

Exhibit No.:
Issues: Class Cost-of-Service
and Rate Design
Witness: Lena M. Mantle
Type of Exhibit: Direct
Sponsoring Party: MoPSC Staff
Case No.: ER-97-81

MISSOURI PUBLIC SERVICE COMMISSION

POLICY & PLANNING DIVISION

DIRECT TESTIMONY

OF

LENA M. MANTLE

FILED

FEB 20 1997

**MISSOURI
PUBLIC SERVICE COMMISSION**

THE EMPIRE DISTRICT ELECTRIC COMPANY

CASE NO. ER-97-81

Jefferson City, Missouri

February, 1997

1 DIRECT TESTIMONY

2 OF

3 LENA M. MANTLE

4 THE EMPIRE DISTRICT ELECTRIC COMPANY

5 CASE NO. ER-97-81

6
7
8 Q. Please state your name and business address.

9 A. My name is Lena M. Mantle and my business address is
10 Missouri Public Service Commission, P. O. Box 360, Jefferson City, Missouri
11 65102.

12 Q. What is your present position with the Missouri Public
13 Service Commission (Commission)?

14 A. I am an Engineer in the Economic Analysis Department,
15 Policy and Planning Division.

16 Q. Are you the same Lena M. Mantle that previously filed
17 direct testimony in this case on February 13, 1997?

18 A. Yes, I am.

19 Q. What is the purpose of this direct testimony?

20 A. The purpose of this testimony is to sponsor part of the class
21 level adjusted hourly Missouri loads used to determine allocators for the class
22 cost-of-service (COS) study performed by Staff. In addition, I am recommending
23 that The Empire District Electric Company (EDE) re-establish a tariff designed to

1 encourage the installation of thermal energy storage (TES) technology in EDE's
2 service territory.

3
4 HOURLY LOADS

5 Q. For which classes did you estimate adjusted hourly loads for
6 the Staff COS study?

7 A. I estimated adjusted hourly loads for the test year for the
8 Commercial Building (rate 25), Commercial Small Heating (rate 26), Total Electric
9 Buildings (rate 63), and Power Furnaces (rate 70) classes. I also estimated hourly
10 loads for the special contract customers.

11 Q. Briefly describe the process used to estimate the adjusted
12 hourly loads.

13 A. For the weather sensitive classes (Commercial Building,
14 Commercial Small Heating and Total Electric Building), I used Electric Power
15 Research Institute's Hourly Electric Load Model (HELM) to estimate a weather
16 adjustment to daily energy and peak for each day of the last twelve months that
17 load research was available (July 1995 through June 1996). This adjustment was
18 applied to the daily energy and peak to obtain a weather adjusted daily energy and
19 peak.

20 The starting point for allocating the daily energies back to the hours
21 while maintaining the weather adjusted daily peak is the actual hourly loads from
22 the load research. A unitized load curve is calculated for each day as a function of

Direct Testimony of
Lena M. Mantle

1 the actual peak and energy for that day. The corresponding weather normalized
2 daily peak and energy, along with the utilized load curves, are used to calculate
3 weather normalized hourly loads. Daily weather adjustments were not calculated
4 for the Power Furnace class and special contract customers because the energy and
5 peaks of these customers are not sensitive to daily fluctuations in weather.

6 Q. What were the inputs to this analysis?

7 A. The actual and weather normalized calendar sales calculated
8 in weather normalizing revenues were inputs as well as the actual load research
9 and actual and normal daily weather.

10 Q. Was the normal weather used the same as was used in the
11 weather normalization of sales?

12 A. Yes, it was.

13 Q. Were any other adjustments made to the hourly loads?

14 A. Yes, there were. Because the load research covered only
15 nine months of the test year, the hourly loads for July, August and September 1995
16 were adjusted to fit both the day types and, if applicable, the weather normalized
17 calendar sales for July, August and September 1996. These sales were estimated
18 by HELM and are discussed in my direct testimony filed in this case on February
19 13, 1997. A ratio of the sum of the weather normalized loads to the annual test
20 year sales was then applied to each hour of the year. This results in the sum of the
21 hourly loads over the test year being equal to the annual test year sales that have

Direct Testimony of
Lena M. Mantle

1 been adjusted for both annualization and customer growth as reported in the
2 testimony filed by Staff witness Janice Pyatte on February 13, 1997.

3 Q. What is the purpose of the adjusted hourly loads?

4 A. After losses are applied to the adjusted hourly loads, they are
5 used to determine allocation factors used in the COS study and rate design.

