

Exhibit No.:  
Issue: On-System Fuel and Purchased Power  
Expense  
Witness: Todd W. Tarter  
Type of Exhibit: Direct Testimony  
Sponsoring Party: Empire District Electric  
Case No.  
Date Testimony Prepared: October 2007

**Before the Public Service Commission  
Of the State of Missouri**

**Direct Testimony**

**of**

**Todd W. Tarter**

**October 2007**

**\*\*Denotes Highly Confidential\*\***

**NP**

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OF  
TODD W. TARTER  
ON BEHALF OF  
THE EMPIRE DISTRICT ELECTRIC COMPANY  
BEFORE THE  
MISSOURI PUBLIC SERVICE COMMISSION

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DIRECT TESTIMONY OF  
TODD W. TARTER  
ON BEHALF OF  
THE EMPIRE DISTRICT ELECTRIC COMPANY  
BEFORE THE  
MISSOURI PUBLIC SERVICE COMMISSION

1 **I. INTRODUCTION**

2 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3 A. Todd W. Tarter. My business address is 602 Joplin Street, Joplin, Missouri.

4 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5 A. The Empire District Electric Company (“Empire” or “Company”). My title is Manager of  
6 Strategic Planning.

7 **Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL**  
8 **BACKGROUND FOR THE COMMISSION.**

9 A. I graduated from Pittsburg State University in 1986 with a Bachelor of Science Degree in  
10 Computer Science. After graduation I received a mathematics education certification. I  
11 began my employment with Empire in May 1989. During my tenure with Empire I have  
12 worked in the Corporate Planning, Strategic Planning, Information Technology, and  
13 Planning and Regulatory departments. My primary responsibilities during this time have  
14 included work with the Company’s construction budget, load forecasts, sales and revenue  
15 budgets, financial forecasts and fuel and purchased power projections, among others. In  
16 September 2004, I was promoted to my current position where I primarily work with  
17 integrated resource planning.

18 **Q. HAVE YOU EVER TESTIFIED BEFORE THIS OR ANY OTHER STATE**  
19 **UTILITY COMMISSION?**

20 A. Yes. I testified on behalf of Empire on the topic of on-system fuel and purchased power

expense in Missouri Case No. ER-2006-0315, and in Kansas Case No. 05-EPDE-980-RTS.

**Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS CASE?**

A. My direct testimony addresses the on-system fuel and purchased power expense in this case. I will also provide some of the forecasted data required for a Fuel Adjustment Clause (“FAC”) filing. In addition, I will present figures for an annualized and normalized on-system fuel and purchased power expense developed with a production cost computer model that Empire supports for establishing fuel and purchased power costs in base rates. In connection with that, I will describe the model, the modeling process and discuss the key data inputs to the model.

**II. ENERGY COST RECOVERY**

**Q. WHAT IS EMPIRE PROPOSING FOR ENERGY COST RECOVERY IN THIS RATE CASE?**

A. Empire is proposing that the Commission approve the implementation of an FAC in this case. For a more detailed description of this request, please refer to the Direct Testimony of Empire witness Dr. H. Edwin Overcast. Empire believes that in conjunction with the FAC it is important to establish the correct level of fuel and purchased power costs for base rates (that portion of the rates that are fixed). Empire has used the PROSYM production cost model to develop this appropriate level for this case. This is the same model used by Empire in its last Missouri rate case that calculated the on-system fuel and purchased power expense level adopted by the Commission.

**Q. ARE YOU PROVIDING ANY SUPPORTING INFORMATION FOR EMPIRE’S REQUEST OF AN FAC?**

A. Yes. To comply with 4 CSR 240-2.090(2)(G), I am providing information as required by

various of the subparts of 4 CSR 240-3.161(2):

- Schedule TWT-1, which is a list of the supply-side and demand side resources that the Company expects to use to meet its load for the next four (4) years (as required by 4 CSR 240-3.161(2)(O));
- Schedule TWT-2, which shows the expected dispatch (generation levels) of the supply-side resources that Empire expects to utilize for the next four (4) years and explains why these expected dispatch levels are appropriate (as required by 4 CSR 240-3.161(2)(O));
- Schedule TWT-3, which shows the expected heat rates for each supply-side resource that the Company expects to utilize for the next four (4) years (as required by 4 CSR 240-3.161(2)(O));
- Schedule TWT-4, which shows the fuel types utilized in each of Empire's supply-side resources (as required by 4 CSR 240-3.161(2)(O)); and
- Schedule TWT-5, which establishes the fact that Empire has in place a long-term resource planning process, which has among its objectives to minimize overall delivered energy costs and to provide reliable service to customers (as required by 4 CSR 240-3.161(2)(Q)).

