

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

Entergy Services, Inc.,	)	
	)	
	)	
on behalf of the Entergy Operating	)	Docket No. RT01-75
Companies: Entergy Arkansas, Inc., Entergy	)	Docket No. ER01-_____
Gulf States, Inc., Entergy Louisiana, Inc.,	)	Docket No. ER01-_____
Entergy Mississippi, Inc., and Entergy	)	Docket No. ER01-_____
New Orleans, Inc.	)	

**DIRECT TESTIMONY  
OF  
GEORGE R. BARTLETT  
ON BEHALF OF  
ENTERGY SERVICES, INC.**

**December 29, 2000**

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**I. INTRODUCTION**

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND TITLE.

A. My name is George R. Bartlett. My business address is 639 Loyola Avenue, New Orleans, Louisiana, 70113. I am the Director of Transmission Operations at Entergy Services, Inc. (“ESI” or “Company”).

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. In 1976, I graduated from Tulane University with a Bachelor of Science in Electrical Engineering. In 1976, I was employed by Louisiana Power & Light Company (“LP&L”), now known as Entergy Louisiana, Inc. (“ELI”), in the System Planning Department. In 1980, I left LP&L to manage a family owned business. I returned to LP&L in 1987 and was assigned to the Substation Design group as a design engineer. I returned to System Planning in 1988. From May 1991 until June 1997, I was a Manager within the Transmission Planning and Policy Departments for ESI. In June 1997, I accepted my present position, Director of Transmission Operations, and I am responsible for transmission planning and operations.

In the course of my career, I have been involved in various aspects of the engineering processes relating to the Transmission functions, and I

1 am familiar with the standards and practices of the transmission  
2 operations of utilities.

3 I am a registered professional engineer in the state of Louisiana. I  
4 am a member of the Institute of Electrical and Electronics Engineers  
5 ("IEEE"), the IEEE Power Engineering Society, and the Louisiana  
6 Engineering Society.

7

8 Q. WHAT ARE YOUR RESPONSIBILITIES AS DIRECTOR OF  
9 TRANSMISSION OPERATIONS?

10 A. I am responsible for the supervision of Transmission System Planning,  
11 Transmission System Security, Transmission System Security  
12 Coordination, and Local Dispatching.

13

14 Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS DOCKET?

15 A. Yes. I provided testimony in the prior phase of this Docket, Entergy's  
16 October 16, 2000 filing, to establish an independent transmission service  
17 company ("Transco") as part of a Southwest Power Pool Partnership  
18 Regional Transmission Organization ("SPP Partnership RTO").

19

20 **II. PURPOSE OF TESTIMONY**

21 Q. PLEASE DESCRIBE THE PURPOSE OF YOUR TESTIMONY.

22 A. The general purpose of my Direct Testimony is to describe the process

1 through which certain ancillary services will be provided in the Transco  
2 Rate Schedules the Company filed with the Federal Energy Regulatory  
3 Commission (“FERC” or “Commission”) in this proceeding. More  
4 specifically, I will describe the following Ancillary Services included in  
5 Appendix TR:

6 Schedule 2 - Reactive Supply and Voltage Control from Generation

7 Source Services

8 Schedule 3 - Regulation and Frequency Response Service

9 Schedule 4 - Energy Imbalance Service

10 Schedule 5 - Operating Reserve – Spinning Reserve Service

11 Schedule 6 - Operating Reserve – Supplemental Reserve Service

12 In addition, I will discuss the performance factors included in the  
13 Performance Rating Adjustment (“PRA”) Formula in Schedule 7 to  
14 Appendix TR, which ESI witness Rodney K. Gilbreath discusses more  
15 fully in his Direct Testimony. I will also discuss how the Transco will  
16 determine Base Case projects as described in the Direct Testimony of ESI  
17 witness Michael M. Schnitzer. Finally, I will discuss the criteria included  
18 in paragraph 1 of Schedule 10 of Appendix TR to determine what facilities  
19 of Network Transmission Service (“NTS”) customers qualify for  
20 compensation.

21

1           **III.    ANCILLARY SERVICES OFFERED UNDER THE SPP OATT**

2    Q.    PLEASE DESCRIBE ANCILLARY SERVICE SCHEDULE 2 – REACTIVE  
3           SUPPLY AND VOLTAGE CONTROL FROM GENERATION SOURCES  
4           SERVICE.

