



**SPP**

*Southwest  
Power Pool*

**Facility Study  
For  
Generator Interconnection  
Request  
GEN-2013-016  
(IFS-2013-001-03)**

*SPP Generator  
Interconnection Studies*

*(#GEN-2013-016)*

**April 2015**

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## Revision History

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Date	Author	Change Description
5/21/2014	SPP	Facility Study Report Issued
3/9/2015	SPP	Revised due to change in interconnection configuration requested by Customer
4/14/2015	SPP	Final Facility Study Revision 2 Issued

## **Summary**

Southwestern Public Service (SPS) performed a detailed Facility Re-Study at the request of Southwest Power Pool (SPP) for Generation Interconnection request GEN-2013-016 (191 MW Summer/203 MW Winter of Natural Gas Combustion Turbine) located in Hale County, Texas to account for a change to the Interconnection Customer's Interconnection configuration at the Point of Interconnection. SPP has proposed an in-service date that will be after the assigned Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades are completed. Full Interconnection Service will also 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 has proposed utilizing the Interconnection Customer's Interconnection Facilities previously required for GEN-2012-037. This will require a Shared Facilities Usage Agreement with the owner/operator of GEN-2012-037. Additionally, the Interconnection Customer will be responsible for all of the transmission facilities connecting the customer owned substation to the Point of Interconnection (POI), at the existing Southwestern Public Service (SPS) TUCO Interchange 345 kV substation. The Interconnection Customer Interconnection Facilities required to interconnect the generator are the required communications, metering, and other as described in the attached report. 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 accommodate the interconnection of the Generating Facility, the Transmission Owner has estimated approximately \$3,000 of Transmission Owner required Interconnection Facilities. No new Non-Shared Network Upgrade facilities will be required at the Point of Interconnection, TUCO Interchange. See attached SPS report for more information.

To mitigate Energy Resource Interconnection Service injection constraints, the following Non-Shared Network Upgrades will also be required:

- No additional Non-Shared Network Upgrades will be required at this time

These Non-Shared Network Upgrades have estimated costs at approximately \$0.

More information regarding the Interconnection Facilities and Non-Shared Network Upgrades can be found in the attached SPS Facility Study.

### Shared Network Upgrades

The Interconnection Customer was studied within the DISIS-2013-001 Impact Study. At this time, the Interconnection Customer is allocated \$0 for Shared Network Upgrades. See attached report for more information. 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		
Total		

### Other Network Upgrades

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

### Conclusion

Interconnection Service for GEN-2013-016 will be delayed until the Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades are constructed. At this time the SPS proposed lead time for these interconnection facilities and network upgrades is minimal. The Interconnection Customer is responsible for approximately \$3,000 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades. At this time, the Interconnection Customer is allocated approximately \$0 for Shared Network Upgrades. After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 191 MW Summer/203 MW Winter of Natural Gas Combustion Turbine, as requested by GEN-2013-016, can be allowed.

At this time the total allocation of costs assigned to GEN-2013-016 for Interconnection Service are estimated at \$3,000.



**Facilities Study For  
Southwest Power Pool (SPP)**  
191 MW Combustion Turbine Generator  
Hale County, Texas  
SPP #GEN-2013-016

April 14, 2015

Transmission Planning South  
Xcel Energy Services

## Executive Summary

[OMITTED] (“Interconnection Customer”) in 2013 requested the interconnection of a generation facility located in Hale County, Texas to the Southwestern Public Service Company (SPS), transmission network. SPS is a New Mexico Corporation and wholly owned subsidiary of Xcel Energy Inc. This facility has a capacity of 191 MW and will connect to the SPS TUCO Interchange also located in Hale County, Texas approximately five (5) miles north of Abernathy, Texas. The Interconnection Customer’s expected commercial operation date is 3/3/2017.

The Southwest Power Pool (SPP) originally evaluated the request to interconnect the generator facility to the SPS transmission system in a Definitive Interconnection System Impact Study (DISIS)-2013-001 for GEN-2013-016, which was completed in August 2013. An updated DISIS-2013-001-4 was completed in October 2014. The interconnection request was studied using one Combustion Turbine Generator for a total output of 191 MW (Summer) 203 MW (Winter). The Interconnection Customer is required to maintain a Power Factor of 0.95 lagging and 0.95 leading at the Point of Interconnection (POI) on the 345 kV.

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](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.

