SPP Southwest Power Pool

Feasibility Study For Generation Interconnection Request GEN-2006-037

SPP Tariff Studies
(#GEN-2006-037)

January, 2007

Executive Summary

[Omitted Text] (Customer) has requested a Feasibility study for the purpose of interconnecting 893MW/925MW (summer/winter rating) of generation within the control area of Oklahoma Gas and Electric Company (OKGE) in Noble County, Oklahoma. The proposed method of interconnection is to interconnect into the existing 345kV switchyard at the Sooner substation by adding a position in the existing bus. The Sooner 345kV bus is set up in a breaker-and-a-half configuration. This substation is owned by OKGE. The proposed in-service date for the generation is June 1, 2011.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 893MW/925MW of generation with transmission system reinforcements within the local transmission systems.

The requirements to interconnect the 893MW/925MW of generation at the existing OKGE Sooner 345kV substation consist of adding two new 345kV circuit breakers and a generator terminal to the existing breaker-and-a-half bus configuration. The total minimum cost for adding the 345kV terminal to the station is $2,000,000 and is shown in Table 2. Other Network Constraints in the Oklahoma Gas and Electric Company (OKGE) transmission system 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 (ER) Interconnection request. With a defined source and sink in a Transmission Service Request (TSR), this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements. These costs do not include building the 345kV lines/buswork from the Customer' facilities into the Sooner 345kV substation bus.

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.

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.

Introduction

[Omitted Text] (Customer) has requested a Feasibility study for the purpose of interconnecting 893MW/925MW (summer/winter rating) of generation within the control area of Oklahoma Gas and Electric Company (OKGE) in Noble County, Oklahoma. The proposed method of interconnection is to add an additional 345kV terminal to the existing breaker-and-a-half bus located at Sooner substation, which is owned by OKGE. The proposed in-service date is June 1, 2011.

Interconnection Facilities

The primary objective of this study is to identify the system problems associated with connecting the plant into 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 of the 893MW/925MW consist of adding a new GSU and associated equipment by the Customer as part of its new facilities. The GSU will have a high side of 345kV and a low side of 26kV. The GSU will interconnect into the Sooner 345kV bus via a new 345kV terminal addition to the existing breaker-and-a-half bus. A specific layout for the Customer's 345kV facilities to serve the GSU and associated equipment has not been defined.

The total estimated cost for OKGE to add two 345kV circuit breakers and associated switching, relaying, buswork, etc. to the existing Sooner 345kV substation bus is $2,000,000. This cost is shown in Table 2. These estimates will be refined during the development of the impact study based on the final designs. Other Network Constraints in the OKGE transmission system that were identified are listed in Table 3. This cost does not include building the 345kV facilities from the Customer facilities into the Sooner 345kV switchyard. The Customer is responsible for these 345kV facilities up to the point of interconnection.

The costs of interconnecting the facility to the OKGE transmission system are listed in Table 1 & 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.

A preliminary one-line drawing of the interconnection and direct assigned facilities are shown in Figure 1.

Table 1: Direct Assignment Facilities

Facility	ESTIMATED COST (2006 DOLLARS)
Customer – 345kV-GSU voltage Substation facilities.	*
Customer – 345kV facilities between Customer facilities and OKGE Sooner 345kV substation	*
Customer - Right-of-Way for Customer facilities.	*
Total	*****

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

Table 2: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2006 DOLLARS)
OKGE – Add a 345kV generator/line terminal to the existing Sooner 345kV Substation bus including two 345kV circuit breakers, associated switches, buswork, relaying and all miscellaneous equipment.	$2,000,000
Total	**$2,000,000**