5    A.    In order to maintain transmission voltages on the Transmission Provider's  
6           transmission facilities within acceptable limits, generation facilities under  
7           the control of the Control Area operator are operated to either produce or  
8           absorb reactive power into or out of the system. The need for reactive  
9           power increases as the amount of energy flowing over the transmission  
10          facilities increase. Thus, Reactive Supply and Voltage Control from  
11          Generation Sources Service must be provided for each transaction on the  
12          Transmission Provider's transmission facilities. The amount of Reactive  
13          Supply and Voltage Control from Generation Sources Service that must  
14          be supplied with respect to the Transmission Customer's transaction will  
15          be determined based on the reactive power support necessary to  
16          maintain transmission voltages within limits that are generally accepted in  
17          the region and consistently adhered to by the Transmission Provider.

18                 Reactive Supply and Voltage Control from Generation Sources  
19                 Service will be provided directly by the Transmission Provider (if the  
20                 Transmission Provider is the Control Area operator) or indirectly by the  
21                 Transmission Provider by his making arrangements with the Control Area  
22                 operator that performs this service for the Transmission Provider's

1           Transmission System. The Transmission Customer must purchase this  
2           service from the Transmission Provider or the Control Area operator.

3                     Until such time as a market for this service is established, the  
4           Operating Companies, on behalf of Transco, will provide service under  
5           Schedule 2. Transco will act as the billing agent for the Operating  
6           Companies as well as the Transmission Customer's agent for securing  
7           such service. The Operating Companies shall offer Reactive Supply and  
8           Voltage Control from Generation Sources Service pursuant to a rate  
9           schedule for this service filed with the Commission.

10

11   Q.   PLEASE DESCRIBE ANCILLARY SERVICE SCHEDULE 3 -  
12       REGULATION AND FREQUENCY RESPONSE.

13   A.   Regulation and Frequency Response Service is necessary to provide for  
14       the continuous balancing of resources (generation and interchange) with  
15       load and for maintaining scheduled Interconnection frequency at sixty  
16       cycles per second (60 Hz). Regulation and Frequency Response Service  
17       is accomplished by committing on-line generation whose output is raised  
18       or lowered (predominantly through the use of automatic generating  
19       control equipment) as necessary to follow the moment-to-moment  
20       changes in load. The obligation to maintain this balance between  
21       resources and load lies with the Transmission Provider (or the Control

1 Area operator that performs this function for the Transmission Provider).  
2 The Transmission Customer must either purchase this service from the  
3 Transmission Provider or make alternative comparable arrangements to  
4 satisfy its Regulation and Frequency Response Service obligation.

5 Until such time as a market for this service is established, the  
6 Operating Companies, on behalf of Transco, will provide service under  
7 Schedule 3. Transco will act as the billing agent for the Operating  
8 Companies as well as the Transmission Customer's agent for securing  
9 such service. The Operating Companies shall offer Regulation and  
10 Frequency Response Service pursuant to a rate schedule for this service  
11 filed with the Commission.

12

13 Q. PLEASE DESCRIBE ANCILLARY SERVICE SCHEDULE 4 – ENERGY  
14 IMBALANCE SERVICE.

15 A. Energy Imbalance Service is provided when a difference occurs between  
16 the scheduled and the actual delivery of energy to a load located within a  
17 Control Area over a single hour. The Transmission Provider must offer  
18 this service when the transmission service is used to serve load within its  
19 Control Area. The Transmission Customer must either purchase this

1 service from the Transmission Provider or make alternative comparable  
2 arrangements to satisfy its Energy Imbalance Service obligation.

3 Until such time as a market for this service is established, the  
4 Operating Companies on behalf of Transco will provide service under  
5 Schedule 4. Transco will act as the billing agent for the Operating  
6 Companies as well as the Transmission Customer's agent for securing  
7 such service. The Operating Companies shall offer Energy Imbalance  
8 Service pursuant to a rate schedule for this service filed with the  
9 Commission.

10

11 Q. PLEASE DESCRIBE ANCILLARY SERVICE SCHEDULE 5 –  
12 OPERATING RESERVE – SPINNING RESERVE SERVICE.

13 A. Spinning Reserve Service is needed to serve load immediately in the  
14 event of a system contingency. Generating units that are on-line and  
15 loaded at less than maximum output may provide Spinning Reserve  
16 Service. The Transmission Provider must offer this service when the  
17 transmission service is used to serve load within its Control Area. The  
18 Transmission Customer must either purchase this service from the  
19 Transmission Provider or make alternative comparable arrangements to  
20 satisfy its Spinning Reserve Service obligation. Unless the Transmission  
21 Customer makes alternative comparable arrangements, the Transmission  
22 Provider will obtain the service from the affected Control Areas, and the

1           Transmission Customer shall pay the Transmission Provider for this  
2           service when the Transmission Provider provides this service to the  
3           Transmission Customer.

