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Witness: Samuel S. McGarrah
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Sponsoring Party: The Empire District
Electric Company
Case No.: ER-2019-0374
Date Testimony Prepared: August 2019

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

Direct Testimony

of

Samuel S. McGarrah

on behalf of

**The Empire District Electric Company -
A Liberty Utilities Company**

August 2019



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OF
SAMUEL S. MCGARRAH
THE EMPIRE DISTRICT ELECTRIC COMPANY
BEFORE THE
MISSOURI PUBLIC SERVICE COMMISSION
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1 I. **INTRODUCTION**

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

3 A. My name is Samuel S. McGarrah, and my business address is 602 Joplin Street, Joplin,
4 MO, 64802.

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

6 A. I am employed by Liberty Utilities Service Corp. as the Director of System
7 Performance for The Empire District Electric Company (“Liberty-Empire” or the
8 “Company”).

9 Q. **ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?**

10 A. I am testifying on behalf of Liberty-Empire, in this proceeding before the Missouri
11 Public Service Commission (“Commission”).

12 Q. **PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL**
13 **BACKGROUND.**

14 A. I hold a Masters of Science Degree in Electrical Engineering from the University of
15 Arkansas. I joined the staff at Liberty-Empire in June 1994 as a Distribution Engineer.
16 I later served as Planning Engineer and Manager of System Planning and Protection. I
17 have served as Director of Engineering and Line Services, Director of Operations and
18 now serve as Director of System Performance. My employment with Liberty-Empire
19 has been continuous since 1994, except for a brief employment with TAMKO Roofing
20 from January 2000 to April 2001.

1 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE COMMISSION OR**
2 **ANY OTHER REGULATORY AGENCY?**

3 A. Yes. I provided testimony before the Commission in Case Nos. ER-2011-0004 and
4 ER-2012-0345. I also provided testimony before the Oklahoma Corporation
5 Commission in Cause No. PUD 201800133.

6 **Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS**
7 **PROCEEDING?**

8 A. With my Direct Testimony, I address (1) the continuation of Liberty-Empire's light
9 emitting diode ("LED") municipal street lighting tariff, (2) a proposed change to the
10 original municipal street lighting tariff, and (3) an LED option that Liberty-Empire
11 proposes to offer its customers for private lighting and the justifications for that LED
12 tariff option.

13 **II. MUNICIPAL STREET LIGHTING TARIFFS**

14 **Q. DOES LIBERTY-EMPIRE OFFER A MUNICIPAL STREET LIGHTING**
15 **SERVICE?**

16 A. Yes. Liberty-Empire has two municipal street lighting tariffs: (1) Municipal Street
17 Lighting Service – LED Tariff, Schedule SPL-LED, PSC Mo. No. 5, Sec. 3, 4th Revised
18 Sheet No. 6 and 3rd Revised Sheet No. 7; and (2) Municipal Street Lighting Tariff,
19 Schedule SPL, PSC Mo. No. 5, Sec. 3, 17th Revised Sheet No. 1 and 7th Revised Sheet
20 No. 1a.

21 **Q. WHAT IS LED LIGHTING?**

22 A. LED lighting is a low maintenance lighting that produces a white light that provides
23 directional illumination and is designed to match natural daytime light. LED lighting

1 is more aesthetically pleasing and is known to be more efficient over other lighting
2 options.

3 **Q. WHEN WAS LIBERTY-EMPIRE’S LED MUNICIPAL STREET LIGHTING**
4 **TARIFF IMPLEMENTED FOR CUSTOMERS IN MISSOURI?**

5 A. On June 27, 2018, Liberty-Empire submitted its Municipal Street Lighting Service –
6 Light Emitting Diode (LED) Tariff, Schedule SPL-LED, which was assigned Tracking
7 No. JE-2018-0169. This schedule took effect on July 27, 2018, and Empire began
8 providing the new service.

9 **Q. WHAT PROMPTED THE IMPLEMENTATION OF LIBERTY-EMPIRE’S**
10 **LED MUNICIPAL STREET LIGHTING TARIFF?**

11 A. It was implemented after a pilot program was conducted to determine the benefits of
12 LED lights compared to High Pressure Sodium (“HPS”) fixtures. The pilot program
13 stemmed from a Commission-approved stipulation and agreement in Commission Case
14 No. ER-2012-0345, and the pilot tariff schedule was assigned Tracking No. JE-2015-
15 0004.