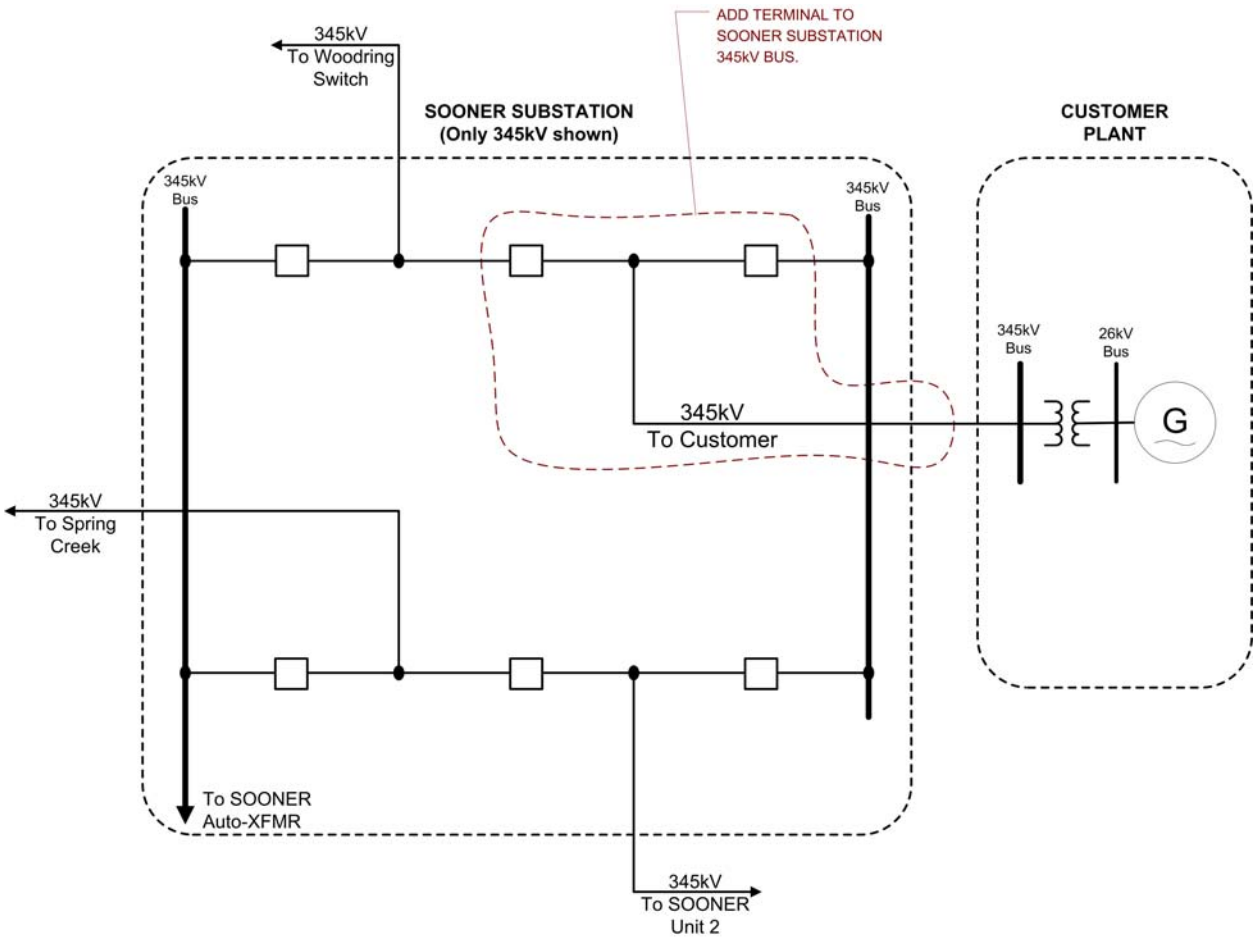

Figure 1: Proposed Interconnection
(Final substation design to be determined)

Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2011 summer and winter peak, and 2016 summer peak models. The output of the Customer's facility was offset in each model by a reduction in output of existing online SPP generation. This method allows the request to be studied as an Energy Resource (ER) Interconnection request. The proposed in-service date of the generation is June 1, 2011. The available seasonal models used were through the 2016 Summer Peak of which is the end of the current SPP planning horizon.

The analysis of the Customer's project indicates that, given the requested generation level of 893MW/925MW and location, additional criteria violations will occur on the existing OKGE transmission systems under steady state and contingency conditions in the peak seasons.

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 one contingency, only the highest loading on the facility for each season is included in the table.

There are several other proposed generation additions in the general area of the Customer's facility. These 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 l hereafter referred to as NERC Table l) 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 Missouri Public Service (MIPU), Westar (WERE), Kansas City Power & Light (KCPL), West Plains (WEPL), Midwest Energy (MIDW), OKGE, American Electric Power West (AEPW), Grand River Dam Authority (GRDA), Western Farmers Electric Cooperative (WFEC) and other control areas were applied and the resulting scenarios analyzed. This satisfies the 'more probable' contingency testing criteria mandated by NERC and the SPP criteria.

Table 3. Network Constraints

OWNER	ELEMENT
OKGE	'KINZE - MCELROY 138KV CKT 1'
OKGE	'SOONER - WOODRING 345KV CKT 1'

Table 4. Contingency Analysis

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
2011 SUMMER PEAK					
'KINZE - MCELROY 138KV CKT 1'	11sp	222	112.4	677	'NORTHWEST - SPRNGCK7 345 345KV CKT 1'
'SOONER - WOODRING 345KV CKT 1'	11sp	956	112.9	709	'NORTHWEST - SPRNGCK7 345 345KV CKT 1'
2011 WINTER PEAK					
'SOONER - WOODRING 345KV CKT 1'	11wp	956	112.4	748	'NORTHWEST - SPRNGCK7 345 345KV CKT 1'
2016 SUMMER PEAK					
'KINZE - MCELROY 138KV CKT 1'	16sp	222	112.1	682	'NORTHWEST - SPRNGCK7 345 345KV CKT 1'
'SOONER - WOODRING 345KV CKT 1'	16sp	956	112.6	712	'NORTHWEST - SPRNGCK7 345 345KV CKT 1'

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.