There was not any shared network upgrades allocated to this new Combustion Turbine Generator project (GEN-2013-016) after the updated DISIS-2013-001-4 was completed in October 2014.

This project is going to connect to the same bus as GEN-2012-037. See one-line diagram in Figure A-2.

## General Description of SPS Facilities <sup>1</sup>

1. **There is not any construction because there is not going to be a new Line Terminal needed.**
  - 1.1. **Revenue Metering:** This was installed on GEN-2012-037 and will be converted to a check meter for net generation.
  - 1.2. Two meters will be installed for Auxiliary Power on the 4.16 kV side of the two 4.16/345 kV transformers and will be owned by SPS, as they are for retail load. SPS is the supplier of the station power.
  - 1.3. The metering point for the Unit 1 and Unit 2 generator will be installed by [Interconnection Customer] located inside the [Generating Facility].
2. **Transmission Work:**
  - 2.1. There is not any additional transmission work required.
3. **Construction Power and Distribution Service:** It is the sole responsibility of the Interconnection Customer to make arrangements for both construction and station power, which may be required for the Interconnection Customer's Combustion Turbine Generator facility and their substation.
4. **Project and Operating Concerns:**
  - 4.1 Close work between the Transmission group, the Interconnection Customer's personnel and local operating groups will be imperative in order to meet any in-service date that has been established.
  - 4.2 The Interconnection customer will be required to maintain a Power Factor of 0.95 lagging and 0.95 leading at the Point of Interconnection (POI). This is required to maintain acceptable dynamic voltage rise as per latest revision of the Xcel Energy Interconnection Guidelines for Transmission Interconnection Producer-Owned Generation Greater than 20 MW:
5. **Fault Current Study:** The available fault current at TUCO Interchange with the 345 kV line from TUCO to Border in service for the interconnection of GEN-2013-016, without any contribution from the Generator facility, is shown in Table 2 below.

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<sup>1</sup> All modifications to SPS facilities will be owned, maintained and operated by SPS.

**Table 1, - Available fault current at Point of Interconnection Location**

<b>Short Circuit Current Availability at TUCO Interchange without contribution from GEN 2013-016, But with the contribution 3<sup>rd</sup> 115/69 kV auto, with TUCO to Woodward 345 kV Transmission line and GEN-2012-037 [Interconnection Customer] new 190 MW Generator.</b>				
Fault Location	Fault Current (Amps)		Impedance ( $\Omega$ )	
	Line-to-Ground	3-Phase	$Z^+$	$Z^0$
345 kV Bus	12,468	10,935	2.15+j18.53	0.79+j18.61

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

<b>Short Circuit Current Availability at TUCO Interchange with contribution from GEN 2013-016 and GEN-2012-037 190 MW each; with the contribution 3<sup>rd</sup> 115/69 kV auto, with TUCO to Woodward 345 kV Transmission line.</b>				
Fault Location	Fault Current (Amps)		Impedance ( $\Omega$ )	
	Line-to-Ground	3-Phase	$Z^+$	$Z^0$
345 kV Bus	13,022	11,148	2.06+j18.17	0.79+j18.61



## Estimated Construction Costs

This project is adding 191 MW Combustion Turbine Generator to a prior facility (GEN-2012-037), which is connected at TUCO Interchange. The cost for this project is summarized in the table below.

**Table 3, Required Interconnection Projects<sup>2</sup>**

Project	Description	Estimate
	<b>Shared Network Upgrades:</b>	
1	There is not any shared network upgrades:	0
	<b>Subtotal:</b>	<b>0</b>
	<b>SPS Network Upgrades</b>	
2	There is not any SPS Network Upgrades.	0
	<b>Subtotal:</b>	<b>0</b>
	<b>Interconnection Facilities (Interconnection Customer's Expense)</b>	
3	Communications <sup>3</sup>	\$ See footnote
4	Revenue metering installed on GEN-2012-037 and will be converted to a check meter for net generation.	0
5	Points needed from the Generators are: Breakers; Power System Stabilizers; MW hours; Pulse is needed by the RTU to have accurate meter data at the top of the Hour; and sending only the accumulator count gives incorrect data. Media Converter so the RTU can accept the pulse data.	\$3000
	<b>Subtotal:</b>	<b>\$3000</b>
	<b>Total Cost:</b>	<b>\$3000</b>

## Engineering and Construction:

No additional work is needed in this study.

