



***Feasibility Study
For
Generation Interconnection
Request
GEN-2005-005***

***SPP Tariff Studies
(#GEN-2005-005)***

May 13, 2005

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 18MW of wind generation within the service territory of OG&E Electric Services (OKGE) in Woodward County Oklahoma. The proposed point of interconnection is at an existing switching station in the Mooreland – Woodward 138kV line. This 138kV line is owned by OKGE. The proposed in-service date is May 1, 2005.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 18MW of generation with transmission system reinforcements within the local transmission system. Given the Point of Interconnection at an existing switching station in the Mooreland – Woodward 138kV line, there are no additional requirements for interconnection.

There are no additional power supply requirements within the existing switching station to accommodate this request for interconnection. Other Network Constraints in the American Electric Power West (AEPW), OKGE and Western Farmers Electric Cooperative (WFEC) systems that may be verified with a transmission service request and associated studies are listed in Table 3. These Network Constraints are in the local area of the new generation when this generation is sunk throughout the SPP footprint for the Energy Resource Interconnection request. With a defined source and sink in a Transmission Service Request, this list of Network Constraints will be refined and expanded to account for all Network Resource Interconnection Upgrade requirements. Capacity limitations that may exist in the 138kV line from the Customer substation into the existing OKGE switching station and within the Customer's 138-34.5kV substation are not included in this report.

In Table 4, a value of Available Transfer Capability (ATC) associated with each overloaded facility is included. These values may be used by the Customer for future analyses including the determination of lower generation capacity levels that may be installed. When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower. When a facility is overloaded for more than 10 contingencies, then only the results with the 10 highest loadings may be included in this table.

There are several other proposed generation additions in the general area of the Customer's facility. It was assumed in this preliminary analysis that these other projects within the AEPW, OKGE and WFEC service territories will be in service. Those previously queued projects that have advanced to nearly complete phases were included in this Feasibility Study. In the event that another request for a generation interconnection with a higher priority withdraws, then this request may have to be re-evaluated to determine the local Network Constraints.

Introduction

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 18MW of wind generation within the service territory of OKGE in Woodward County Oklahoma. The existing Mooreland – Woodward 138kV line is owned by OKGE, and the proposed generation interconnection is within OKGE. The proposed point of interconnection is at an existing 138kV switching station in this line. The proposed in-service date is May 1, 2005.

Interconnection Facilities

The primary objective of this study is to identify the system problems associated with connecting the plant to the area transmission system. The Feasibility and other subsequent Interconnection Studies are designed to identify attachment facilities, Network Upgrades and other direct assignment facilities needed to accept power into the grid at the interconnection receipt point.

There are no additional power supply requirements within an existing switching station that is in the Mooreland – Woodward 138kV line to accommodate this request for interconnection. Capacity limitations that may exist in the 138kV line from the Customer substation into the existing OKGE switching station and within the Customer's 138-34.5kV substation are not included in this report.

Network Constraints in the AEPW, OKGE and WFEC systems that were identified are listed in Table 3. Estimates for any necessary Network Upgrades in the existing switching station will be created during the development of the impact study based on the final designs. The Customer is responsible for capacity requirements of its 138kV line and 138-34.5kV substation up to the point of interconnection.

The costs of interconnecting the facility to the OKGE 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.

Table 1: Direct Assignment Facilities

Facility	ESTIMATED COST (2005 DOLLARS)
Customer – 34.5 kV Substation facilities additions.	*
Customer- Wind Farm facility additions	*
	*
Total	*

Note: *Estimates of cost to be determined by Customer.

Table 2: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2005 DOLLARS)
OKGE – No additional power supply facilities are required in the existing 138kV switching station that is located in the Mooreland – Woodward 138kV line.	\$0
Total	\$0

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
ALVA - CHEROKEE SW 69kV	07SP, 55848-55999, WFEC AEP-OP , CEDARDALE - MOORELAND 138kV	100.5	14	6/1/2007
ANADARKO - WASHITA 138kV	06AP, 54140-56089, AEPW WESTERN - WFEC AEP-CS , SOUTHWEST STATION - WASHITA 138kV	122.3	0	12/31/2005
ANADARKO - WASHITA 138kV	10WP, 54140-56089, AEPW WESTERN - WFEC AEP-CS , SOUTHWEST STATION - WASHITA 138kV	114.7	0	
ANADARKO - WASHITA 138kV	05WP, 54140-56089, AEPW WESTERN - WFEC AEP-CS , SOUTHWEST STATION - WASHITA 138kV	103.0	0	
BUFFALO - *2004-19T 69kV	07SP, 54794-54795-55732, OKGE ENID , KNOBHILL - KNOBHILL 138-69kV	116.4	0	6/1/2007
BUFFALO - *2004-19T 69kV	15SP, 54792-54794, OKGE ENID , ALVA - KNOBHILL 69kV	108.9	0	
ELK CITY - *2002-05T 138kV	07SP, 54787-54822, OKGE ENID - OKGE METRO , DEWEY - SOUTHARD 138kV	106.7	0	6/1/2007
ELK CITY - *2002-05T 138kV	07SP, 54788-55999, OKGE ENID - WFEC AEP-OP , GLASS MOUNTAIN - MOORELAND 138kV	105.3	0	
ELK CITY - *2002-05T 138kV	07SP, 54778-54788, OKGE ENID , CLEO CORNER - GLASS MOUNTAIN 138kV	104.8	0	