**III. PROPOSED LEVEL OF ON-SYSTEM FUEL AND PURCHASED POWER  
EXPENSE FOR BASE RATES**

**Q. WHAT LEVEL OF ON-SYSTEM FUEL AND PURCHASED POWER EXPENSE IS  
EMPIRE PROPOSING FOR BASE RATES IN THIS CASE?**

A. The model run presented in this testimony is being provided as Empire's recommendation for the on-system fuel and purchased power expense to include in base rates (that portion

1 of the rates that is fixed). At the time of filing this case, Empire recommends that a total  
2 company on-system fuel and purchased power expense, including demand charges, of  
3 \$172,032,185 be used to establish its base electric rates. This is based on a projected  
4 energy requirement of 5,425,392 MWh. On an average basis, this is 31.71 \$/MWh. A  
5 summary of the output from the computer simulation which supports this number is  
6 attached as Schedule TWT-6.

7 **Q. HOW WAS THIS LEVEL OF FUEL AND PURCHASED POWER EXPENSE**  
8 **DEVELOPED?**

9 A. This ongoing level of fuel and purchased power expense was developed by running the  
10 hourly production cost computer model known as PROSYM using normalized sales levels,  
11 growth and weather, and projected fuel and purchased power costs.

12 **Q. COULD YOU BRIEFLY DESCRIBE THE PROSYM MODEL?**

13 A. The PROSYM model is a chronological computer model that dispatches resources to meet  
14 demand requirements on an hourly basis. The model commits resources based on fuel  
15 costs, unit start-up costs, and variable operation and maintenance (“O&M”) costs after  
16 accounting for operational characteristics of a utility system that may override economic  
17 dispatch.

18 The PROSYM simulation engine is described by its developer, Global Energy Decisions,  
19 as providing the most accurate generation unit commitment logic in the world. PROSYM  
20 is used by well over 100 energy organizations around the world in both control room  
21 dispatch environments as well as in market analytic groups. Empire has been using  
22 chronological production costing models for projection purposes since 1991. Empire’s  
23 five previous rate case filings in Missouri, and most recent rate case in Kansas, have

utilized the PROSYM model.

**IV. UNIT DATA USED IN THE MODEL**

**Q. PLEASE PROVIDE AN OVERVIEW OF THE DATA USED FOR MODELING  
EMPIRE'S GENERATING UNITS.**

A. Data for Empire's generating units are shown in Schedule TWT-7. These data include each unit's rated capacity, maximum capacity, minimum capacity, heat rate curve information, ramp rate, forced outage rate information, mean repair time, minimum down time, minimum up time, fuel ratio, start-up fuel requirements and associated cost, and variable O&M. The normalized outage schedule is provided in Schedule TWT-8.

**Q. ARE THERE ANY NEW GENERATING UNITS SINCE THE LAST EMPIRE  
RATE CASE THAT WAS USED IN THE MODEL RUN?**

A. Yes. Riverton Unit 12 a Siemens V84.3A2 combustion turbine that uses natural gas as its fuel source was declared available for commercial operation on April 10, 2007. It was included in the model as a 150-megawatt unit. The unit characteristic data can be found in Schedule TWT-7, along with all of the other generating unit data.

**Q. ARE THERE ANY SPECIAL CONSIDERATIONS THAT NEED TO BE MADE  
WHEN MODELING EMPIRE'S GENERATING UNITS?**

A. Yes. There are special considerations that need to be made for modeling (1) Asbury Unit 1 and Asbury Unit 2; (2) Riverton Unit 7 and Riverton Unit 8; and (3) the State Line Combined Cycle ("SLCC").