16 **Q. WHAT DID THE MISSOURI PILOT PROGRAM DETERMINE WITH**
17 **REGARD TO THE BENEFITS OF LED LIGHTS?**

18 A. The LED streetlights demonstrated much lower energy usage in comparison to HPS
19 lights of similar lumens. In fact, Liberty-Empire found that the LED lights used less
20 than half of the kWh used by HPS lights over the course of a year during the pilot
21 program.

22 **Q. ARE THERE ANY OTHER BENEFITS ASSOCIATED WITH OFFERING**
23 **LED LIGHTING OPTIONS TO LIBERTY-EMPIRE’S CUSTOMERS?**

1 A. Yes. Not only are the LED lights more efficient and use less energy, the LED lights
2 last longer, are more durable, have the ability to operate at lower temperatures, and
3 provide a higher quality light output. The improvement in the quality of light is
4 expected to reduce crime as well as prevent the color distortion associated with the HPS
5 lights. This improvement in light quality may also assist law enforcement. Descriptions
6 of activities in these improved lighted areas, should more accurately describe the color
7 of garments, vehicles, and other objects.

8 **Q. WAS THERE A COST DIFFERENCE DETERMINED IN THE PILOT**
9 **BETWEEN LED AND THE HPS LIGHTS?**

10 A. Yes. Liberty-Empire studied the 20-year life cycle of costs for both the new LED lights
11 and the HPS lights used as a comparison in the Missouri pilot program. While the
12 initial installation costs of the LED lights were more expensive than the HPS lights, the
13 pilot program demonstrated that there will be less costs associated with the LED over
14 a 20-year period after installation. That is, the LED required less material, equipment,
15 labor, and overhead costs after installation and over a longer period of time. HPS lights
16 require their bulbs to be replaced multiple times during the life of the fixture in contrast
17 to LED lights. In recent years, LED lights have dropped in their cost; and, considering
18 the price gap between them and their closest competitor, they may continue to drop in
19 the future.

20 **Q. WHAT HAS LIBERTY-EMPIRE LEARNED ABOUT THE COST OF LED**
21 **LIGHTS SINCE IMPLEMENTING ITS LED MUNICIPAL STREET**
22 **LIGHTING TARIFF?**

23 A. Since implementing the Tariff, approximately 167 LED fixtures have been installed
24 and most of these have been installed in the last 6 months. There have been no surprises

1 with the installation of the lights, but this limited number of installations provides very
2 limited amounts of data.

3 **Q. DID ANY LIBERTY-EMPIRE CUSTOMERS IN MISSOURI REQUEST THE**
4 **LED OPTION?**

5 A. Yes. Prior to and during the LED pilot program, Liberty-Empire was approached by
6 customers in Missouri about LED lighting as it seemed to be well established as a
7 superior lighting system and encompassed the benefits described above.

8 **Q. IS LIBERTY-EMPIRE PROPOSING ANY CHANGES TO THE LED**
9 **MUNICIPAL STREET LIGHTING TARIFF WHICH WAS IMPLEMENTED**
10 **FOR CUSTOMERS IN MISSOURI ON JULY 27, 2018?**

11 A. No, not at this time.

12 **Q. WITH THE LED MUNICIPAL STREET LIGHTING TARIFF IN PLACE, ARE**
13 **LIBERTY-EMPIRE'S MUNICIPAL CUSTOMERS STILL ABLE TO USE**
14 **NON-LED LIGHT FIXTURES?**

15 A. Yes. Liberty-Empire continues to also provide service under its original Municipal
16 Street Lighting Tariff, Schedule SPL.

17 **Q. IS LIBERTY-EMPIRE PROPOSING ANY CHANGES TO THE MUNICIPAL**
18 **STREET LIGHTING TARIFF?**

19 A. Yes. The revised tariff is attached to my testimony as Schedule SSM-1.

20 **Q. PLEASE EXPLAIN THE PROPOSED CHANGES.**

21 A. Liberty-Empire is proposing that the Municipal Street Lighting Tariff be modified such
22 that customers will still be able to choose HPS light fixtures on the Municipal Street
23 Lighting Tariff, but they will not be able to choose Mercury Vapor ("MV") light

1 fixtures. For customers with existing HPS or MV light fixtures, Liberty-Empire will
2 continue to replace bulbs until those existing fixtures are changed to a different fixture.