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
ELK CITY - *2002-05T 138kV	07SP, 54778-54789, OKGE ENID , CLEO CORNER - MEN TAP 138kV	104.8	0	
ELK CITY - *2002-05T 138kV	07SP, 54789-54790, OKGE ENID , MEN TAP - IMO TAP 138kV	104.0	0	
ELK CITY - *2002-05T 138kV	10SP, 54787-54822, OKGE ENID - OKGE METRO , DEWEY - SOUTHARD 138kV	103.6	0	
ELK CITY - *2002-05T 138kV	07SP, 54822-54823, OKGE METRO , SOUTHARD - ROMAN NOSE 138kV	103.4	0	
ELK CITY - *2002-05T 138kV	10SP, 54788-55999, OKGE ENID - WFEC AEP-OP , GLASS MOUNTAIN - MOORELAND 138kV	101.7	9	
ELK CITY - *2002-05T 138kV	07SP, 54121-54148, AEPW WESTERN , ELK CITY - CLINTON JUNCTION 138kV	101.6	7	
ELK CITY - *2002-05T 138kV	07SP, 55848-55999, WFEC AEP-OP , CEDARDALE - MOORELAND 138kV	101.3	11	
ELK CITY - *2002-05T 138kV	10SP, 54778-54788, OKGE ENID , CLEO CORNER - GLASS MOUNTAIN 138kV	101.1	12	
ELK CITY - *2002-05T 138kV	10SP, 54778-54789, OKGE ENID , CLEO CORNER - MEN TAP 138kV	101.0	13	
ELK CITY - *2002-05T 138kV	07SP, 55848-56016, WFEC AEP-OP - WFEC AEP-IM , CEDARDALE - OKEENE 138kV	100.9	13	

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
ELK CITY - *2002-05T 138kV	07SP, 54819-54823, OKGE METRO , EL RENO - ROMAN NOSE 138kV	100.8	14	
ELK CITY - *2002-05T 138kV	10SP, 54789-54790, OKGE ENID , MEN TAP - IMO TAP 138kV	100.2	17	
ELK CITY - *2002-05T 138kV	10SP, 54822-54823, OKGE METRO , SOUTHARD - ROMAN NOSE 138kV	100.1	17	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 55920-55957, WFEC AEP-OP , FT SUPPLY - IODINE 138kV	145.2	0	12/31/2005
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 55957-55999, WFEC AEP-OP , IODINE - MOORELAND 138kV	144.5	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	07SP, 54785-55785, OKGE ENID , WOODWARD - EXISTING SWITCHING STATION 138kV	127.4	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	05WP, 54785-55785, OKGE ENID , WOODWARD - EXISTING SWITCHING STATION 138kV	127.3	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 54785-55785, OKGE ENID , WOODWARD - EXISTING SWITCHING STATION 138kV	127.2	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	07WP, 54785-55785, OKGE ENID , WOODWARD - EXISTING SWITCHING STATION 138kV	127.2	0	

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
EXISTING SWITCHING STATION - MOORELAND 138kV	10SP, 54785-55785, OKGE ENID , WOODWARD - EXISTING SWITCHING STATION 138kV	127.2	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	10WP, 54785-55785, OKGE ENID , WOODWARD - EXISTING SWITCHING STATION 138kV	127.2	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	15SP, 54785-55785, OKGE ENID , WOODWARD - EXISTING SWITCHING STATION 138kV	127.2	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 54782-54785-55771, OKGE ENID , WOODWARD 138-69kV	125.4	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	05WP, 54782-54785-55771, OKGE ENID , WOODWARD 138-69kV	123.9	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	06SP, 54782-54785-55771, OKGE ENID , WOODWARD 138-69kV	121.2	0	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 56082-56096, WFEC AEP-OP , VICI - WOODWARD 69kV	117.4	1	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 55835-99953, WFEC AEP-OP - , BUFFALO - 2004-19T 69kV	115.2	3	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 55835-56093, WFEC AEP-OP , BUFFALO - WEST 69kV	114.5	4	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 55915-56093, WFEC AEP-OP , FREEDOM - WEST 69kV	114.4	4	

