Exhibit No.: _____
Issues: Class Cost of Service Study and Rate Design
Witness: Timothy S. Lyons
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Before the Public Service Commission of the State of Missouri

Direct Testimony

of

Timothy S. Lyons

on behalf of

The Empire District Gas Company

August 2021

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TABLE OF CONTENTS
FOR THE DIRECT TESTIMONY OF TIMOTHY S. LYONS
THE EMPIRE DISTRICT GAS COMPANY
BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION
CASE NO. GR-2021-0320

SUBJECT **PAGE**

DIRECT TESTIMONY OF TIMOTHY S. LYONS
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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Timothy S. Lyons. My business address is 1900 West Park Drive, Suite 250, Westborough, Massachusetts, 01581.

Q. By whom are you employed and in what capacity?

A. I am a Partner at ScottMadden, Inc. ("ScottMadden").

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of The Empire District Gas Company ("EDG" or "Company").

Q. Please describe your professional and educational experience.

A. I have more than 30 years of experience in the energy industry. I started my career in 1985 at Boston Gas Company, eventually becoming Director of Rates and Revenue Analysis. In 1993, I moved to Providence Gas Company, eventually becoming Vice President of Marketing and Regulatory Affairs. Starting in 2001, I held a number of management consulting positions in the energy industry, first at KEMA and then at Quantec, LLC. In 2005, I became Vice President of Sales and Marketing at Vermont Gas Systems, Inc. before joining Sussex Economic Advisors, LLC ("Sussex") in 2013. Sussex was acquired by ScottMadden in 2016.

I hold a bachelor's degree from St. Anselm College, a master's degree in Economics from The Pennsylvania State University, and a master's degree in Business Administration from Babson College.

Q. Have you previously testified before the Missouri Public Service Commission ("Commission") or any other regulatory agency?

A. Yes. My qualifications and testimony experience are included in **Direct Schedule TSL-1**.

Q. What is the purpose of your Direct Testimony?

A. The purpose of my testimony is to sponsor the Company's proposed rates. My Direct Testimony includes: (a) description of the current rate classes; (b) description of the allocated or Class Cost of Service ("CCOS") study; (c) description of the proposed revenue targets, rate design and bill impact analyses for each rate class; and (d) description of the proposed Weather Normalization Adjustment Rider ("WNAR"). In addition, my Direct Testimony includes a cost study and revenue requirement for the Nodaway County service area in compliance with the Commission's order in File No. GA-2012-0111.

Q. Have you prepared Schedules to support your testimony?

A. Yes. Direct **Schedule TSL-2** through Direct **Schedule TSL-6** summarize the results of the CCOS study, proposed revenue targets, rate design and bill impact analysis. Direct **Schedule TSL-7** contains the proposed WNAR tariff. Direct **Schedule TSL-8** summarizes the results of the Nodaway County cost study. The Schedules were prepared by me or under my direction.

II. OVERVIEW

Q. Please summarize your Direct Testimony.

A. The results of the Company's CCOS study show the current rates produce a disparity in class rates of return ("ROR"), as shown in Direct **Schedule TSL-2**. The Schedule shows the Residential rate class produces a ROR that is less than the system or overall ROR, indicating their rates recover less than their cost of service. The Schedule also shows the

remaining rate classes produce RORs that are more than the system ROR, indicating their rates recover more than their cost of service.

The results of the CCOS study support a movement toward a more equitable rate structure where class RORs move closer to the system ROR. However, the proposed movement toward the system ROR was subject to certain limitations to address customer bill impact considerations.

The proposed rate design reflects improved alignment between monthly customer charges and customer-related costs.

The Company prepared a bill impact analysis to evaluate the impact of the proposed rate changes. The bill impact analysis evaluated a range of customer usage within each rate class. The bill impact analysis was prepared in two ways:

1. Proposed base rates as compared to the current base rates; and
2. Proposed total rates as compared to the current total rates, where the total rates reflect the base rates plus the current Purchased Gas Adjustment ("PGA") rate.

Overall, the proposed base rates will increase a monthly bill for a Residential customer using 54 CCF per month by $2.71 per month.

The proposed rate design reflects three important rate design principles: (a) rates should recover the overall cost of providing service; (b) rates should be fair, minimizing inter- and intra-class inequities to the extent possible; and (c) rate changes should be tempered by rate continuity concerns.

Q. Please describe the Company's service area and rate classes.

A. EDG provides natural gas service to multiple communities in Missouri. The communities are designated into three areas: (1) North System; (2) South System; and (3) Northwest System.

The Company serves a mix of Residential, Commercial, and Industrial customers. Specifically, the Company serves approximately 44,014 customers, of which 38,442 (87.3 percent) are Residential and 5,572 (12.7 percent) are Commercial and Industrial ("C&I"). Customers are presently served under one of nine rate classes based on type of service and load characteristics. The current rate classes and rates are summarized in Figure 1 (below).

