



***Feasibility Study
For
Generation Interconnection
Request
GEN-2004-020***

***SPP Tariff Studies
(#GEN-2004-020)***

March 7, 2005

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 36MW of wind generation within the service territory of American Electric Power West (AEPW) in Custer County Oklahoma. The proposed point of interconnection is in the existing Weatherford SE – Clinton Junction 138kV line at a new switching station being located southwest of Weatherford, OK for another interconnection request. This 138kV line is owned by AEPW. The proposed in-service date is December 1, 2005.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 36MW of generation with transmission system reinforcements within the local transmission system. The requirements for interconnection consist of adding no new facilities in the 138kV switching station being constructed for request GEN-2003-022. This 138kV addition is being constructed and will be maintained by AEPW.

As this new 138kV switching station will have sufficient capacity to serve this additional amount of generation, the total cost for adding capacity in this new 138kV switching station, the required interconnection facility, is estimated at \$0. Other Network Constraints in the AEPW 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. 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 Upgrade requirements. This cost does not include building any additional 138kV line from the Customer substation into this new AEPW switching station. This cost does not include the Customer's 138-34.5kV substation.

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.

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 WFEC and AEPW 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 36MW of wind generation within the service territory of AEPW in Custer County Oklahoma. The existing Weatherford SE – Clinton Junction 138kV line is owned by AEPW, and the proposed generation interconnection is within AEPW. The proposed point of interconnection is at a new 138kV switching station currently being constructed to accommodate request GEN-2003-022. The proposed in-service date is December 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.

The requirements for interconnection consist of adding no additional capacity in this new 138kV switching station being constructed to serve request GEN-2003-022. This new 138kV switching station is being constructed and will be maintained by AEPW.

The total cost for AEPW to add additional capacity in this new 138kV switching station, the interconnection facility, in the Weatherford SE – Clinton Junction 138kV line is estimated at \$0. Other Network Constraints in the WFEC and AEPW system that were identified are listed in Table 3. These estimates will be refined during the development of the impact study based on the final designs. This cost does not include building 138kV line from the Customer substation into the new AEPW switching station. 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.

The costs of interconnecting the facility to the AEPW 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 – 138-34.5 kV Substation facilities.	*
Customer – 138kV line between Customer substation and new AEPW 138kV switching station.	*
Customer - Right-of-Way for Customer Substation & Line.	*
Total	*

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

Table 2: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2005 DOLLARS)
AEPW – Add capacity in the 138kV switching station in the Weatherford SE – Clinton Junction 138kV line being constructed for GEN-2003-022.	\$0
Total	\$0

Table 3: Network Constraints

Facility
WFEC - ANADARKO 138-69kV: Add 2nd 112MVA transformer including bus and breakers.
WFEC - CARTER JCT - DILL JCT 69kV: None. Upgrade being completed by WFEC including the reconductor of the line.
AEPW - CLINTON - CLINTON NATURAL GAS TAP 138kV: Replace Clinton Jct switches 1302 & 1303.
AEPW - CLINTON CITY - FOSS TAP 69kV: Replace wavetrap @ Clinton City

Note: (1) Network Upgrade description will be determined at the request of the Customer.

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
ANADARKO 138-69kV, Add 2nd 112MVA transformer including bus and breakers.	07SP, 55814-55923, WFEC FLA - WFEC AEP-OP, ANADARKO - GEORGIA 138kV	110.5	0	6/1/2006
ANADARKO 138-69kV	07SP, 55912-55923, WFEC FLA - WFEC AEP-OP, FLETCHER - GEORGIA 138kV	106.3	0	
CARTER JCT - DILL JCT 69kV, None.	05AP, 56001-99940, WFEC AEP-CS - , MOREWOOD SW - 2002-05T 138kV	110.5	0	4/1/2006
CLINTON - CLINTON NATURAL GAS TAP 138kV, Replace Clinton Jct switches 1302 & 1303.	05AP, 54199-99950, AEPW WESTERN - , WEATHERFORD TAP - 2003-22T 138kV	106.9	26	12/1/2005
CLINTON - CLINTON NATURAL GAS TAP 138kV	07WP, 54199-99950, AEPW WESTERN - , WEATHERFORD TAP - 2003-22T 138kV	105.2	28	
CLINTON - CLINTON NATURAL GAS TAP 138kV	10WP, 54199-99950, AEPW WESTERN - , WEATHERFORD TAP - 2003-22T 138kV	105.2	28	
CLINTON - CLINTON NATURAL GAS TAP 138kV	05WP, 54199-99950, AEPW WESTERN - , WEATHERFORD TAP - 2003-22T 138kV	105.0	29	
CLINTON - CLINTON NATURAL GAS TAP 138kV	07SP, 54199-99950, AEPW WESTERN - , WEATHERFORD TAP - 2003-22T 138kV	104.4	30	
CLINTON - CLINTON NATURAL GAS TAP 138kV	05AP, 54160-54199, AEPW WESTERN, Weatherford Southeast - WEATHERFORD TAP 138kV	104.1	30	
CLINTON - CLINTON NATURAL GAS TAP 138kV	10SP, 54199-99950, AEPW WESTERN - , WEATHERFORD TAP - 2003-22T 138kV	103.2	31	

Note: Listed loading of each facility is the highest value when an operating guide is not applicable.

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)
CLINTON CITY - FOSS TAP 69kV, Replace wavetraps @ Clinton City	07SP, 54199-99950, AEPW WESTERN - , WEATHERFORD TAP - 2003-22T 138kV	114.1	0	6/1/2006
CLINTON CITY - FOSS TAP 69kV	10SP, 54199-99950, AEPW WESTERN - , WEATHERFORD TAP - 2003-22T 138kV	111.8	0	
CLINTON CITY - FOSS TAP 69kV	07SP, 54160-54199, AEPW WESTERN, Weatherford Southeast - WEATHERFORD TAP 138kV	104.5	16	
CLINTON CITY - FOSS TAP 69kV	10SP, 54160-54199, AEPW WESTERN, Weatherford Southeast - WEATHERFORD TAP 138kV	101.3	30	

Note: Listed loading of each facility is the highest value when an operating guide is not applicable.
 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 the 2005 April, 2005 Winter Peak, 2007 and 2010 Summer and Winter Peak models. 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 December 1, 2005. The available seasonal models used were the 2005 April and 2005 through 2010 peak models. This is the end of the current SPP planning horizon.

The analysis of the Customer's project indicates that, given the requested generation level of 36MW and location, additional criteria violations will occur on the existing WFEC and AEPW facilities under steady state conditions in the peak 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, Southwestern Public Service Company, and Western Farmers Electric Cooperative were applied and the resulting scenarios analyzed. This satisfies the 'more probable' contingency testing criteria mandated by NERC and the SPP criteria.

Conclusion

The minimum cost of interconnecting the Customer project is estimated at \$0 for AEPW's interconnection Network Upgrade facilities listed in Table 2 excluding upgrades of other transmission facilities by AEPW 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.

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.