**Q. BRIEFLY EXPLAIN THE OPERATING CHARACTERISTICS FOR EMPIRE'S  
ASBURY UNITS THAT NEED SPECIAL CONSIDERATION.**

A. The Asbury coal plant is comprised of one boiler and two turbines. The Asbury Unit 1

1 turbine is rated at 193 MW and Asbury Unit 2 is rated at 17 MW. Asbury Unit 2 cannot  
2 operate while Asbury Unit 1 is off line. In addition, Asbury is not able to run on a  
3 continuous basis at 210 MW due to operational issues. Specifically, the upper convection  
4 passes in the furnace tend to plug with ash. These operational limitations have been taken  
5 into consideration in the PROSYM model.

6 **Q. ASBURY UNIT 2 DOES NOT APPEAR TO RUN VERY MANY HOURS IN THE**  
7 **MODEL RUN. COULD YOU PLEASE EXPLAIN WHY?**

8 A. Running Asbury Unit 2 increases the total cycle heat rate of the Asbury plant which  
9 decreases the plant's efficiency. It also contributes to plugging the furnace, which could  
10 lead to more forced outages. As a result Empire generally operates Asbury Unit 2 as a  
11 peaking unit. In the computer model run Asbury Unit 2 generates 1,636 MWh. In the test  
12 year (twelve months ending ("TME") June-07) Asbury Unit 2 generated 482 MWh.

13 **Q. BRIEFLY EXPLAIN THE OPERATING CHARACTERISTICS FOR EMPIRE'S**  
14 **RIVERTON COAL UNITS THAT NEED SPECIAL CONSIDERATION.**

15 A. Riverton Unit 7 can operate to approximately 24 MW out of its 38 MW of rated capacity  
16 on a blend of coal and petroleum coke. The remainder of the Riverton Unit 7 capacity can  
17 only be obtained by over-firing natural gas. Likewise, Riverton Unit 8 can operate to  
18 approximately 45 MW out of its 54 MW rated capacity on a blend of coal and petroleum  
19 coke with the remainder of the capacity obtained by over-firing natural gas. These  
20 operational constraints were modeled in PROSYM.

21 **Q. BRIEFLY EXPLAIN THE OPERATING CHARACTERISTICS FOR EMPIRE'S**  
22 **STATE LINE COMBINED CYCLE THAT NEED SPECIAL CONSIDERATION.**

23 A. Empire owns 300 MW, or 60%, of the 500-MW State Line combined cycle unit ("SLCC").



1 The combined cycle consists of three electrical generating units—two combustion turbines  
2 (“CTs”) and one steam turbine. The CTs have heat recovery steam generators (“HRSGs”) on  
3 the exhaust end which utilize the high temperature exhaust gases to generate steam for use in  
4 the steam turbine. Steam can be used from one or both HRSGs to operate the steam turbine.  
5 This allows the combined cycle to be operated in one of two modes. Mode one, which I will  
6 call 1x1 mode, consists of one CT operating in conjunction with the steam turbine. Mode  
7 two, which I will call 2x1 mode, consists of both CTs operating in conjunction with the steam  
8 turbine. For this rate case filing, SLCC was modeled as two separate units. In the model, one  
9 unit running represents 1x1 mode and both units running represents the 2x1 mode  
10 configuration. Multi-step heat rates were input for each unit with the overall heat rate of the  
11 units comparing favorably to SLCC’s average heat rate of approximately 7,400 Btu/kWh.

12 **Q. HOW WAS THE OZARK BEACH HYDRO UNIT MODELED?**

13 A. Ozark Beach was modeled close to the 30-year average of the historical generation of the unit  
14 from 1977 to 2006. Hydro generation accounts for less than 1.2 percent of net system input in  
15 this normalized model run. Historical data for Ozark Beach are shown as Schedule TWT-9.

