



**Facility Study  
For  
Generation Interconnection  
Request  
GEN-2012-040**

***SPP Generation  
Interconnection Studies***

***(#GEN-2012-040)***

**July 2013**

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## Revision History

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Date	Author	Change Description
7/8/2013	SPP	Facility Study Report Issued

## **Summary**

Oklahoma Gas and Electric (OKGE) and Western Farmers Electric Cooperative (WFEC) performed detailed Facility Studies at the request of Southwest Power Pool (SPP) for Generation Interconnection request GEN-2012-040 (76.5 MW/Wind) located in Kay County, Oklahoma. The Interconnection Request is proposed into the Transmission System of WFEC. However, the interconnection into the WFEC affects OKGE's Transmission System as well. SPP has coordinated OKGE's facility requirements into this study (The OKGE study inadvertently indicates the interconnection is on the OKGE Transmission System). The originally proposed in-service date for GEN-2012-040 was December 1, 2013. SPP has proposed the in-service date will be after the assigned Interconnection Facilities and Non-Shared network upgrades are completed. 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 the Western Farmers Electric Cooperative (WFEC) owned Chilocco 138kV substation. The WFEC 138kV substation will be disconnected from its current radial feed from OKGE owned Middleton Tap 138kV substation. In addition, WFEC (or its designated representative) will build three (3) miles of 138kV transmission line. The additional transmission line will parallel the existing OKGE transmission line and extend from the present point of interconnection of the WFEC transmission line to the OKGE to the proposed three breaker ring bus substation to be built for GEN-2008-071. 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 Owners will need to disconnect the existing WFEC 138kV substation from its current radial feed from Oklahoma Gas and Electric (OKGE) owned Middleton Tap 138kV substation. In addition, WFEC will build three (3) miles of 138kV transmission line to tie the Chilocco 138kV substation into WFEC owned Newkirk 138kV substation along with any worked needed for associated terminal equipment for acceptance for the addition of the Interconnection Customer's Interconnection Facilities. At this time GEN-2012-040 is responsible for \$3,524,000.00 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades.

## **Shared Network Upgrades**

The Interconnection Customer was studied within the DISIS-2012-002 Impact Study. At this time, the Interconnection Customer is allocated \$481,148.75 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
Remington - Fairfax 138kV CKT 1, Increase conductor clearance on Remington - Fairfax 138kV circuit #1	\$401,148.75	\$5,000,000.00
NRIS Upgrade Only: Cimarron - Draper 345kV CKT 1, Replace wave trap at Cimarron and current transformer at Draper to atleast 1600 amps	\$80,000.00	\$80,000.00
Total	\$481,148.75	

**Conclusion**

Interconnection Service for GEN-2012-040 will be delayed until the Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades are constructed. The Interconnection Customer is responsible for \$3,524,000.00 of Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades. At this time, the Interconnection Customer is allocated \$481,148.75 for Shared Network Upgrades. After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 76.5 MW, as requested by GEN-2012-040, can be allowed. At this time the total allocation of costs assigned to GEN-2012-040 for Interconnection Service are estimated at \$4,005,148.75.

**Summary**

Western Farmers Electric Cooperative performed this study at the request of SPP (Southwest Power Pool). 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.

Pursuant to the tariff, Western Farmers Electric Cooperative has performed this generation interconnect facility study to satisfy the agreement executed between the customer and SPP.

**Customer Interconnection Facilities**

The customer will be responsible for the Wind Turbine Collector Substation, 138kV transmission line to the 138 kV switch and the 138kV switch at the point of interconnection.

The customer will also be responsible for maintaining +/- 0.95 % power factor at the point of interconnection to WFEC's facilities.

# ***WESTERN FARMERS ELECTRIC COOPERATIVE***

## FACILITY STUDY

For

Generation Interconnection Request 2012-040

76.5 MW Wind Generation Facilities

In Kay County

Near

Chilocco, Ok.

April 23, 2013

## **SUMMARY**

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Western Farmers Electric Cooperative (WFEC) performed the following facility Study to satisfy the Facility Study agreement executed by the requesting customer for SPP Generation Interconnection request Gen-2012-040. 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. The requirements for interconnection consist of no new facilities required.