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 56064-56082, WFEC AEP-OP , TALOGA - VICI 69kV	114.2	4	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, 55806-55915, WFEC AEP-OP , ALVA - FREEDOM 69kV	113.9	5	
EXISTING SWITCHING STATION - MOORELAND 138kV	06AP, Base Case	111.6	7	
EXISTING SWITCHING STATION - MOORELAND 138kV	06WP, 54782-54785-55771, OKGE ENID , WOODWARD 138-69kV	104.7	13	
EXISTING SWITCHING STATION - MOORELAND 138kV	07WP, 55920-55957, WFEC AEP-OP , FT SUPPLY - IODINE 138kV	100.8	17	
GLASS MOUNTAIN - MOORELAND 138kV	07SP, 54121-99940, AEPW WESTERN - , ELK CITY - 2002-05T 138kV	111.0	0	6/1/2007
GLASS MOUNTAIN - MOORELAND 138kV	10SP, 54121-99940, AEPW WESTERN - , ELK CITY - 2002-05T 138kV	109.9	0	
GLASS MOUNTAIN - MOORELAND 138kV	15SP, 54121-99940, AEPW WESTERN - , ELK CITY - 2002-05T 138kV	109.4	0	
GLASS MOUNTAIN - MOORELAND 138kV	15SP, 55848-55999, WFEC AEP-OP , CEDARDALE - MOORELAND 138kV	104.9	0	
GLASS MOUNTAIN - MOORELAND 138kV	15SP, 55848-56016, WFEC AEP-OP - WFEC AEP-IM , CEDARDALE - OKEENE 138kV	104.3	0	
GLASS MOUNTAIN - MOORELAND 138kV	07SP, 55848-55999, WFEC AEP-OP , CEDARDALE - MOORELAND 138kV	103.8	0	

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
GLASS MOUNTAIN - MOORELAND 138kV	10SP, 55848-55999, WFEC AEP-OP , CEDARDALE - MOORELAND 138kV	103.7	0	
GLASS MOUNTAIN - MOORELAND 138kV	07SP, 55848-56016, WFEC AEP-OP - WFEC AEP-IM , CEDARDALE - OKEENE 138kV	103.2	2	
GLASS MOUNTAIN - MOORELAND 138kV	10SP, 55848-56016, WFEC AEP-OP - WFEC AEP-IM , CEDARDALE - OKEENE 138kV	103.1	3	
GLASS MOUNTAIN - MOORELAND 138kV	10SP, 54787-54822, OKGE ENID - OKGE METRO , DEWEY - SOUTHARD 138kV	102.3	7	
GLASS MOUNTAIN - MOORELAND 138kV	15SP, 54787-54822, OKGE ENID - OKGE METRO , DEWEY - SOUTHARD 138kV	102.2	8	
GLASS MOUNTAIN - MOORELAND 138kV	07SP, 54787-54822, OKGE ENID - OKGE METRO , DEWEY - SOUTHARD 138kV	102.1	8	
HOBART JUNCTION - TAMARAC TAP 138kV	10SP, 54121-54122-54156, AEPW WESTERN , ELK CITY 138-69kV	101.4	0	6/1/2010
KNOBHILL - KNOBHIL4 138-()kV	15SP, 54788-55999, OKGE ENID - WFEC AEP-OP , GLASS MOUNTAIN - MOORELAND 138kV	109.0	0	6/1/2007
KNOBHILL - KNOBHIL4 138-()kV	15SP, 54778-54788, OKGE ENID , CLEO CORNER - GLASS MOUNTAIN 138kV	108.0	0	

