SPP Southwest Power Pool

Feasibility Study for Generation Interconnection Request For GEN – 2003 - 001

SPP Coordinated Planning
(#GEN-2003-001)

August 2003

Introduction

The Customer has requested a Feasibility Study for interconnection of a 100.5 MW wind generation facility in northwestern Oklahoma in Leedy, Oklahoma on the 138 kV Western Farmers Electric Cooperative (WFEC) Mooreland to Elk City line. The projected in-service date of the facility is June 2004.

Interconnection Facilities

The primary objective of this study is to identify the system problems associated with connecting the plant to the area transmission system and estimated costs of system modifications needed to alleviate the system problems.

The Feasibility and other Interconnection Studies are designed to identify attachment facilities and other direct assignment facilities needed to accept power into the grid at the interconnection receipt point. The Customer proposed that they build a 138/34 kV substation on the Mooreland – Elk City 138 kV line. The station shall be constructed, owned and maintained by WFEC. It is assumed the switching station will be located adjacent to the Customer's proposed substation and also that the Customer will provide the land.

The costs of interconnecting the facility to the Southwest Power Pool transmission system are listed in Table 2. **These costs do not include any cost that might be associated with short circuit study results or dynamic stability study results**. These costs will be determined when and if a System Impact Study is conducted.

Powerflow Analysis

A powerflow analysis was conducted for the facility. The output of the Customer's facility was offset by a reduction in output of generation. A modified version of the 03 Series Southwest Power Pool 2004 summer peak base case was used for this study. The modified model includes transmission reservations that have been confirmed on Southwest Power Pool's OASIS since the release of the last model.

The analysis of the Customers 100.5 MW Wind power project shows that systems upgrades are required to handle the proposed additional MW output at steady state conditions. There are several proposed generation additions in the general area of the Customer's facility with higher queue positions. It was assumed in the analysis that these other projects were all in service.

The Woodward to Mooreland 138 kV line and equipment is currently rated 93 MVA. A higher queued project is currently planning to upgrade the CT's at Mooreland plant for the Knob Hill line. This will revise the line conductor rating to 130/170 MVA. Based on this new rating the feasibility study was conducted to apply the contingency criteria. The results

presented in Table 1 indicate the impact of the Customer's project on system performance in the event of several contingencies based on the 100.5 MW output.

Table 1.: Overloaded Facilities under contingency

Critical Facility	Facility Rating	Loading	
		Max. Continuous Loading	% Current Loading*
Morewood 69/138 kV transformer	33	34.3	103.9%
Red Hills – Elk City	158	162.4	100.3%

* % Loading based on seasonal emergency rating

Powerflow Analysis Methodology

The 03 Series Southwest Power Pool 2004 summer peak base case was used to model the transmission network and system loads

Using the created models and the ACCC function of PSS\E, single contingencies in the western Oklahoma zones of WFEC, AEP West and Oklahoma Gas & Electric were analyzed.

Table 2.: Network Upgrades

Facility	Transmission Owner	ESTIMATED COST (2003 DOLLARS)
Build three breaker 138 kV switching station on the Mooreland to Elk City line with terminals capable of feeding Mooreland, Elk City and Customer's facility	WFEC	$1, 200,000
Morewood 69/138 kV transformer		$ 750,000
Red Hill to Elk City 138 kV Line		$ 4,400,000
TOTAL		**$ 6,350,000**

Conclusion

The minimum cost of interconnecting the Customer Facility is $ 6,350,000. The Customer's facility is not feasible as described due to the constraints noted in Table 1. The network upgrades to the transmission Owners electrical systems as noted in Table 1 and Table 2 need to be installed or upgraded before the customers facility can be interconnected at a maximum power output of 100.5 MW.

These interconnection costs do not include any cost that may be associated with short circuit or transient stability analysis. These studies will be performed if the Customer signs a system impact study agreement. The cost of any additional network upgrades that may be required will be estimated during the Impact study.

These costs do not include any costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer requests transmission service through Southwest Power Pool's OASIS.