4                     Until such time as a market for this service is established, the  
5           Operating Companies, on behalf of Transco, will provide service under  
6           Schedule 5. Transco will act as the billing agent for the Operating  
7           Companies as well as the Transmission Customer's agent for securing  
8           such service. The Operating Companies shall offer Spinning Reserve  
9           Service pursuant to a rate schedule for this service filed with the  
10          Commission.

11

12   Q.   PLEASE DESCRIBE ANCILLARY SERVICE SCHEDULE 6 –  
13        OPERATING RESERVE – SUPPLEMENTAL RESERVE SERVICE.

14   A.   Supplemental Reserve Service is needed to serve load in the event of a  
15        system contingency. It is not meant to be immediately available to serve  
16        load, but rather it must have the capability of being brought on line within  
17        a short period of time. Supplemental Reserve Service may be provided  
18        by generating units that are on-line but unloaded, by quick-start  
19        generation or by interruptible load. The Transmission Provider must offer  
20        this service when the transmission service is used to serve load within its  
21        Control Area. The Transmission Customer must either purchase this  
22        service from the Transmission Provider or make alternative comparable

1 arrangements to satisfy its Supplemental Reserve Service obligation.  
2 Unless the Transmission Customer makes alternative comparable  
3 arrangements, the Transmission Provider will obtain the service from the  
4 affected Control Areas, and the Transmission Customer shall pay the  
5 Transmission Provider for this service when the Transmission Provider  
6 provides this service to the Transmission Customer.

7 Until such time as a market for this service is established, the  
8 Operating Companies, on behalf of Transco, will provide service under  
9 Schedule 6. Transco will act as the billing agent for the Operating  
10 Companies as well as the Transmission Customer's agent for securing  
11 such service. The Operating Companies shall offer Supplemental  
12 Reserve Service pursuant to a rate schedule for this service filed with the  
13 Commission.

14

15 **IV. PERFORMANCE BASED RATES ("PBR") -- PERFORMANCE**

16 **FACTORS**

17 Q. PLEASE DESCRIBE THE ENERGY DELIVERY INDEX ("EDI") AND  
18 VOLTAGE FAULT INDEX ("VFI") PERFORMANCE FACTORS UTILIZED  
19 IN THE PRA FORMULA.

20 A. In addition to proposing incentives for expansion of the transmission grid,  
21 the Company is also proposing a performance based incentive plan. Part  
22 of the PBR will include certain factors to gauge the Transco's

1 performance, including an Energy Delivery Index (“EDI”) and a Voltage  
2 Fault Index (“VFI”). My testimony will briefly describe these two factors  
3 that will be part of the PBR.

4

5 Q. WHY ARE THE EDI AND VFI MEASURES APPROPRIATE?

6 A. These measures are appropriate because they are indicators of Transco’s  
7 service to its customers in terms of reliability and quality of service.

8

9 Q. PLEASE EXPLAIN THE RATIONALE BEHIND EDI.

10 A. EDI is a measure of the level of transmission reliability afforded the  
11 Transco transmission customers. It is defined as the amount of energy  
12 not served to end-use customers, resulting from transmission-related  
13 equipment outages, normalized by the total energy served during a year.

14 The index can be affected by system design, maintenance, and  
15 operations. The amount of energy not served because of a component  
16 outage will be determined by the amount of redundancy built into the  
17 system, maintenance practices, operating practices, and restoration time.

18 For example, substations served by radial transmission lines would  
19 generally contribute more loss of energy to the index than would  
20 substations served by two lines, simply because of the fact that radial  
21 substations lose power for loss of just one line, while other substations do  
22 not. Therefore, radial substations are more likely to exhibit loss of load

1 for single component outages.

2 The impact of EDI is to drive Transco to improve the reliability of  
3 the Transco transmission system. The goal of reducing EDI will drive  
4 several behaviors simultaneously:

- 5 • It will drive the reduction of outages that result in unserved energy.
- 6 • It will drive transmission planners to focus reliability projects in those  
7 areas where the most load is at risk, including the probability of  
8 historically poor performing lines.
- 9 • It will drive the maintenance crews to shorten restoration times, thus  
10 reducing the amount of time customers are out of power.
- 11 • It will drive the automation of switching components, thereby  
12 facilitating operations.
- 13 • It will tend toward redundancy, by promoting the integration of radial  
14 transmission lines into the network.