16 **V. FUEL DATA USED IN THE MODEL**

17 **Q. BRIEFLY EXPLAIN THE BASIS FOR THE SOLID FUEL COSTS INCLUDED IN**  
18 **THE PRODUCTION COST MODEL.**

19 A. All coal and petroleum coke prices are based on the expected 2008 delivered cost (initial and  
20 freight). Other costs associated with solid fuel, including handling and unit train costs are not  
21 included in the solid fuel costs in the model. These fuel related costs will be discussed in  
22 Section VII, Other Fuel Related Costs. The following solid fuel types were modeled: (1)  
23 Asbury western coal; (2) Asbury blend coal; (3) Riverton western coal; (4) Riverton

petroleum coke; and (5) Iatan western coal.

**Q. WHAT FUEL BLEND RATES ARE USED IN THE MODEL?**

A. In the model on an MMBtu basis, Asbury burns 87% western coal and 13% blend coal; Riverton Unit 7 and Riverton Unit 8 burn 66% western coal and 34% petroleum coke; and Iatan burns 100% western coal. On a tonnage basis this is approximately equivalent to the following: Asbury 90% western coal and 10% blend coal; Riverton Unit 7 and Riverton Unit 8 75% western coal and 25% petroleum coke; and Iatan 100% western coal.

**Q. PLEASE EXPLAIN HOW THE NATURAL GAS PRICES WERE DEVELOPED FOR THE MODEL.**

A. In the computer model, the gas-fired units can burn natural gas from two sources—from hedged natural gas and from spot market natural gas. The hedged gas represents Empire's current hedged position for 2008 (as of August 10, 2007). The hedged natural gas is a limited fuel type. Gas-fired generating units can burn this fuel until a specified MMBtu level is reached. After the limit is reached, the computer models the generating units as if they must operate on spot market gas.

**Q. WHAT IS THE 2008 HEDGED NATURAL GAS POSITION THAT WAS USED IN THE MODEL?**

A. The following table summarizes the 2008 hedged natural gas position that was used in the model. As of August 10, 2007, 7,826,000 MMBtu of natural gas are hedged for calendar year 2008, at an average price of about 6.852 \$/MMBtu.

**2008 Natural Gas Hedged Position  
As of August 10, 2007**

Month	MMBtu	Avg Price \$/MMBtu
Jan	** _____ **	** _____ **

Feb	** _____ **	** _____ **
Mar	** _____ **	** _____ **
Apr	** _____ **	** _____ **
May	** _____ **	** _____ **
Jun	** _____ **	** _____ **
Jul	** _____ **	** _____ **
Aug	** _____ **	** _____ **
Sep	** _____ **	** _____ **
Oct	** _____ **	** _____ **
Nov	** _____ **	** _____ **
Dec	** _____ **	** _____ **
	7,826,000	6.852

1 **Q. HOW WERE THE SPOT MARKET NATURAL GAS PRICES DEVELOPED FOR**  
2 **THE MODEL RUN?**

3 A. The spot market natural gas prices in the model are based on NYMEX gas futures for 2008 as  
4 of August 10, 2007, with a basis adjustment. The data is summarized in the following table.

**2008 Estimated Spot Natural Gas Prices**  
**August 10, 2007 NYMEX with Basis Adjustment**

Month	NYMEX \$/MMBtu	Basis Adj	Spot Gas Modeled \$/MMBtu
Jan	8.914	-1.195	7.719
Feb	8.914	-1.195	7.719
Mar	8.679	-1.195	7.484
Apr	7.939	-1.160	6.779
May	7.904	-1.160	6.744
Jun	7.986	-1.160	6.826
Jul	8.081	-1.160	6.921
Aug	8.146	-1.160	6.986
Sep	8.199	-1.160	7.039
Oct	8.319	-1.160	7.159
Nov	8.769	-1.182	7.587
Dec	9.214	-1.182	8.032
Average			7.250

5 **Q. COULD YOU BRIEFLY EXPLAIN THE NATURAL GAS BASIS ADJUSTMENT?**

6 A. NYMEX natural gas prices are based on a standard contract point at the Henry Hub in  
7 Louisiana. Since Empire takes gas delivery from the Southern Star Central Gas Pipeline

1 (“Southern Star”), formerly known as Williams Gas Pipeline, NYMEX prices have been  
2 adjusted to reflect the cost from Southern Star. Empire subscribes to a service from Risk  
3 Management Inc. called Mark-It View basis valuations to determine the basis adjustment  
4 estimates. The NYMEX prices adjusted for Southern Star delivery point were used in the  
5 model.

