



***Facility Study
For
Generation Interconnection
Request
GEN-2008-092***

SPP Tariff Studies

(#GEN-2008-092)

July 2010

Summary

Midwest Energy performed the following Study at the request of the Southwest Power Pool (SPP) for Generation Interconnection request Gen-2008-092. 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.

Pursuant to the tariff, Midwest Energy was asked to perform a detailed Facility Study of the generation interconnection request to satisfy the Facility Study Agreement executed by the requesting customer and SPP.

Interconnection Customer Interconnection Facilities

The Interconnection Customer will be responsible for the 230kV transmission line from the point of interconnection to its 230/34.5kV substation that will contain its 230/34.5kV transformer(s) and wind turbine collector feeders. In addition, the Customer will be required to maintain a +/- 95% power factor at the point of interconnection (MIDW Knoll 230kV substation).

Transmission Owner Interconnection Facilities and Non Shared Network Upgrades

The interconnection customer was studied within the DISIS-2009-001 Impact Study. The Interconnection Customer is responsible for \$541,125 of Transmission Owner Interconnection Facilities and \$599,380 of non shared Network Upgrades. At this time, the Interconnection Customer is allocated \$0 of shared network upgrades. If higher queued interconnection customers withdraw from the queue, suspend or terminate their LGIA, restudies will have to be conducted to determine the Interconnection Customers' allocation of shared network upgrades.



Midwest Energy Inc.

***Facility Study for Generation Interconnection
Request GEN-2008-092***



June 14, 2010

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Study Overview

At the request of Southwest Power Pool (SPP), Midwest Energy developed the following generation interconnection facility study for interconnection request GEN-2008-092 based on the results of Definitive Interconnection System Impact Study 2009-001 (DISIS-2009-001). As studied in DISIS-2009-001, GEN-2008-092 consists of 200 MW of wind generation interconnecting at Midwest Energy’s Knoll 230 kV bus. It is Midwest Energy’s understanding that the interconnection will be made at the Post Rock 230 kV bus. The Post Rock substation will be located adjacent to the Knoll substation in conjunction with the Spearville-Post Rock (Knoll)-Axtell SPP Balanced Portfolio transmission project.

The purpose of this study is to identify only facilities and associated costs necessary for interconnection of the proposed wind generation with the 230 kV transmission system. Any network upgrades identified in DISIS-2009-001 are not included in this study. The 230 kV transmission line, wind collector substations, and collector system are not addressed in this study and are considered the responsibility of the interconnection customer.

Interconnection Facilities

An additional 230 kV line terminal will be required at the Post Rock substation to accommodate the generation interconnection. The line terminal will include one 230 kV circuit breaker, substation bus work, dead end structures, metering, and associated hardware. Cost estimates ($\pm 20\%$) for the facilities and equipment required for interconnection can be found in Table 1.

A fault study was conducted by Midwest Energy to determine if the addition of the proposed generation will cause fault currents on the Midwest Energy transmission system to exceed circuit breaker interrupting capabilities. Based on the results of the fault study, it was determined that all fault levels remain within the interrupting capability of existing circuit breakers.

Table 1 - Interconnection facility cost estimates

Facility	Estimated Cost
Interconnection Facilities: 230 kV Line Terminal (Dead end structure, substation steel, substation bus, interconnection metering, line switch, etc.)	\$541,125
Network Upgrades at Post Rock: 1-230 kV circuit breaker, switches, relaying, etc.	\$599,380
Total	\$1,140,505

Reactive Compensation Considerations

Power factor requirements for the interconnecting generation were studied and established in DISIS-2009-001. In addition to these requirements, Midwest Energy reserves the right to request installation of additional reactive compensation by the interconnection customer based on operational experience. Of particular concern are light load, low generation production situations resulting in elevated 230 kV bus voltage related to line capacitance of the interconnection customer's 230 kV transmission line and wind generation collector system.

DISIS-2009-001 Appendix S: Stability Study for Group 11 states GEN-2008-092 will consist of GE 1.5 MW wind turbines. Based on operating experience with other wind generation utilizing GE wind turbines, Midwest Energy strongly encourages the interconnection customer to consider installation of GE's Wind Farm Management System or a comparable control system that will facilitate the management of reactive power production/absorption ensuring adequate reactive and voltage support on the transmission system.