3 **Q. PLEASE EXPLAIN WHY THE COMPANY IS ELIMINATING THE OPTION**
4 **FOR NEW MV LIGHT FIXTURES.**

5 A. While mercury vapor light bulbs are still available, the mercury vapor fixtures are not
6 available in the market. Also, as discussed above, Empire now has a LED Municipal
7 Street Lighting Tariff, and LED lights are more energy efficient than MV lights, have
8 reduced maintenance costs and a longer life, and are more energy efficient and
9 environmentally friendly.

10 **Q. DOES LIBERTY-EMPIRE ALSO SEEK TO REPLACE ALL MERCURY**
11 **VAPOR LIGHT FIXTURES CURRENTLY IN OPERATION?**

12 A. Yes. Since these mercury vapor lights are becoming obsolete, Liberty-Empire proposes
13 to convert all Company-owned, mercury vapor municipal street light fixtures to LED
14 light fixtures (or HPS light fixtures if specified by the customer). The number of
15 mercury vapor light fixtures that would need to be replaced is approximately 8,500
16 lights.

17 **Q. WHAT IS THE TIME FRAME TO CONVERT MERCURY VAPOR LIGHTS**
18 **TO LED?**

19 A. Liberty-Empire proposes that such a replacement program occur over a 12-18 month
20 period of time. Changing out the lights all at once is more efficient and less expensive
21 to install than replacing the lights individually through attrition. If the mercury vapor
22 light fixtures are replaced through attrition, a technician would drive a truck out to each
23 of the 8,500 lights to inspect and determine what type of light is out, whether the failure

1 is a bulb or the fixture and whether the parts are available. This process would be more
2 costly than a wholesale change-out of the lights.

3 **Q. IS LIBERTY-EMPIRE REQUESTING REGULATORY TREATMENT TO**
4 **TRACK THE COSTS OF REPLACING MERCURY VAPOR LIGHTS FOR ITS**
5 **MUNICIPAL LIGHTING SERVICE?**

6 A. Yes. Liberty-Empire would like the Commission to approve regulatory treatment to
7 capture the costs associated with the mercury vapor light fixture replacement program.
8 Liberty-Empire requests that a regulatory asset or liability be established to account for
9 the difference between the actual cost incurred and the actual revenues collected from
10 customers as they move to the LED light fixtures. The difference would be recovered
11 or returned as determined in the next rate case.

12 **III. PRIVATE LIGHTING LED TARIFF**

13 **Q. IS LIBERTY-EMPIRE PROPOSING A NEW LED OPTION FOR ITS**
14 **PRIVATE LIGHTING CUSTOMERS IN MISSOURI?**

15 A. Yes. Liberty-Empire is proposing changes to its Private Lighting Service, Schedule PL,
16 PSC Mo. No. 5, Sec. 3, Revised Sheet No. 2, to include an option for LED lighting.
17 The revised tariff is attached to my testimony as Schedule SSM-2. This LED option
18 will be offered to Liberty-Empire's customers if approved by the Commission.

19 **Q. HOW WILL THE EXISTING PRIVATE LIGHTING SERVICE (SCHEDULE**
20 **PL) BE AMENDED TO INCLUDE THE LED OPTION?**

21 A. The schedule will be amended to include four options for LED lights so that LED lights
22 can be installed on all new private light installations unless HPS lighting is specifically
23 requested.

1 **Q. HOW DID LIBERTY-EMPIRE DETERMINE THE CHARGES FOR THE LED**
2 **LIGHTING OPTION?**

3 A. The initial rate was determined factoring the cost of a new LED light fixture and
4 factoring the comparison of the energy usage and anticipated maintenance cost of the
5 LED fixture in comparison to the HPS from the Missouri pilot study; however, the cost
6 will not be fully known until after the LED lights are installed and operated. As
7 discussed below, Liberty-Empire intends to track actual costs and revenues associated
8 with LED lights, so that customers pay precisely what the LED lights cost to operate
9 and maintain.

10 **Q. HAVE ANY LIBERTY-EMPIRE CUSTOMERS IN MISSOURI REQUESTED**
11 **A LED PRIVATE LIGHTING OPTION?**

12 A. Yes. Customers are requesting the superior light qualities provided by LED technology.

13 **Q. WILL CUSTOMERS STILL BE ABLE TO CHOOSE OTHER PREVIOUSLY**
14 **OFFERED PRIVATE LIGHTING OPTIONS UNDER THE REVISED**
15 **TARIFF?**

16 A. Under the revised tariff, customers will still be able to choose HPS light fixtures, but
17 will not be able to choose mercury vapor light fixtures. For customers with existing
18 HPS or MV light fixtures, Liberty-Empire will continue to replace bulbs until those
19 existing fixtures are changed to a different fixture.