6 **Q. WHAT WAS THE WEIGHTED AVERAGE NATURAL GAS PRICE FROM THE**  
7 **MODEL RUN?**

8 A. In the PROSYM run for this case, with the model utilizing the hedged and spot market  
9 natural gas fuel types, the weighted average of the natural gas consumed was about 6.91  
10 \$/MMBtu.

11 **Q. HOW MUCH NATURAL GAS WAS DELIVERED IN THE MODEL RUN, AND**  
12 **HOW DOES THIS COMPARE TO HISTORY?**

13 A. In the model run, 8,299,672 MMBtu of natural gas was delivered (8,106,732 burned plus  
14 192,940 MMBtu losses). In 2005, Empire delivered \*\*\_\_\_\_\_\*\* MMBtu. In the filed  
15 test year (TME June-07) Empire delivered \*\*\_\_\_\_\_\*\* MMBtu. In 2006, Empire  
16 delivered \*\*\_\_\_\_\_\*\* MMBtu. The primary reason that the model run reflects a lower  
17 natural gas delivery than the calendar year 2005 level is due to the Elk River wind purchase.

18 **VI. PURCHASED POWER DATA IN THE MODEL**

19 **Q. BRIEFLY OUTLINE THE PURCHASES THAT WERE MODELED.**

20 A. In the model, purchased power can be grouped into three categories: (1) 162 MW Westar –  
21 Jeffrey contract purchase; (2) 150 MW Elk River Wind Farm contract purchase; and (3)  
22 the wholesale power market also referred to as spot purchases or non-contract purchases.

23 **Q. PLEASE DESCRIBE HOW THE WESTAR - JEFFREY PURCHASE WAS**

1       **MODELED.**

2       A.   The energy and capacity for this 162 MW contract purchase comes from the three different  
3       coal units at the Jeffrey Energy Center (54 MW each). The purchase is represented as  
4       three units in PROSYM, all with the same energy costs, but each with separate scheduled  
5       maintenance outages. The test year average energy price with losses from this purchase  
6       was \*\*\_\_\_\_\*\* \$/MWh. In 2006, the average energy price with losses was \*\*\_\_\_\_\*\*  
7       \$/MWh. In the model, the expected 2008 level of \*\*\_\_\_\_\*\* \$/MWh was used. This  
8       purchase also has a fixed demand charge which will be discussed in Section VII, Other  
9       Fuel Related Costs.

10      **Q. PLEASE DESCRIBE HOW THE ELK RIVER WIND FARM PURCHASE WAS**  
11      **MODELED.**

12      A.   This purchase was modeled as a must take purchase with an hourly load profile from  
13      calendar year 2006 (the only full calendar year of actual operational data at this time). In  
14      the model run, the annual energy purchased was \*\*\_\_\_\_\*\* MWh or about a \*\*\_\_\_\_\*\*  
15      capacity factor. The energy price used in the model is based on the agreed to contract price  
16      for 2008.

17      **Q. WHAT PRICE WAS USED FOR THE NON-CONTRACT PURCHASED ENERGY?**

18      A.   The non-contract purchase data in the model represents the wholesale power market. The  
19      data is comprised of 8,760 hourly prices. The prices were developed by Global Energy  
20      Decisions using regional models for the Southwest Power Pool North region. The prices  
21      are forecasted for year 2008, utilizing the same spot natural gas forecast with basis  
22      adjustments described in this testimony. The average non-contract purchase price in the  
23      model run is 53.11 \$/MWh. The test year average (TME June-07) was about \*\*\_\_\_\_\*\*

1       \$/MWh. In 2006, the average price was about \*\*\_\_\_\_\_\*\* \$/MWh. In 2005, the average  
2       price was about \*\*\_\_\_\_\_\*\* \$/MWh.

