunion 50Mvars Capacitor Bank(s). AEP Public Service of Oklaunion (PSO) to install one (1) steps of 50Mvars of capacitor bank(s) at Oklaunion Substation on the Oklaunion 345kV bus. Oklaunion 345kV bus would require expanding from three (3) breaker ring to five (5) 345kV breaker ring, installing capacitors, associated switches, foundations, protective and control relaying equipment, and all associated and miscellaneous materials.	\$30,607	0.50	\$6,100,000
Total	\$30,607	0.50	\$6,100,000

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.

AFFECTED SYSTEM 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) National Enrichment Plant – Targa – Cardinal 115kV circuit #1 rebuild assigned in the 2015 Integrated Transmission Plan Near Term Assessment (2015 ITPNT) per SPP-NTC-200360. Currently, the anticipated in-service date is 6/1/2018.
- 2) Tolk – Plant X 230kV circuit #1 and circuit #2 rebuilds assigned to DISIS-2014-002 Interconnection Customer(s). Currently, the anticipated in-service date is 6/1/2018.

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 Affected System Shared Network Upgrades and Non-Shared Network Upgrades have been placed into service, Interconnection Service for 2.00 MW can be granted. Interconnection Service will be delayed until the Shared Network Upgrades and Non-Shared Network Upgrades are completed. The Interconnection Customer’s estimated cost responsibility for Affected System Non-Shared Network Upgrades and Shared Network Upgrades is summarized in the table below.

Description	Allocated Cost Estimate (\$)
<u>AEP-PSO Oklaunion 345kV Capacitor Bank(s)</u>	\$30,607
Total	\$30,607

A draft Construction Agreement will be provided to the Interconnection Customer consistent with the final results of this IFS report.

APPENDICES

A: AFFECTED SYSTEM TRANSMISSION OWNER'S AFFECTED SYSTEM INTERCONNECTION FACILITIES STUDY REPORT

See next page for the Affected System Transmission Owner's Affected System Interconnection Facilities Study Report.



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

2 MW Wind
Lubbock County, Texas
SPP #ASGI-2015-002

November 5, 2015

Transmission Planning South
Xcel Energy Services

Executive Summary

The Interconnection Customer in 2015 requested the interconnection of a 2 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 Interconnection Customer's expected commercial operation date is November 30, 2015 when the DISIS-2015-001 will be completed.

The Southwest Power Pool ("SPP or Transmission Provider") evaluated the request to interconnect the wind farm facility to the SPS transmission system in a Definitive Interconnection System Impact Study (DISIS)-2015-001 for ASGI-2015-002 to be completed on November 30, 2015. The customer would like to proceed with their generation. 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:	\$	0
Transmission Owner Interconnection Facilities:	\$	0
Total:	\$	TBD

¹ The cost estimates are 2015 dollars with an accuracy level of ±20%.

General Description of SPS Facilities²

1. Metering Facilities:

1.1 Revenue Metering: The existing SPS metering already bi-directional, thus no changes are required to existing revenue meters.

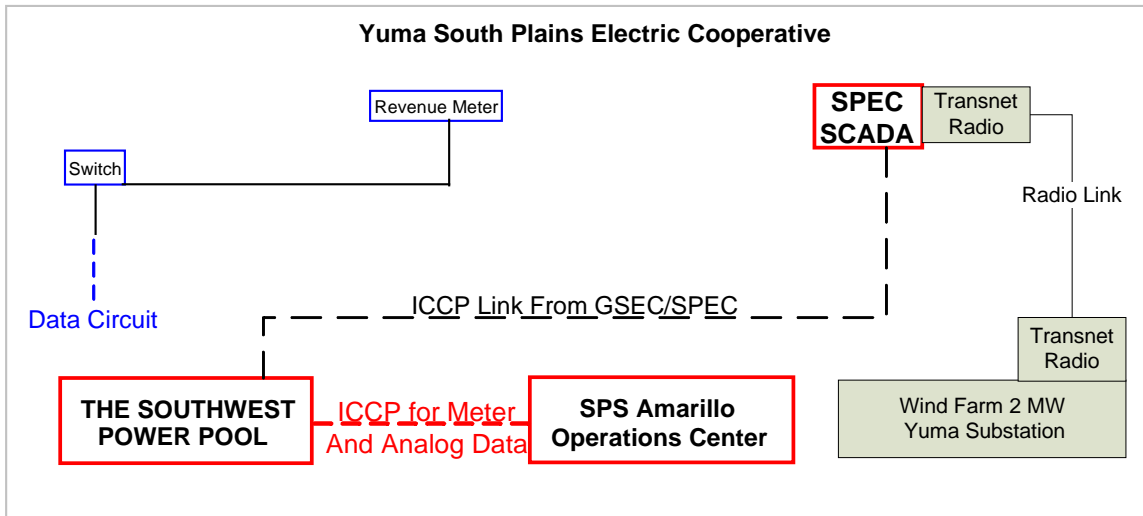
1.2 Generator Output Meters: Golden Spread Electric Cooperative (GSEC) will provide generator information to SPS over the GSEC-SPP ICCP Link.