Figure 1: Current Rate Classes and Rates[1]

Rate Class	Availability	Current Rates[2]	
Residential Service ("RS")	Available to any residential customer	Customer charge (Monthly) Energy charge (per CCF)	$16.50 $0.20721
Small Commercial Firm Sales ("SCFS") and Transportation ("SVFTS") Service - Small	Available to all non-residential firm customers with annual usage less than 5,000 CCF	Customer charge (Monthly) Energy charge (per CCF)	$25.00 $0.26078
Small Commercial Firm Sales ("SCFM") and Transportation ("SVFTM") Service - Medium	Available to C&I customers having annual usage more than 5,000 CCF but less than 20,000 CCF	Customer charge (Monthly) Energy charge (per CCF)	$85.00 $0.21960
Small Commercial Firm Sales ("SCFL") and Transportation ("SVFTL") Service - Large	Available to C&I customers having annual usage more than 20,000 CCF but less than 40,000 CCF	Customer charge (Monthly) Energy charge (per CCF)	$200.00 $0.19766
Large Volume Sales ("LV") and Transportation ("LVFT") Service	Available to C&I customers having annual usage of at least 40,000 CCF	Customer charge (Monthly) Energy charge (per CCF) Demand charge (per CCF)	$400.00 $0.02257 $0.60000

[1] The Company proposes to change the naming convention for its C&I customers to "General Service" customers. Accordingly, the testimony references the proposed C&I rate classes as Small General Service (SGS), Medium General Service (MGS), and Large General Service (LGS), where the proposed SGS rate class consists of the current Small rate class, the proposed MGS rate class consists of the current Medium and Large rate classes, and the proposed LGS rate class consists of the current Large Volume rate class.

The Figure shows there are currently nine rate classes: one Residential and eight C&I or General Service rate classes with each General Service rate class consisting of two services: sales service and transportation service. For example, the Small C&I class consists of sales service ("SCFS") and transportation service ("SVFTS").

Sales service customers receive their gas supply from the Company, while transportation service customers receive their gas supply from third-party suppliers. For the purpose of setting delivery rates, the sales service and transportation service customers, usage and revenues are combined for each rate class.

Q. Please describe the Company's current rate structure.

A. The Company's current rate structure consists of two types of rates: (1) delivery or base rates applicable to sales and transportation service customers; and (2) PGA rates applicable to sales service customers. The current delivery rates were approved by the Missouri Public Service Commission (the "Commission") in File No. GR-2009-0434, as amended to reflect the federal Tax Cuts and Jobs Act of 2017 in File No. GR-2018-0229.

The delivery rates consist of a monthly customer charge, energy charge and—for customers in the Large Volume ("LV") rate class—a demand charge, as shown in Figure 1 (above).

Q. Please describe the load characteristics of the rate classes.

A. Figure 2 (below) provides the load characteristics of the rate classes, including a breakdown of test year customers and usage by rate class. The test year is based on the period January 1, 2020 through December 31, 2020. The usage has been normalized for weather.

Figure 2: Test Year Customers and Usage

Test Year Customers and Usage	Number of Customers	% of Customers	Annual Use	% of Use
Residential	38,442	87.3%	24,773,367	32.2%
Small General Service	4,800	10.9%	6,901,303	9.0%
Medium General Service	592	1.3%	4,979,267	6.5%
Large General Service	93	0.2%	2,207,462	2.9%
Large Volume	88	0.2%	37,999,768	49.4%
Total	44,014	100.0%	76,861,167	100.0%

The Figure shows the Residential rate class represents the largest number of customers, representing 87.3 percent of total customers. The Figure also shows that the Large Volume rate class represents the highest usage, representing 49.4 percent of total usage.

Figure 3 (below) shows there is significant variation in annual usage per customer among the rate classes.