6 Q. Which Staff witness used these hourly loads?

7 A. I provided these loads to Staff witness Daniel I. Beck applied
8 hourly losses to the hourly loads.

9
10 THERMAL ENERGY STORAGE TARIFF

11 Q. What is Thermal Energy Storage (TES)?

12 A. TES combines a conventional air conditioner chiller with an
13 ice or chilled water storage system. When air conditioning is needed during peak
14 periods the demand for cooling is supplied partially or completely from the cooled
15 or chilled water. The chiller then regenerates the cool storage system during off-
16 peak hours. This can be beneficial to the customer by reducing their peak demand
17 which also, if timed correctly, results in a lower peak demand for EDE. For
18 customers considering expansion, it can also provide a way to increase cooling
19 capacity without having to replace existing chillers.

20 Q. Has EDE investigated the applicability of TES for their
21 customers?

Direct Testimony of
Lena M. Mantle

1 A. Yes, it has. EDE conducted a TES pilot demand-side
2 program from December 31, 1993 through December 31, 1995. In this program
3 EDE offered technical assistance, a rebate based on the projected demand
4 reduction and a shorter on-peak time period.

5 Q. Were there any participants in the program?

6 A. Yes. TES systems were installed in two theaters in Branson
7 and were evaluated but not installed by three other customers.

8 Q. What was the result of the program?

9 A. In the evaluation report on the pilot program sent to Staff on
10 June 3, 1996 by Brad Beecher of EDE, TES was shown to be a cost-effective
11 technology for both EDE and the customers installing the technology. Even so,
12 EDE concluded the evaluation with its decision not to implement a similar
13 program on a larger scale because it felt that the limited applicability of the
14 technology did not justify the time and expense of maintaining the program.

15 Q. Do you agree with EDE's conclusion?

16 A. No, I do not. EDE obtained valuable experience in not only
17 how to implement demand-side programs but also in the TES technology itself.
18 EDE states in its evaluation report that:

19 The awareness and acceptance of TES technology
20 seem to have increased significantly within the local
21 design community, primarily as a result of Empire's
22 program.
23

Direct Testimony of
Lena M. Mantle

1 My concern is that this awareness and the experience gained from this pilot will be
2 forgotten if allowed to lie idle. In addition, EDE could be foregoing demand-side
3 opportunities that may not occur again over the life of a building.

4 Q. What do you recommend?

5 A. I recommend that since EDE has found the technology to be
6 cost-effective for everyone concerned, it should try to influence the TES market
7 through price signals with a tariff designed to take advantage of the unique
8 potential of this technology to reduce on-peak demand and increase off-peak
9 energy usage.

10 Q. What would such a tariff contain?

11 A. I recommend a combination of a real-time pricing (RTP) and a
12 credit for demand reduction. The real-time pricing would accurately reflect the
13 lower cost of the energy used to re-charge a TES unit in the off-peak hours. The
14 demand credit would correspond to the difference between the demand that the
15 customer would have put on EDE's system at time of summer system peak using
16 currently installed technology and the actual demand of the TES and would be
17 priced at the credit that EDE's interruptible customers currently receive.

18 Q. How would the RTP aspect of the tariff operate?

19 A. It would function in the same way as EDE's RTP
20 experimental rate and time-of-use rate. The customer pays the hourly RTP for
21 incremental use above a Customer Baseline Load (CBL) calculated for each
22 customer and receives a credit at the RTP for use below the CBL. I also

Direct Testimony of
Lena M. Mantle

1 recommend that the CBL be determined as a function of temperature for each TES
2 customer. The CBL could be determined from building simulation models that
3 allow for customer specific thermal building and equipment specifications when
4 determining energy usage.

5 Q. What is your recommendation regarding EDE's filing of a
6 TES tariff?

7 A. I recommend that in this case the Commission order EDE to
8 file a TES tariff within 30 days from the effective date of its order. This tariff
9 should include provisions for real-time pricing and capacity credits for savings at
10 time of EDE's summer peak.

11 Q. Does this conclude your testimony?

12 A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the matter of the Empire District Electric Company)
of Joplin, Missouri, for Authority to File Tariffs) CASE NO. ER-97-81
Increasing Rates for Electric Service Provided to)
Customers in the Missouri Service Area of the Company.)

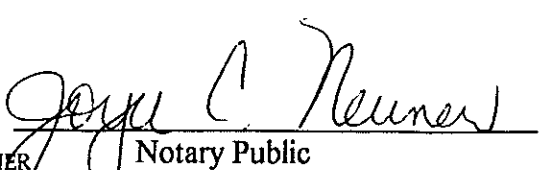
AFFIDAVIT OF LENA M. MANTLE

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

Lena M. Mantle, of lawful age, on her oath states: that she has participated in the preparation of the foregoing written testimony in question and answer form, consisting of 7 pages of testimony to be presented in the above case; that the answers in the attached written testimony were given by her; that she has knowledge of the matters set forth in such answers; and that such matters are true to the best of her knowledge and belief.


Lena M. Mantle

Subscribed and sworn to before me this 20th day of February, 1997.


JOYCE C NEUNER
NOTARY PUBLIC STATE OF MISSOURI
OSAGE COUNTY

Notary Public

My commission expires _____
MY COMMISSION EXP JUNE 18, 1997