See table 1 for estimated costs of construction.

## INTRODUCTION

The Southwest Power Pool has requested a facility Study for the purpose of interconnecting approximately 76.5MW of wind generation within the service territory of WFEC in Kay County, Oklahoma.

Power Flow analysis has indicated that for the power flow case studied, it is possible to interconnect the 76.5 MW of generation with selective upgrades to the existing transmission system. Given the point of interconnection there are additional requirements for interconnection including bus, breakers, switches, relaying, metering, etc.

See table 1 for estimated costs of construction. Other network constraints with OG&E or AEP should be verified with a transmission service request and associated studies.



## INTERCONNECTION & TRANSMISSION FACILITIES

There are WFEC requirements for interconnection of the additional 76.5 MW at Chilocco.

The 138kV, 336.5ACSR, H- frame transmission line “Chilocco Tap” is owned by WFEC and serves a 5 MW peak load at the end of the 3.5 mile tap, with the addition of 76.5 MW of new generation at peak production the existing WFEC transmission line becomes loaded at 67.0% of Rate A and 54.6% of Rate B.

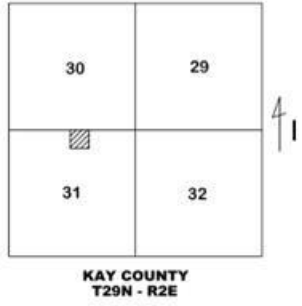
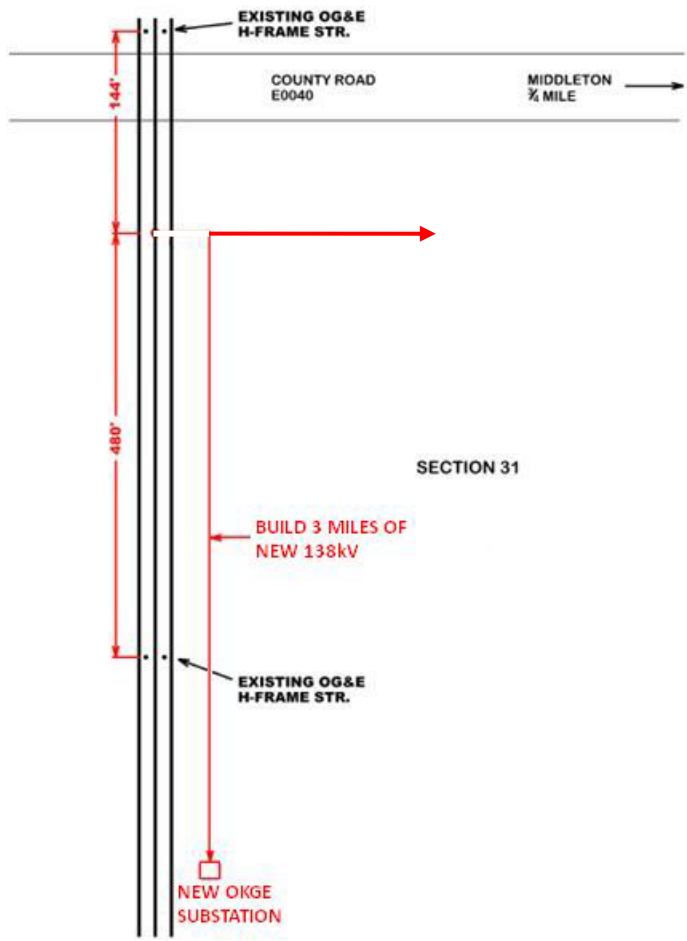
With the wind farm collector sub and the interconnection site near the existing WFEC transmission line, an inline transmission tap structure and three (3) miles of 138kV transmission line to the point of interconnect will be needed from WFEC. WFEC will require customer to install a single breaker, controllable by WFEC, along with appropriate relaying and switches in its collector substation to allow disconnection when necessary. Since the WFEC transmission line taps an OGE owned facility, OGE may require additional system upgrades not covered by this study.

