



*Feasibility Study for Interconnection  
of 750 MW in AEP Control Area*

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*AEP Southwest  
Transmission Planning  
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## **Executive Summary**

Customer has requested a feasibility study for the interconnection of a plant located in AEP's Control Area. The plant will have a maximum output of 750 MW and the projected in service date is 2004.

The principle objective of this study is to identify the costs associated with connecting the plant to AEP's system and what system problems and potential system modifications might be necessary to facilitate the installation of the plant. For the purpose of this study, Customer requested that the 750 MW of generation be sent to the southern Arkansas area of Entergy.

The steady-state analysis considers the impact of the 750 MW transfer on transmission line loading and transmission bus voltages for outages of single, double, and triple circuit transmission lines, autotransformers, and generators on the AEP, Entergy, and CLECO systems. The 2001 Series Southwest Power Pool 2004 modified summer peak case provided by the Southwest Power Pool was used for this study.

The cost of interconnecting the generator to AEP's system is \$6.6 million for a 6-breaker, 345 kV ring bus substation. This cost does not include any cost that might be associated with short circuit study results or stability study results. These costs will be determined when and if a System Impact Study is requested. However, from a previous stability study in this area, it is safe to mention that there may need to be another 345 kV line built from the new Customer plant for stability purposes.

The analysis in this document shows that to accommodate a 750 MW transfer to southern Arkansas, upgrades will be required on the western portion of AEP's system. These upgrades are listed in the Table 1. There are also many overloads in the Entergy and CLECO systems that will need upgrades as well. This study provides only preliminary results regarding the transfer of power from the generation facility to the requested locations and does not guarantee that if the recommended improvements are made that the full 750 MW can be transferred.

## **Study Methodology**

The AEP and Southwest Power Pool (SPP) criteria state that the following conditions be met in order to maintain a reliable and stable system.

- 1) More probable contingency testing...must conclude that
  - a) All facility loadings are within their emergency ratings and all voltages are within their emergency limits (0.90-1.05 per unit) and
  - b) Facility loadings can be returned to their normal limits within four hours
  
- 2) Less probable contingency testing...shall conclude that
  - a) Neither uncontrolled islanding, nor uncontrolled loss of large amounts of load will result

More probable contingency testing is defined as losing any single piece of equipment or multi-circuit transmission lines. Less probable contingency testing involves the loss of any two critical pieces of equipment such as 345 kV autotransformers and generating units or the loss of critical transmission lines in the same right-of-way.

The 2001 Series Southwest Power Pool 2004 modified summer peak case was used to model the transmission network and system loads.

Using the created models and the ACCC function of PSS/E, single and select double contingency outages on AEPW, Entergy, and CLECO systems were analyzed.

## **System Improvements**

In order to accommodate the total 750 MW, the following improvements will need to be made on the SWEPCO system. The following improvements and costs correspond only with the 750 MW transfer to southern Arkansas. Besides the following improvements there are also two separate 345 kV lines having conductors overloaded; 12.2 miles of the Lydia to Welsh line and 53.04 miles of the Welsh to Northwest Texarkana line.

There are also many problems on the Entergy and CLECO systems that need further investigation to determine what the upgrade requirements would be, but the SWEPCO system is the only one considered in the following table. One such improvement would be the 500/345 kV autotransformer at El Dorado. The load flows indicate that this autotransformer overloads the base case, normal operation rating of 900 MVA by 119%.

SYSTEM IMPROVEMENT	ESTIMATED COST (2001 DOLLARS)
Construct new 345 kV 6-breaker ring bus substation	\$6,600,000
<b>Subtotal for Interconnection</b>	<b>\$6,600,000</b>
Rebuild 3.03 miles of Ellerbe to Lucas 69 kV with 1272 ACSR and replace 600 A switch with 1200 A switch at Ellerbe	\$900,000
Replace bus and jumpers at Ellerbe 69 kV with 1272 ACSR	\$75,000
Replace jumpers at S. Shreveport 69 kV with 1272 ACSR	\$15,000
Rebuild 6.86 miles of Wallace Lake to International Paper 138 kV with 1272 ACSR	\$2,130,000
Rebuild 11.18 miles of South Shreveport to Wallace Lake 138 kV with 1272 ACSR	\$3,654,000
Rebuild 23.42 miles of Patterson to South Nashville with 795 ACSR	\$6,225,000
Replace wavetrap at South Nashville on the South Nashville to Murfreesboro 138 kV (Entergy will also need to do some work on this line.)	\$25,000
Replace jumpers at Wilkes on Wilkes to Munz City 138 kV with 1272 ACSR	\$15,000
Reset 800/5 CT at Crockett to 2000/5 CT.	\$5,000
Replace wavetrap on Knox Lee to Northwest Henderson 138 kV at Knox Lee	\$32,000
Replace wavetrap on the Knox Lee to Northwest Henderson 138 kV at Northwest Henderson	\$32,000
Replace 600 A switch on Mineola to Hoard 69 kV at Mineola with 2000 A device	\$35,000
Reset CT's on Lone Star South to Pittsburg 138 kV at Pittsburg with 1200/5 CT's	\$5,000
Replace 600 A switch on Pittsburg to Winnsboro 69 kV at Pittsburg with a 2000 A device	\$35,000
Rebuild 1.25 miles of Beaver Dam to Eureka 161 kV with 1590 ACSR	\$515,000
Rebuild 3.61 miles of Fulton to Hope 115 kV with 1590 ACSR	\$1,710,000
<b>Subtotal for Transmission Service Improvements</b>	<b>\$15,408,000</b>
<b>Total</b>	<b>\$22,008,000</b>

Table 1: 750 MW generation sent to southern Arkansas