



***Feasibility Study for Generation
Interconnection Request
GEN – 2004 – 005***

***SPP Coordinated Planning
(#GEN-2004-005)***

June 2004

Feasibility Study GEN-2004-005

Summary

I2R Technologies performed the following study at the request of the Southwest Power Pool (SPP) for SPP Generation Interconnection request Gen-2004-005. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff Attachment V, which covers new generation interconnections on SPP's transmission system.

Pursuant to the tariff, I2R Technologies was asked to perform a detailed Energy Resource Load Flow analysis of the generation interconnection requests to satisfy the Feasibility Study Agreement executed by the requesting customer and SPP.

Feasibility Study GEN-2004-005

***Feasibility Study for Generation
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Prepared by I2R Technologies

June 2004

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I. EXECUTIVE SUMMARY

The <Customer> requested a generator interconnection feasibility study through the Southwest Power Pool Tariff (OATT) for a 161 kV interconnection to a new 275 MW generating unit <Omitted> at an existing SPRM plant in Greene County, Missouri. The Customer has requested Network Service in accordance with FERC 2003-A procedure LGIP. The Southwest Power Pool has prepared the feasibility study to account for the Energy Resource portion of the requested interconnection service. The Network Service portion of the study will be completed under the applicable TSR study. The proposed unit would be interconnected to the SPRM transmission system at the existing Southwest 161 kV substation and have a nominal maximum rating of 275 MW.

A load flow analysis was conducted using both winter and summer models for the 2010 peak forecast. Both overloads and voltage violations were investigated for basecase and contingency conditions with and without the proposed generator in-service.

No additional overloads or voltage violations were found with the proposed generator in-service under normal conditions or with the summer load flow model under contingency conditions. One overload was identified under contingency conditions with the winter load flow model. The West Plains Transformer #1 was found to overload with the outage of the West Plains Transformer #2. This overload did not occur before the proposed unit was brought on-line. When the proposed unit goes into service, the West Plains Transformer #1 will need to be upgraded to maintain the reliability of the transmission system.

Based on review of the overload with AECI the overload was determined to be a “local Area Problem” and does not need to be listed as a “Network Upgrade”.

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II. INTRODUCTION

The <Customer> has requested a generator interconnection feasibility study through the Southwest Power Pool Tariff (OATT) for a 161 kV interconnection to a new 275 MW generating unit <omitted> at an existing SPRM plant in Greene County, Missouri. The proposed unit would be interconnected to the SPRM transmission system at the existing Southwest 161 kV substation and will have a nominal maximum rating of 275 MW.

III. OBJECTIVE

The primary objective of this study is to identify unacceptable loading and voltages that would occur as a result of the proposed plant's connection to the area transmission system in accordance with the Energy Resource portion of the feasibility study. This analysis will be performed for the basecase and for each of the SPP listed contingencies. System upgrades will be identified that resolve loading above the normal rating and voltages below 0.95 or above 1.05 per unit for the basecase and loading above the emergency rating and voltages below 0.9 or above 1.1 per unit for contingencies.

The Feasibility Study is designed to identify interconnection facilities and other direct assigned facilities required to deliver power to the transmission system at a defined interconnection point. This proposed generator would be interconnected to the SPRM transmission system at the existing <Omitted> 161 kV Substation via a 20/161 kV step-up transformer. The substation is owned and maintained by the City Utilities of Springfield, Missouri.

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IV. LOAD FLOW MODELING

The SPP provided basecase load flow models based on the 2010 summer and winter peak forecast. The title of the summer case is “SPP MDWG 2004 UPDATE 2 REDUCED: 2010 SUMMER PEAK-B10SP2 (FEB)” and the title of winter case is “SPP MDWG 2004 UPDATE 2 REDUCED: 2010 WINTER PEAK-B10WP2 (FEB)”. These models provided the basis for building load flows to evaluate the proposed generator.

The SPP provided files to redispatch generation on the SPRM system. The proposed unit is scheduled to be in service by March 1, 2008; therefore, it would be available for dispatch in the 2010 load flow models.

Table 1 shows the SPRM summer dispatch before and after the proposed generator is placed in service.

Table 2 shows the SPRM winter dispatch before and after the proposed generator is placed in service.

The EMDE dispatch included the new GEN-2003-010 50 MW gas turbine. Power purchases by SPRM were modeled based on their existing expiration dates.