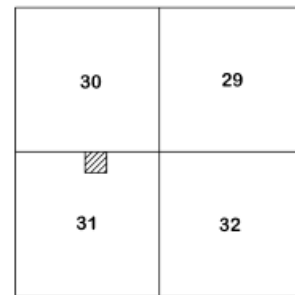
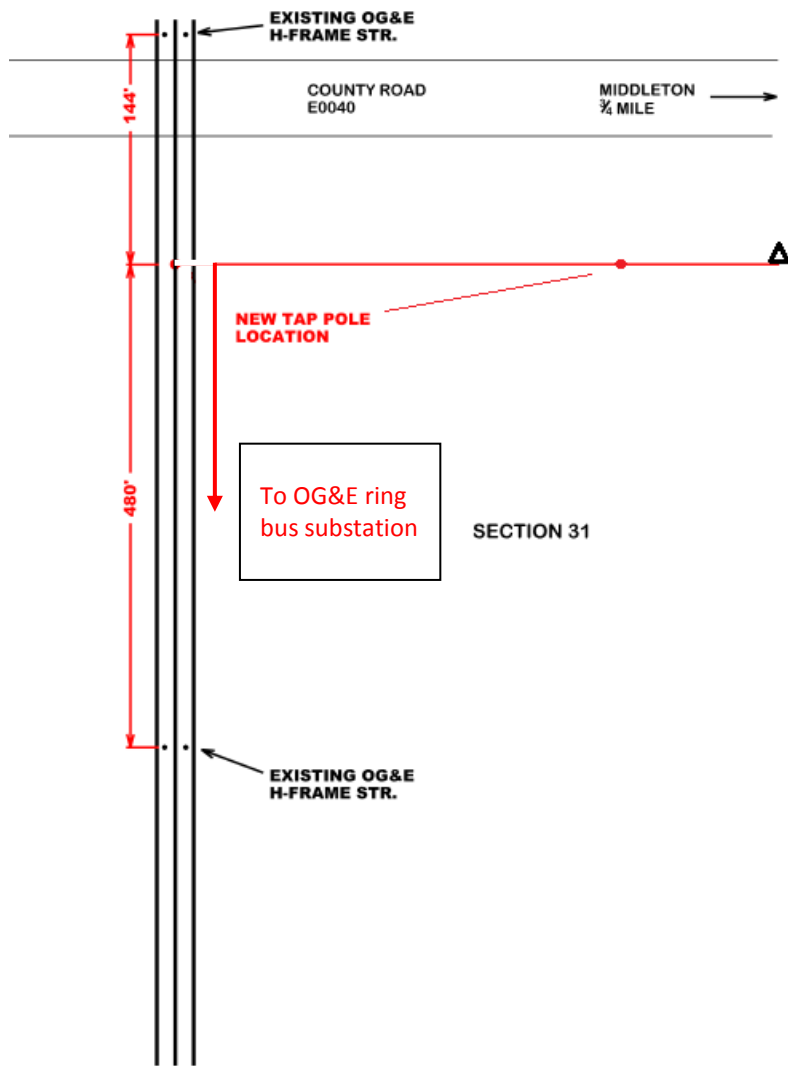
This facility study does not guarantee the availability of transmission service necessary to deliver additional generation to any specific point inside or outside of the SPP transmission system. The transmission network may not be adequate to deliver any additional generation output to the system. If the customer requests firm transmission service under the SPP open access transmission tariff at a future date, network upgrades or other new construction may be required to provide the service.

The costs of interconnecting to WFEC’s facilities are listed in Table one below.