Conclusion

The minimum cost of interconnecting the Customer's interconnection request is estimated at $2,000,000 for OKGE's interconnection Network Upgrade facilities listed in Table 2. These costs exclude upgrades of other transmission facilities by OKGE 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, the 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 one contingency, only the highest loading on the facility for each season is included in the 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.

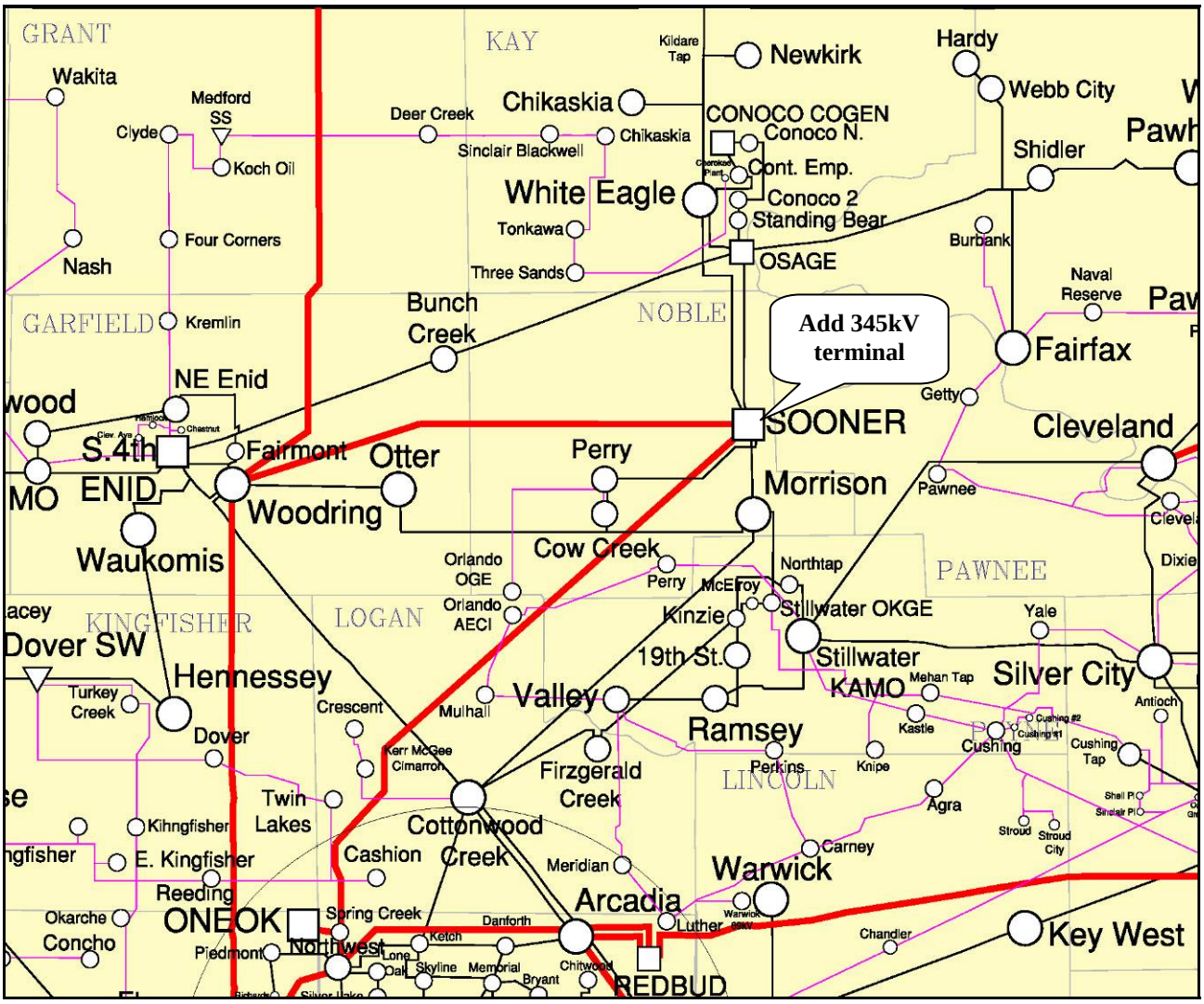

FIGURE 2. MAP OF THE LOCAL AREA