3       **VII. OTHER FUEL RELATED COSTS**

4       **Q. BRIEFLY OUTLINE THE OTHER FUEL RELATED COSTS THAT ARE**  
5       **INCLUDED IN THE TOTAL COMPANY ON-SYSTEM FUEL AND PURCHASED**  
6       **POWER EXPENSES OF \$172,032,185.**

7       A. The other fuel related costs are: (1) Purchased power demand charge; (2) natural gas  
8       demand charges; and (3) unit train and undistributed and other costs.

9       **Q. PLEASE DESCRIBE THE PURCHASED POWER DEMAND CHARGE.**

10      A. There is a monthly demand charge for the 162 MW Westar – Jeffrey purchase. By contract  
11      this is 8.33 \$/Kw/month which is \$1,349,460 monthly and \$16,193,520 annually. This  
12      contract expires May 31, 2010.

13      **Q. PLEASE DESCRIBE THE NATURAL GAS DEMAND CHARGES.**

14      A. When I describe the natural gas demand charges I am referring to the following three  
15      components: (1) fixed cost for firm transportation service; (2) commodity charge; and (3)  
16      natural gas losses.

17      Empire's contract fixed costs for firm natural gas transportation service is based on the  
18      three contracts TA-0907, TA-8251 and TA-8385. The total 2008 expected level for all of  
19      these contracts is \*\*\_\_\_\_\_\*\*. The commodity charge is based on \*\*\_\_\_\_\_\*\*  
20      \$/MMBtu for a total of \*\*\_\_\_\_\_\*\* (\*\*\_\_\_\_\_\*\* x 8,106,732 MMBtu in the model  
21      run). The losses are based on a natural gas loss rate of \*\*\_\_\_\_\_\*\* for a total of  
22      \*\*\_\_\_\_\_\*\* (\*\*\_\_\_\_\_\*\* x 8,106,732 MMBtu in the model run x 6.911294 \$/MMBtu  
23      average natural gas cost in the model). These three components result in a total gas

1 demand cost of \*\*\_\_\_\_\_\*\*.

2 **Q. PLEASE DESCRIBE THE OTHER FUEL RELATED EXPENSES.**

3 A. The other fuel related expenses include undistributed and other costs, unit train lease, unit  
4 train maintenance, unit train depreciation and unit train property taxes. A five-year  
5 average (adjusted for nonrecurring expenses) of approximately \$1,706,507 was used in this  
6 rate filing. These are shown in Schedule TWT-10.

7 **Q. HAVE YOU DESCRIBED IN GENERAL, THE OPERATIONS OF THE**  
8 **COMPUTER MODEL AND THE DATA INPUTS FOR THE SIMULATION THAT**  
9 **WAS PERFORMED?**

10 A. Yes. And I have reviewed all of the inputs and outputs and compared them to actual  
11 situations such that I am confident that the result is accurate and reasonable for the use to  
12 which we are putting it in this case.

13 **VIII. SUMMARY**

14 **Q. PLEASE PROVIDE A SUMMARY OF YOUR DIRECT TESTIMONY.**

15 A. In this case Empire is requesting an FAC. In conjunction with an FAC it is important to  
16 correctly set the appropriate level of on-system fuel and purchased power expense in base  
17 rates. Empire has made a computer simulation run with the PROSYM production cost  
18 model to determine the appropriate level of an annualized and normalized total company  
19 fuel and purchased power expense including demand charges. Based on this model run  
20 Empire supports a value of \$172,032,185 or 31.71 \$/MWh to be used to establish its base  
21 electric rates in this case pending any true up runs.

22 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

23 A. Yes, at this time.

**AFFIDAVIT OF TODD W. TARTER**

STATE OF MISSOURI )  
 ) ss  
COUNTY OF JASPER )

On the 15<sup>th</sup> day of October, 2007, before me appeared Todd W. Tarter, to me personally known, who, being by me first duly sworn, states that he is the Manager of Strategic Planning of The Empire District Electric Company and acknowledges that he has read the above and foregoing document and believes that the statements therein are true and correct to the best of his information, knowledge and belief.

Todd W. Tarter  
Todd W. Tarter

Subscribed and sworn to before me this 15<sup>th</sup> day of October, 2007.

Sherri J. Blalock  
Notary Public

My commission expires: Nov. 16, 2010