<sup>2</sup> The cost estimates are 2015 dollars with an accuracy level of ±20% except it does not include AFUDC.

<sup>3</sup> Generator output data such as generator auto voltage regulator status will be provided over [Interconnection Customer]'s ICCP data link to SPP.

## Appendix A



Figure A- 1 Approximate location of proposed [Interconnection Customer]’s Combustion Turbine Generator

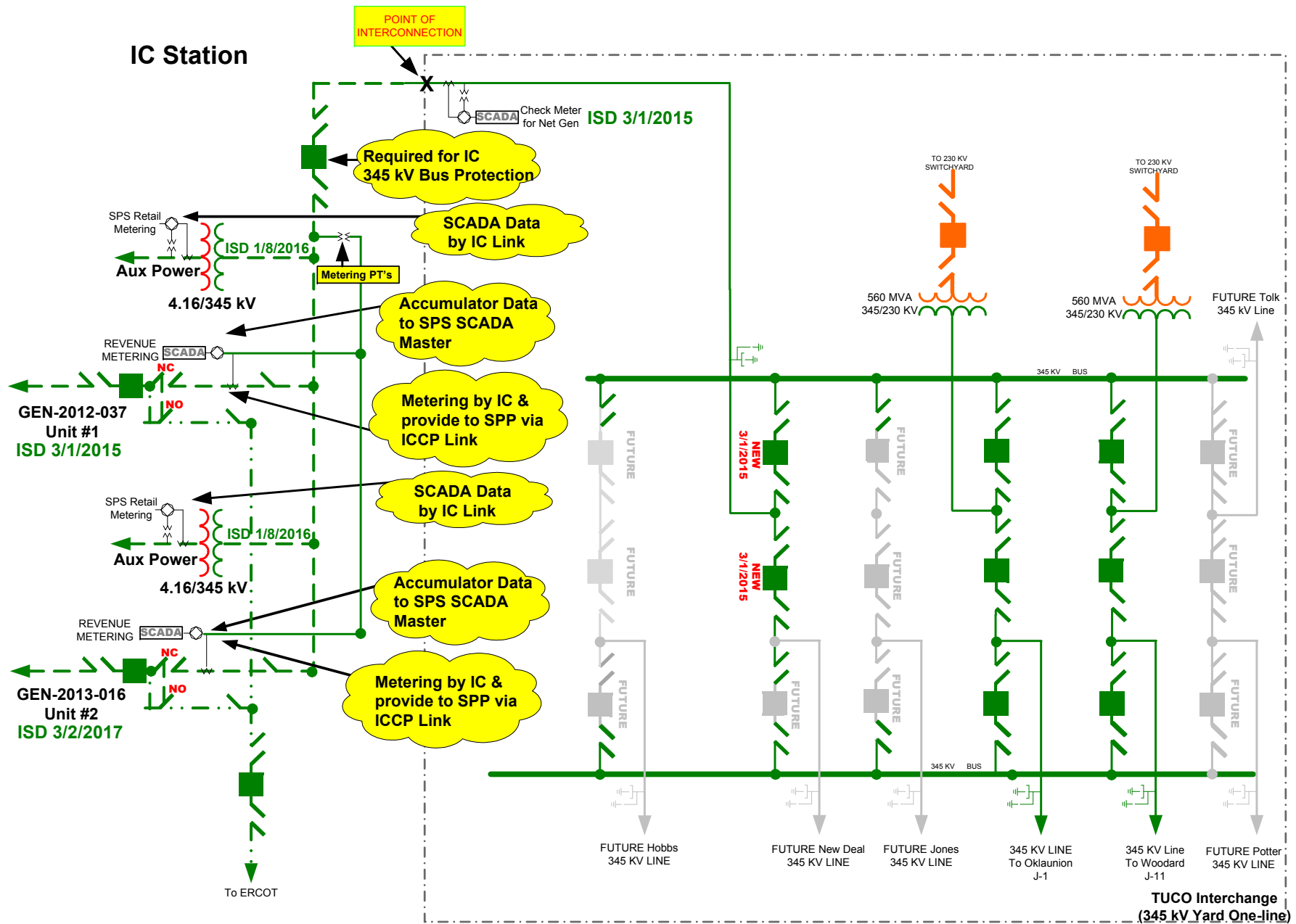


Figure A- 2 One-line Diagram of TUCO Interchange to Interconnection Customer (IC) Facility

*– END OF REPORT –*