Facility	Estimated Cost (2013 Dollars)
ROW, Environmental, Engineering	\$45,000
Install 3-pole structure for line tap to Chilocco wind interconnection	\$50,000
Disconnection from OG&E, Temporary transmission facilities, connection to OG&E ring bus if required	\$200,000
Metering and communications	\$80,000
Build three (3) miles of 138kV transmission line	\$1,500,000
<b>Total</b>	<b>\$2,250,000</b>

Table 1





KAY COUNTY  
T29N - R2E

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## **FACILITY STUDY**

**for**

### **Generation Interconnection Request 2012-040**

76.5 MW Wind Generating Facility  
In Kay County  
Near  
Newkirk, Oklahoma

April 30, 2013

Steve M. Hardebeck, PE  
Lead Engineer  
Transmission Planning  
**OG&E Electric Services**

## **Summary**

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Oklahoma Gas and Electric (OG&E) performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting customer for SPP Generation Interconnection request Gen-2012-040. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system. The requirements for interconnection consist of adding one new 138kV breaker and a terminal in a substation requested under Gen-2008-071. The total cost for OKGE to add one new 138kV breaker and a terminal in the substation requested under Gen-2008-071, the interconnection facility, is estimated at \$1,274,000.

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## **Introduction**

The Southwest Power Pool has requested a Facility Study for the purpose of interconnecting 76.5MW of wind generation within the service territory of OG&E Electric Services (OKGE) in Kay County Oklahoma. The proposed 138kV point of interconnection will be at a 138kV substation on the Kildare to Creswell 138kV transmission line in Kay County Oklahoma requested under Gen-2008-071. This substation will be owned by OKGE. There was no proposed in-service date provided.

Power flow analysis has indicated that for the power flow cases studied, it is possible to interconnect the 76.5MW of generation with transmission system reinforcements within the local transmission system. Given the Point of Interconnection at a previously proposed substation, there are additional requirements for interconnection including bus, breakers, switches, relaying, metering, etc.

The cost for adding a new line terminal in a new 138kV Substation, the required interconnection facility, is estimated at \$410,000. Other Network Constraints in the American Electric Power West (AEPW), OKGE Western Farmers Electric Cooperative (WFEC) and western Resources(Westar) systems may be verified with a transmission service request and associated studies.



### **Interconnection Facilities**

The primary objective of this study is to identify attachment facilities. The requirements for interconnection consist of adding a new breaker in a 138kV Substation requested under Gen-2008-071. This 138kV substation will be constructed and maintained by OKGE. The Customer did not propose a route of its 138kV line to serve its 138/34.5kV facilities.

The total cost for OKGE to add a new 138kV line terminal in a previously proposed 138kV substation, the interconnection facility, is estimated at \$410,000. This cost does not include building the 138kV line from the Customer substation into the new 138kV Substation. The Customer is responsible for this 138kV line up to the point of interconnection. This cost does not include the Customer's 138-34.5kV substation and the cost estimate should be determined by the Customer.

This Facility Study does not guarantee the availability of transmission service necessary to deliver the additional generation to any specific point inside or outside the Southwest Power Pool (SPP) transmission system. The transmission network facilities may not be adequate to deliver the additional generation output to the transmission system. If the customer requests firm transmission service under the SPP Open Access Transmission Tariff at a future date, Network Upgrades or other new construction may be required to provide the service requested under the SPP OATT.

The costs of interconnecting the facility to the OKGE transmission system are listed in Table 1.

Short Circuit Fault Duty Evaluation

It is standard practice for OG&E to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating with recloser de-rating applied, as determined by the ANSI/IEEE C37.5-1979, C37.010-1979 & C37.04-1979 breaker rating methods.

For this generator interconnection, no breakers were found to exceed their interrupting capability after the addition of the Customer's 76.5MW generation and related facilities. OG&E found no breakers that exceeded their interrupting capabilities on their system. Therefore, there is no short circuit upgrade costs associated with the Gen-2012-040 interconnection.

**Table 1: Required Interconnection Network Upgrade Facilities**

Facility	ESTIMATED COST (2013 DOLLARS)
OKGE – <b>Interconnection Facilities</b> - Add a single 138kV line terminal to a new 138kV Substation. Dead end structure, line relaying, revenue metering including CTs and PTs	<b>\$410,000</b>
OKGE – <b>Network Upgrades</b> at a new 138kV 2000A breaker, line relaying, disconnect switches, and associated equipment	<b>\$864,000</b>
<b>Total</b>	<b>\$1,274,000</b>

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April 30, 2013

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# 138kV Substation Required for Gen-2008-071 and Interconnection Point for Gen-2012-040