20 **Q. PLEASE EXPLAIN WHY THE COMPANY IS ELIMINATING THE OPTION**
21 **FOR NEW MERCURY VAPOR LIGHT FIXTURES AND OFFERING LED**
22 **LIGHTS INSTEAD.**

23 A. As discussed above, while mercury vapor light bulbs are still available, the mercury
24 vapor fixtures are not available in the market. Also, as discussed above, LED lights

1 are more energy efficient than MV lights, have reduced maintenance costs and a longer
2 life, and are more energy efficient and environmentally friendly.

3 **Q. IS LIBERTY-EMPIRE REQUESTING REGULATORY TREATMENT TO**
4 **TRACK THE COSTS OF REPLACING MERCURY VAPOR LIGHTS AND**
5 **ALSO THE ACTUAL REVENUES AND COSTS OF THE LED LIGHTS FOR**
6 **ITS PRIVATE LIGHTING SERVICE?**

7 A. Yes. Liberty-Empire is requesting that the Commission approve regulatory treatment
8 to (i) capture the costs associated with the mercury vapor light fixture replacement
9 program and (ii) track the difference between estimated and actual revenues and costs
10 of the LED light fixtures. The LED “charge per lamp” proposed in this proceeding is
11 based on the proposed HPS municipal street light rate adjusted for lower energy usage
12 and maintenance costs derived from the prior Missouri pilot study. The amounts are
13 estimates, and actual costs need to be determined and will not be known until we are
14 granted permission to perform the conversion. Liberty-Empire requests that a
15 regulatory asset or liability be established to account for the difference between the
16 actual cost incurred and the actual revenues collected from customers that choose to
17 move to the LED light fixtures. The difference would be recovered or returned as
18 determined in the next rate case.

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

20 A. Yes, it does.

THE EMPIRE DISTRICT ELECTRIC COMPANY

P.S.C. Mo. No. 5 Sec. 3 ~~17th-18th~~
1

Revised Sheet No.

Canceling P.S.C. Mo. No. 5 Sec. 3 ~~16th-17th~~
1

Revised Sheet No.

For ALL TERRITORY

MUNICIPAL STREET LIGHTING SERVICE
 SCHEDULE SPL

AVAILABILITY:

This schedule is available to municipalities served by the Company under the provisions of an Electric Franchise having an original term of not less than ten (10) years, for outdoor lighting for streets, alleys, parks and public places under the provisions of the Company's standard Municipal Electric Service Agreement, having an original term of not less than two (2) years.

ANNUAL STREET LIGHTING CHARGE:	Annual Charge Per Lamp	Annual kWh	Watts
Incandescent Lamp Sizes (No New Installation Allowed)			
4,000 lumen	\$ 65.55 <u>68.18</u>	1,088	
Mercury-Vapor Lamp Sizes: (No New Installation Allowed)			
7,000 lumen	89.02 <u>92.60</u>	784	175
11,000 lumen	106.85 <u>111.14</u>	1,186	250
20,000 lumen	152.97 <u>159.11</u>	1,868	400
53,000 lumen	258.08 <u>268.44</u>	4,475	1000
High-Pressure Sodium-Vapor Lamp Sizes (Lucalox, etc.):			
6,000 lumen	83.42 <u>86.77</u>	374	70
16,000 lumen	104.43 <u>108.62</u>	694	150
27,500 lumen	135.91 <u>141.37</u>	1,271	250
50,000 lumen	193.68 <u>201.46</u>	1,880	400
130,000 lumen	312.56 <u>325.11</u>	4,313	1000
Metal Halide Lamp Sizes:			
12,000 lumen	130.55 <u>135.79</u>	696	175
20,500 lumen	159.99 <u>166.42</u>	1,020	250
36,000 lumen	214.03 <u>222.63</u>	1,620	400
110,000 lumen	472.96 <u>491.95</u>	4,056	1000

The monthly charge per lamp, is 1/12th of the annual charge.

FUEL ADJUSTMENT CLAUSE:

The above charges will be adjusted in an amount provided by the terms and provisions of the Fuel Adjustment Clause, Rider FAC.