15 Normalization to the total energy served during a year is a modification  
16 necessary to account for load growth and to accommodate new Transco  
17 load and members.

18

19 Q. ARE THERE CERTAIN TYPES OF OUTAGES THAT WILL BE  
20 EXCLUDED FROM THE CALCULATION OF EDI?

21 A. Yes. Outages due to force majeure and other system disturbances  
22 initiated by outside influences will be excluded from this measure. These

1           exclusions include but are not limited to:

- 2           • Hurricanes
- 3           • Tornadoes
- 4           • Ice Storms with ice buildup exceeding design specifications
- 5           • System disturbances initiated by outside influences:
  - 6                 • Cascading outages promulgated by interconnected utilities
  - 7                 • Curtailments to Transco load resulting from requests for same
  - 8                 from outside Security Coordinators
  - 9                 • Outages to load resulting from failure of customer owned and
  - 10                maintained equipment
  - 11                • Customer curtailments and outages resulting from energy
  - 12                shortages caused by energy suppliers

13

14 Q.   PLEASE EXPLAIN THE RATIONALE BEHIND VFI.

15 A.   VFI is a measure of the level of power quality provided to Transco  
16 transmission customers. It is defined as the number of faults, not cleared  
17 within design specifications, occurring on the transmission system per  
18 year, per the number of circuit miles of transmission line (weighted by line  
19 voltage). For example, a fault, promulgated by a lightning strike to the  
20 system, which is interrupted by the timely operation of the circuit breakers  
21 on either end of the line, would not contribute to VFI. However, such a

1 fault, for which the system protective equipment did not operate within  
2 design specifications, would contribute to the VFI.

3 The impact of this measure is to improve the quality of service as  
4 seen by the end-use customers of the Transco transmission system.

5 Reducing VFI will drive several behaviors simultaneously:

- 6 • It will drive the reduction of outages that often cause power quality  
7 problems for customers.
- 8 • It will drive maintenance personnel to be the most proactive and the  
9 most reactive on those lines and substations where improvements will  
10 provide the greatest benefits for the greatest number of customers.

11 Because customers generally design their facilities to be able to withstand  
12 system disturbances that are cleared within design specifications of the  
13 interrupting equipment, it is appropriate not to count properly cleared  
14 faults against the VFI. Normalization to the number of miles of line in  
15 each voltage class is necessary to accommodate system expansion as  
16 well as new Transco members.

17 Additionally, it is appropriate to weight a fault that occurs on the  
18 higher voltage network more heavily than one which occurs on the lower  
19 voltage network. Weighting by line voltage is required for two reasons:

- 20 • Equal weighting of lines of all voltage classes would drive Transco to  
21 obtain equal performance from all lines on the transmission system.

22 However, by nature of their design, higher voltage lines have less

1 exposure to the natural elements and therefore suffer fewer  
2 instantaneous faults per mile than do lower voltage lines. Because it is  
3 not reasonable to expect lines of different voltage classes to perform  
4 the same, it is appropriate to weigh their performance differently. It is  
5 not economical or prudent to build 69kV lines to 500kV specifications  
6 merely to reduce the exposure to faults.

- 7 • The characteristic impedance of high voltage lines tends to be lower  
8 than that of low voltage lines. The result of this difference is that  
9 voltage dips propagate further on the high voltage lines, and are  
10 therefore potentially felt by more customers than are faults on lower  
11 voltage lines.

12

13 Q. HOW IS THE VOLTAGE FAULT WEIGHTING DETERMINED?

14 A. Faults are weighted in inverse proportion to the line voltage of the  
15 affected transmission facilities. The individual weightings for the voltage  
16 classes on the Transco transmission system are normalized such that  
17 they sum to unity as indicated in Schedule 7 to Appendix TR.

18

19 Q. AGAINST WHAT BASIS WOULD TRANSCO MEASURE THE  
20 IMPROVEMENT OF EDI AND VFI?

21 A. The Energy Delivery Index and Voltage Fault Index of the test year are  
22 measured against base indices generated from data collected over the

1 period from 1999 to 2001. It is appropriate to use a three-year average  
2 for the base indices in order that any aberrations within a single year do  
3 not skew the basis on which future performance is judged. The years  
4 from 1999 to 2001 represent the most recent time period against which to  
5 measure improvement on the part of Transco in the performance of the  
6 transmission grid.