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
KNOBHILL - KNOBHIL4 138-()kV	10SP, 54788-55999, OKGE ENID - WFEC AEP-OP , GLASS MOUNTAIN - MOORELAND 138kV	106.6	0	
KNOBHILL - KNOBHIL4 138-()kV	07SP, 54788-55999, OKGE ENID - WFEC AEP-OP , GLASS MOUNTAIN - MOORELAND 138kV	105.6	0	
KNOBHILL - KNOBHIL4 138-()kV	10SP, 54778-54788, OKGE ENID , CLEO CORNER - GLASS MOUNTAIN 138kV	105.6	0	
KNOBHILL - KNOBHIL4 138-()kV	07SP, 54778-54788, OKGE ENID , CLEO CORNER - GLASS MOUNTAIN 138kV	104.6	0	
KNOBHILL - KNOBHIL4 138-()kV	15SP, 55835-99953, WFEC AEP-OP - , BUFFALO - 2004-19T 69kV	100.6	13	
KNOBHILL - KNOBHIL4 69-()kV	15SP, 54788-55999, OKGE ENID - WFEC AEP-OP , GLASS MOUNTAIN - MOORELAND 138kV	110.1	0	
KNOBHILL - KNOBHIL4 69-()kV	15SP, 54778-54788, OKGE ENID , CLEO CORNER - GLASS MOUNTAIN 138kV	109.1	0	
KNOBHILL - KNOBHIL4 69-()kV	10SP, 54788-55999, OKGE ENID - WFEC AEP-OP , GLASS MOUNTAIN - MOORELAND 138kV	107.6	0	
KNOBHILL - KNOBHIL4 69-()kV	07SP, 54788-55999, OKGE ENID - WFEC AEP-OP , GLASS MOUNTAIN - MOORELAND 138kV	106.8	0	

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
KNOBHILL - KNOBHIL4 69-()kV	10SP, 54778-54788, OKGE ENID , CLEO CORNER - GLASS MOUNTAIN 138kV	106.6	0	
KNOBHILL - KNOBHIL4 69-()kV	07SP, 54778-54788, OKGE ENID , CLEO CORNER - GLASS MOUNTAIN 138kV	105.8	0	
KNOBHILL - KNOBHIL4 69-()kV	15SP, 55835-99953, WFEC AEP-OP - , BUFFALO - 2004-19T 69kV	101.2	8	
MOREWOOD - MOREWOOD SW 138-69kV	07SP, 54121-99940, AEPW WESTERN - , ELK CITY - 2002-05T 138kV	111.6	0	6/1/2007
MOREWOOD - MOREWOOD SW 138-69kV	10SP, 54121-99940, AEPW WESTERN - , ELK CITY - 2002-05T 138kV	110.9	0	
MOREWOOD - MOREWOOD SW 138-69kV	15SP, 54121-99940, AEPW WESTERN - , ELK CITY - 2002-05T 138kV	107.7	0	

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of models for the 2005 Winter Peak, 2006 April, Summer and Winter Peak for 2006, 2007 and 2010, and the 2015 Summer Peak seasons. This is the end of the current SPP planning horizon. The output of the Customer's facility was offset in each model by a reduction in output of existing online SPP generation. The proposed in-service date of the generator is May 1, 2005.

The analysis of the Customer's project indicates that, given the requested generation level of 18MW and location, additional criteria violations will occur on the existing AEPW, OKGE and WFEC facilities under steady state conditions in the modeled seasons.

There are several other proposed generation additions in the general area of the Customer's facility. Local projects that were previously queued were assumed to be in service in this Feasibility Study. Those local projects that were previously queued and have advanced to nearly complete phases were included in this Feasibility Study.

Powerflow Analysis Methodology

The Southwest Power Pool (SPP) criteria states that: "The transmission system of the SPP region shall be planned and constructed so that the contingencies as set forth in the Criteria will meet the applicable *NERC Planning Standards* for System Adequacy and Security – Transmission System Table I hereafter referred to as NERC Table I) and its applicable standards and measurements".

Using the created models and the ACCC function of PSS\E, single contingencies in portions or all of the modeled control areas of American Electric Power West, OG&E Electric Services, Western Farmers Electric Cooperative, and Southwestern Public Service Company were applied and the resulting scenarios analyzed. This satisfies the 'more probable' contingency testing criteria mandated by NERC and the SPP criteria.

Conclusion

There are no additional power supply requirements within the existing switching station to accommodate this request for interconnection. The minimum cost of interconnecting the Customer project is estimated at \$0 for OKGE's interconnection Network Upgrade facilities listed in Table 2 excluding upgrades of other transmission facilities by AEPW, OKGE and WFEC listed in Table 3 of which are Network Constraints. At this time, the cost estimates for other Direct Assignment facilities including those in Table 1 have not been defined by the Customer. As stated earlier, local projects that were previously queued are assumed to be in service in this Feasibility Study.

In Table 4, a value of Available Transfer Capability (ATC) associated with each overloaded facility is included. These values may be used by the Customer to determine lower generation capacity levels that may be installed. When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. When a facility is overloaded for more than 10 contingencies, then only the results with the 10 highest loadings may be included in this table.

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 required interconnection costs listed in Table 2 and other upgrades associated with Network Constraints listed in Table 3 do not include all 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.