DETERMINATION OF ENERGY (kWh) USAGE FOR NON-METERED FIXTURES:

The monthly energy for each type and size of lamp is determined by multiplying the annual kWh listed above, by the monthly usage factor listed in the table below:

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	12 month total
Usage Factor	.103	.089	.087	.075	.070	.064	.067	.073	.079	.091	.098	.104	1.00

P.S.C. Mo. No. 5 Sec. 3 21st-22nd Revised Sheet No. 2

Canceling P.S.C. Mo. No. 5 Sec. 3 20th-21st Revised Sheet No. 2

For ALL TERRITORY

PRIVATE LIGHTING SERVICE
SCHEDULE PL

AVAILABILITY:

This schedule is available for outdoor lighting service to any retail Customer.

MONTHLY RATE:

	Per Lamp	Monthly kWh	Watts
STANDARD STREET LIGHTING CONSTRUCTION:			
Mercury-Vapor Lamp Sizes (No new installations allowed):			
6,800 lumen	\$ 15.79 <u>15.83</u>	65	175
20,000 lumen	\$ 26.28 <u>26.34</u>	156	400
54,000 lumen	\$ 50.37 <u>50.48</u>	373	1000
Sodium-Vapor Lamp Sizes:			
6,000 lumen	\$ 14.58 <u>14.61</u>	31	70
16,000 lumen	\$ 21.22 <u>21.27</u>	58	150
27,500 lumen	\$ 30.67 <u>30.74</u>	106	250
50,000 lumen	\$ 35.57 <u>35.65</u>	157	400
Metal Halide Lamp Sizes:			
12,000 lumen	\$ 24.60 <u>24.65</u>		59
175 20,500 lumen	\$ 32.83 <u>32.90</u>	85	250
36,000 lumen	\$ 36.83 <u>36.91</u>	135	400
<u>LED</u>			
7,500-9,500 lumen	\$ 00.00 <u>14.61</u>	31	92
13,000-16,000 lumen	\$ 00.00 <u>21.27</u>	48	143

STANDARD FLOOD LIGHTING CONSTRUCTION:

Mercury-Vapor Lamp Sizes (No new installations allowed):			
20,000 lumen	\$ 36.83 <u>36.91</u>	156	400
54,000 lumen	\$ 60.81 <u>62.63</u>	373	1000
Sodium-Vapor Lamp Sizes:			
27,500 lumen	\$ 35.68 <u>35.76</u>	106	250
50,000 lumen	\$ 48.94 <u>49.05</u>	157	400
140,000 lumen	\$ 71.51 <u>71.67</u>	359	1000
Metal Halide Lamp Sizes:			
12,000 lumen	\$ 25.26 <u>25.58</u>	59	175
20,500 lumen	\$ 33.79 <u>33.87</u>	85	250
36,000 lumen	\$ 49.82 <u>49.93</u>	135	400
110,000 lumen	\$ 72.80 <u>72.96</u>	338	1000
<u>LED</u>			
16,000-19,000 lumen	\$ 00.00 <u>35.76</u>	51	150
28,000-32,000 lumen	\$ 00.00 <u>49.05</u>	74	218

Additional Charge for installations requiring additions to, or rearrangement of, existing facilities:

Regular wood pole, per month	\$ <u>2.03</u> <u>2.03</u>
Transformer	\$ <u>2.03</u> <u>2.03</u>
Guy and anchor, per month	\$ <u>2.03</u> <u>2.03</u>
Overhead conductor, three wire, per foot, per month	\$ 0.02
Other (miscellaneous) per month	1.5% of the estimated installed cost thereof

For installations requiring a large expenditure for additions to, or rearrangements of existing facilities, the total additional charge may be computed at 1.5% of the estimated installed cost thereof per month. Such estimated installed cost excludes the estimated installed cost of materials required for standard construction (see Conditions of Service, No. 1, below).

FUEL ADJUSTMENT CLAUSE:

The above charges will be adjusted in an amount provided by the terms and provisions of the Fuel Adjustment Clause, Rider FAC.

DETERMINATION OF ENERGY (kWh) FOR NON-METERED FIXTURES:

DATE OF ISSUE February 28, 2013 August 14, 2019 DATE EFFECTIVE April 1, 2013 September 13, 2019
 ISSUED BY Kelly S. Walters, Vice President Sheri Richard, Director Rates and Regulatory Affairs, Joplin, MO

P.S.C. Mo. No. 5 Sec. 3 ~~21st~~ 22nd Revised Sheet No. 2

Canceling P.S.C. Mo. No. 5 Sec. 3 ~~20th-21st~~ Revised Sheet No.
2

For ALL TERRITORY

PRIVATE LIGHTING SERVICE
SCHEDULE PL

The monthly energy (kWh) for each type and size of lamp is listed above.