7

8 **V. BASE CASE INVESTMENTS**

9 Q. WHY ARE BASE CASE INVESTMENTS NECESSARY?

10 A. Base case investments are projects required to meet the North American  
11 Electric Reliability Council standards and to accommodate local  
12 requirements to serve load and comply with safety issues.

13

14 Q. WHAT TYPES OF PROJECTS ARE CONSIDERED BASE CASE  
15 PROJECTS?

16 A. The three types of projects that are considered Base Case projects are  
17 mandatory, reliability, and infrastructure.

18 Mandatory projects include those that are either government-  
19 mandated or required because of safety, contractual, or regulatory  
20 requirements. An example of a mandatory project is the relocation of  
21 transmission lines to accommodate highway construction.

1           Reliability projects are needed to meet customer load (including  
2           load growth) requirements. These projects are determined through the  
3           studies performed by the Transco planning department using customer  
4           load projections and anticipated system changes. System changes that  
5           are investigated will include the addition of network resources and  
6           construction of regional transmission facilities.

7           Infrastructure projects are those required to maintain the continued  
8           integrity of the existing transmission assets. Examples of such projects  
9           include pole replacement and changeout of obsolete equipment.

10

11 Q.   HOW WILL THE THREE TYPES OF PROJECTS BE IDENTIFIED?

12 A.   Mandatory projects will be identified through either internal studies or  
13       requests from customers whose projects will impact the Transmission  
14       facilities.

15           Reliability projects will be identified by Transco through the normal  
16       planning process. The Transco planning department will perform studies  
17       to determine the adequacy and security of the interconnected  
18       transmission system in order to meet the existing and future load  
19       requirements of the load-serving customers. The planning department  
20       will identify transmission constraints that limit the load-serving customers'  
21       ability to serve the load as well as projects to relieve those constraints.

22           Infrastructure projects will be identified through Transco's internal

1 maintenance programs such as an annual pole and line inspection.

2

3 **VI. SCHEDULE 10 - NTS QUALIFYING FACILITIES**

4 Q. WHAT ARE NTS QUALIFYING FACILITIES?

5 A. NTS Qualifying Facilities are transmission facilities that are owned by  
6 Transco NTS customers such as cooperatively owned utilities, which are  
7 integrated with and support the Transco transmission system according to  
8 section 30.9 of the OATT.

9

10 Q. HOW ARE EXISTING NTS QUALIFYING FACILITIES TO BE  
11 DETERMINED?

12 A. Existing facilities of NTS Customers that are integrated with Transco's  
13 Transmission System may be eligible to receive consideration either  
14 through a billing credit or some other mechanism. In order to receive such  
15 consideration, the NTS Customer must demonstrate that its transmission  
16 facilities are integrated into the plans or operations of Transco to serve its  
17 power and transmission customers.

18

19 Q. HOW WILL FUTURE QUALIFYING FACILITIES BE IDENTIFIED?

20 A. Future facilities owned and constructed by NTS customers will be eligible  
21 for treatment as qualifying facilities if they are jointly planned as part of  
22 the Transco planning process. This annual planning process will be used

1 to identify facilities that provide system-wide benefit in order to ensure the  
2 security and reliability requirements of Transco's interconnected  
3 transmission system. Such projects will constitute Transco's Base Case  
4 investments, which I discuss earlier. When it is more appropriate for a  
5 NTS customer to install a Base Case facility, as opposed to the Transco,  
6 the NTS customer would receive a bill credit or other consideration for the  
7 qualifying facilities.

8

9 Q. WHAT IF FUTURE FACILITIES CONSTRUCTED BY NTS CUSTOMERS  
10 ARE NOT PART OF TRANSCO'S BASE CASE?

11 A. NTS customers may also elect to construct facilities that are not part of  
12 the Transco Base Case. To the extent that these facilities create  
13 additional deliverability or transmission capacity, the customer will receive  
14 the resulting transmission rights (whether FTRs or FGRs) that are created  
15 by their facilities, consistent with the "participant funding" model for  
16 transmission expansion discussed above in my testimony and in Mr.  
17 Schnitzer's testimony.

18

19 Q. DOES THIS CONCLUDE YOUR TESTIMONY?

20 A. Yes.