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TABLE 1

2010 SUMMER PEAK BASE CASE			
Bus #	Bus Name	Generation (MW)	
		Base Case	SWPS2 On
59890	SWPS#1 1	149.4	149.4
59891	SWPSGT 1	52.0	-
59891	SWPSGT 1	52.0	-
59892	MAC GT1	52.0	52.0
59892	MAC GT1	52.0	52.0
59893	SWPS#2 1	-	275.0
59895	JRPS#1 1	21.0	21.0
59896	JRPS#2 1	21.0	21.0
59897	JRPS#3 1	41.0	41.0
59898	JRPS#4 1	56.0	56.0
59899	JRPS#5 1	97.0	97.0
59900	JRGT1 1	75.0	-
59901	JRGT2 1	84.0	-
59903	PHELPS 1	12.0	-
Transaction From GRDA		-	-
Total		764.4	764.4

TABLE 2

2010 WINTER PEAK BASE CASE			
Bus #	Bus Name	Generation (MW)	
		Base Case	SWPS2 On
59890	SWPS#1 1	178.0	178.0
59891	SWPSGT 1	-	-
59891	SWPSGT 1	-	-
59892	MAC GT1	-	-
59892	MAC GT1	30.0	-
59893	SWPS#2 1	-	275.0
59895	JRPS#1 1	21.0	-
59896	JRPS#2 1	21.0	-
59897	JRPS#3 1	41.0	-
59898	JRPS#4 1	56.0	-
59899	JRPS#5 1	49.3	47.3
59900	JRGT1 1	52.0	-
59901	JRGT2 1	52.0	-
59903	PHELPS 1	-	-
Transaction from GRDA		-	-
Total		500.3	500.3

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The contingency analysis was performed with the PSS/E ACC function. Subsystem, monitor, and contingency files were provided for this analysis. Subsystems were defined for Area 546 (SPRM), Area 544 (EMDE), Area 515 (SWPA), Area 523 (GRDA), Zone 190 & 212 (AEPW), and Area 130 (AECI).

In each of the defined subsystems, the analysis considered the following:

- All branches and ties above 69 kV were monitored.
- Only voltages outside the range of 0.9 to 1.1 per unit were reported.
- Contingencies included all single branches and ties in these subsystems plus 84 multi-branch contingencies.
- Overloads were reported only when the loading exceeded the emergency rating.

V. RESULTS

The basecase analysis did not identify any overloads or voltage violations with the proposed unit on-line that did not exist previously.

The contingency analysis using the summer load flow model did not identify any overloads or voltage violations with the proposed unit on-line that did not exist previously.

The contingency analysis using the winter load flow model identified one branch as overloaded after the proposed unit came on-line. Upon further review with AECI, this branch was determined to be a “local Area Problem” and for that reason was not reported as a “Network Upgrade Facility”.

The costs of interconnecting the facility to the SPRM transmission system are listed in Tables 3 and 4. 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.

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Table 3: Network Upgrade Facilities

Facility	ESTIMATED COST (2004 DOLLARS)
Existing Facility	\$0
Total	\$0

Table 4: Direct Assignment Facilities

Facility	ESTIMATED COST (2004 DOLLARS)
Interconnection Facilities – Add 161kV bus, breaker, switches, metering, relaying, etc.	*
Customer – 161-20 kV Substation facilities.	*
Total	*

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

VI. CONCLUSIONS

The minimum Energy Resource cost of interconnecting the Customer's project is estimated at \$0 dollars for interconnection Direct Assignment facilities. At this time, the Customer has not defined the cost estimates for the Direct Assignment facilities. If any previously queued projects included in this study are not implemented, then this Feasibility Study may have to be revised to determine the impacts of this Interconnection Customer's project on SPRM transmission facilities.

The feasibility interconnection cost does not include any cost that may be associated with short circuit or transient stability. 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.

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Since this is a preliminary Feasibility Study, not all previously queued projects were assumed to be in service in this Feasibility Impact Study. If any of those projects are constructed, then this Feasibility Study may have to be revised to determine the impacts of this Interconnection Customer's project on SPRM transmission facilities. In accordance with FERC and SPP procedures the study cost for restudy shall be borne by the Interconnection Customer.

The costs included in this study do not include any costs associated with Network Resource (deliverability) of the energy to final customers. These costs are determined by separate studies when the Customer requests transmission service through Southwest Power Pool's OASIS. This cost if any will be presented in a subsequent study results.