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-2015-002).				
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 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)	
2	Revenue meter replaced with bi-directional revenue meter	\$ 0
	Subtotal:	\$ 0
	Transmission Owner Interconnection Facilities (at the Interconnection Customer's expense)	
3	Communications ⁴	\$ See footnote
	Subtotal:	\$ 0
	Total Cost	\$ TBD

Engineering and Construction:

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

³ The cost estimates are 2015 dollars with an accuracy level of $\pm 20\%$.

⁴ It is the Requester's responsibility to provide both the data circuit and communication circuits, see Section 1.3.

Appendix A

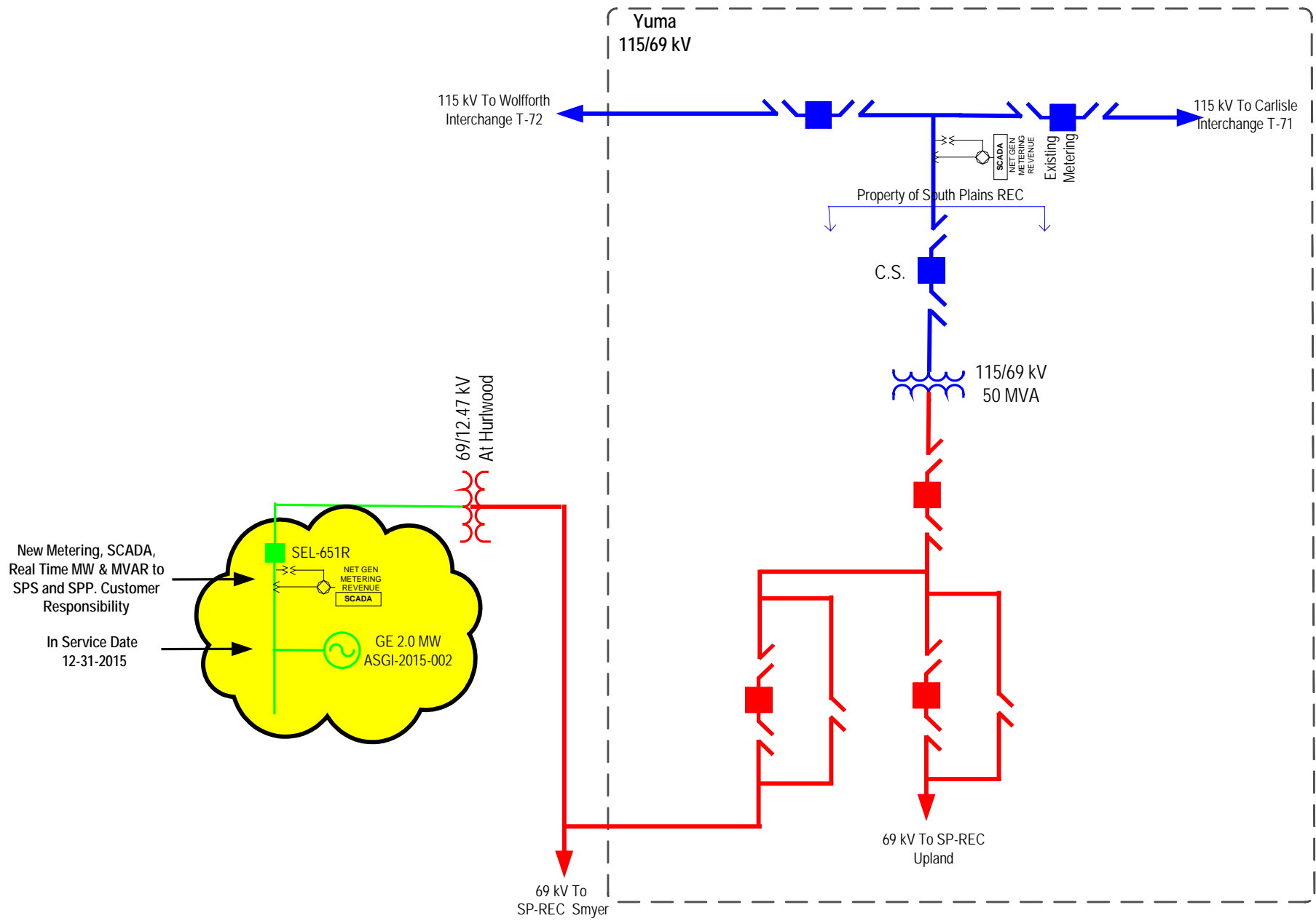


Figure A- 1 One-line Diagram of GEN-2015-002 at Yuma Substation