



***Facility Study
For
Generation Interconnection
Request
GEN-2009-020***

SPP Tariff Studies

(#GEN-2009-020)

March 2011

Summary

Midwest Energy performed a detailed Facility Study at the request of Southwest Power Pool (SPP) for Generation Interconnection request GEN-2009-020. 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.

Interconnection Customer Interconnection Facilities

The Interconnection Customer will be responsible for the 69 kV transmission line from its Generation Facility Substation to the Point of Interconnection (POI), a new 69 kV breaker station on the Midwest Energy's Nekoma-Bazine 69 kV transmission line. In addition, the customer will be responsible for reactive power compensation equipment to maintain 95% lagging (providing vars) and 95% leading (absorbing vars) power factor at the point of interconnection. The customer will be required to install a +/-15 MVAR Static VAR Compensator on its 34.5kV bus if Vestes turbines are being installed. If GE turbines are being installed, no Static VAR compensator is required. Both turbine types have been studied by SPP. Interconnection Customer will be required to decide which turbine is being installed at the time the Interconnection Agreement is finalized.

Transmission Owner Interconnection Facilities and Non-Shared Network Upgrades

Per the following Facility Study, the Interconnection Customer is responsible for **\$1,664,657** of Transmission Owner Interconnection Facilities and non-shared network upgrades.

Shared Network Upgrades

The interconnection customer was studied within the DISIS-2010-001-1 Impact Study. At this time, the Interconnection Customer is allocated **\$503,735** of shared network upgrades as shown in the following table:

Post Rock 345/230/13.8kV Transformer CKT 2 DISIS-2010-001 Restudy	\$323,940
South Hays - Hays Plant - Vine Street 115kV CKT 1 Rebuild approximately 4 miles of 115 kV line	\$179,795
Shared Network Upgrade Costs - TOTAL	\$503,735

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. 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.

Other Network Upgrades

Certain Network Upgrades that are not the cost responsibility of the Customer are required for Interconnection. These Network Upgrades include:

1. the Axtel - Post Rock 345kV transmission line,
2. the Comanche - Medicine Lodge double circuit 345kV transmission line,
3. the Spearville - Comanche double circuit 345kV transmission line, and
4. the Medicine Lodge – Wichita double circuit 345kV transmission line.

These network upgrades are not schedule to be in service until December 31, 2014. Depending upon the status of higher or equally queued customers, the Interconnection Customer's in service date may be delayed until the in service date of these Network Upgrades.



Midwest Energy Inc.

***Facility Study for Generation Interconnection
Request GEN-2009-020***



January 25, 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-2009-020 based on the results of Definitive Interconnection System Impact Study 2010-001 (DISIS-2010-001). As studied in DISIS-2010-001, GEN-2009-020 consists of 48.6 MW of wind generation and a 15 MVAR SVC for reactive compensation interconnecting at a new breaker station on Midwest Energy’s Nekoma-Bazine 69 kV line.

The purpose of this study is to identify only facilities and associated costs necessary for interconnection of the proposed wind generation with the 69 kV transmission system. Any network upgrades identified in DISIS-2010-001 are not included in this study. The wind collector system, collector substation, and any transmission line required between the collector substation and point of interconnection are not addressed in this study and are considered the responsibility of the interconnection customer.

Interconnection Facilities

A 69 kV breaker station will be constructed in the Nekoma-Bazine 69 kV line to accommodate the generation interconnection. Cost estimates for the facilities and equipment required for interconnection can be found in Table 1. Included in the network upgrade costs are 69 kV wave traps at Midwest Energy’s Nekoma and Hanston substations. The existing 400 amp wave traps could potentially be overloaded under N-1 situations with high output from GEN-2009-020 and the required 15 MVAR SVC. These limiting elements were identified after the DISIS-2010-001 models were developed and therefore, were not identified in DISIS-2010-001.

A fault study was conducted by Midwest Energy to determine if addition of the proposed generation caused fault levels 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: 69 kV Line Terminal (Dead end structure, metering, relaying, etc.)	\$173,850
Network Upgrades: 69 kV Breaker Station (Breaker station sitework, breakers, bus, etc.)	\$1,490,807
Total	\$1,664,657

Reactive Compensation Considerations

Power factor requirements for the interconnecting generation were studied and established in DISIS-2010-001. This includes installation of a 15 MVAR SVC by the interconnection customer. 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 69 kV bus voltage related to line capacitance of the interconnection customer's transmission line and wind generation collector system.

Midwest Energy will require the Interconnection Customer to install either:

- a. Sufficient capacitors, reactors and switching/control equipment to maintain the voltage at the Point of Interconnection at levels not less than 95% of nominal and not greater than 105% of nominal under normal operating conditions; or
- b. A control system for the turbines that is comparable to the GE Wind Farm Management System that provides for real-time control of the reactive power production of the individual turbines and the generating facility as a whole. The control system shall be capable of maintaining the voltage at the Point of Interconnection at levels not less than 95% of nominal and not greater than 105% of nominal under normal operating conditions.