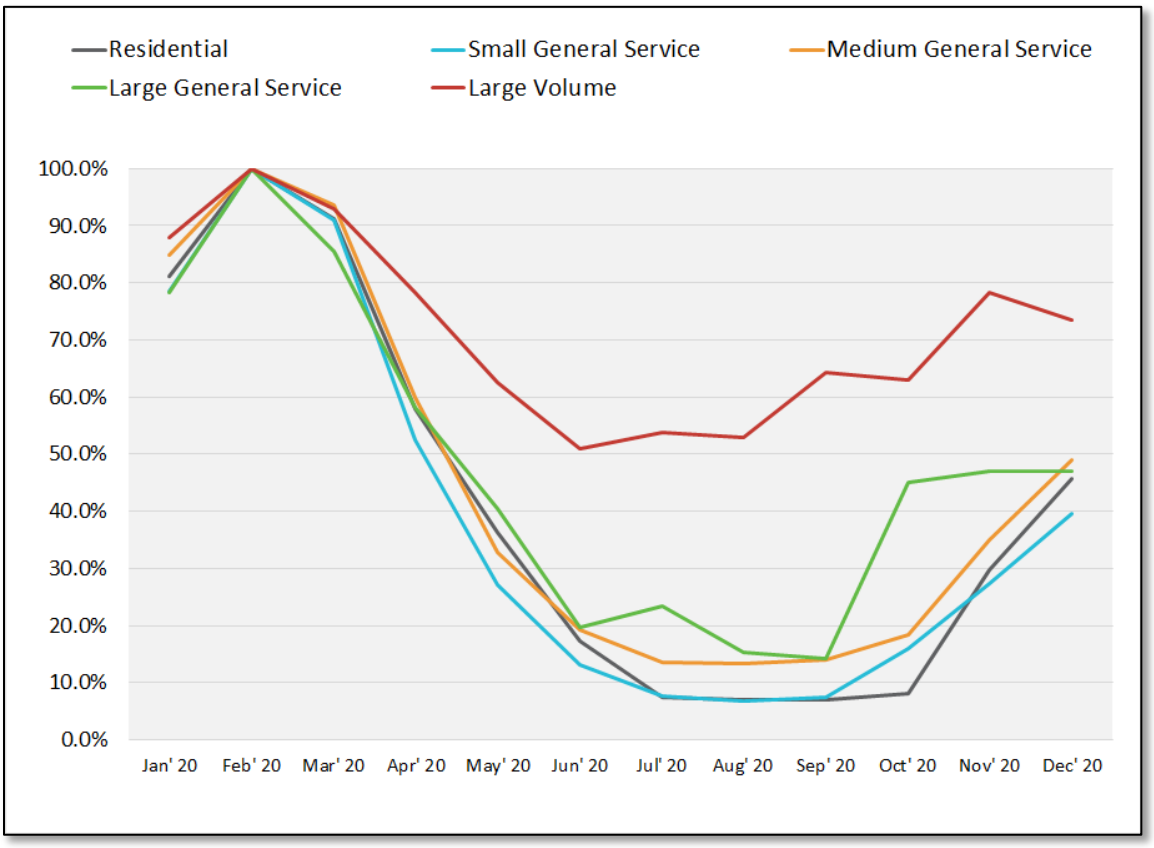
Figure 3: Test Year Usage per Rate Class

Test Year Customers and Usage	Annual Use per Customer
Residential	644
Small General Service	1,438
Medium General Service	8,411
Large General Service	23,864
Large Volume	430,999
Total	1,746

The Figure shows Residential customers use on average 644 CCF per year, while Large Volume customers use on average 430,999 CCF per year.

Figure 4 (below) shows there is also seasonal variation in monthly usage among the Company's rate classes. Seasonal variation is calculated as monthly usage divided by the peak month usage or, in the case of the test year, February usage.

Figure 4: Monthly Usage as a Percentage of Peak Month Usage



The Figure shows that most rate classes demonstrate a seasonal load pattern, with monthly consumption increasing during the winter heating season and decreasing during the summer non-heating season. The Large Volume rate class, by comparison, demonstrates a somewhat flatter, less seasonal load pattern. Differences in seasonal load patterns, as discussed below, have implications on cost allocation to each of the rate classes.

III. CLASS COST OF SERVICE STUDY

Q. Please describe the purpose of a Class Cost of Service ("CCOS") study.

A. The purpose of a CCOS study is to allocate a utility's overall cost of service to each rate class in a manner that reflects its underlying cost drivers. The CCOS study sponsored in this testimony was developed by identifying the relationship between the service requirements for each rate class and its underlying cost drivers. This approach is well established in industry literature[3] and is consistent with the Company's most recent rate case filing.[4] The class cost of service study sponsored in this testimony was generally based on the methodology filed in the Company's most recent rate case, File No. GR-2009-0434.

Q. How was the CCOS study developed?

A. The CCOS study was developed utilizing a spreadsheet model prepared specifically for this filing. The study assigns each rate base and expense item in the Company's cost of service to a rate class based on a three-step process: (1) functionalization, or cost assignment into functional categories, largely related to production, transmission, distribution and customer; (2) classification, or cost assignment according to whether costs are related to serving customer requirements, peak demands, or energy demands; and (3) allocation, or cost assignment to each rate class consistent with the functionalization and classification steps described above.

[3] See Principles of Public Utility Rates by James C. Bonbright
[4] File No. GR-2009-0434.

Q. Please describe the data used to prepare the CCOS study.

A. The CCOS study was based on test year data for the period January 1, 2020 through December 31, 2020. The CCOS study includes the number of customers, usage, and revenues by rate class. The usage and revenues have been adjusted from the test year data to reflect normal weather conditions. The CCOS study also includes rate base items, such as transmission, distribution, and general plant, as well as (a) additions to rate base including cash working capital, and (b) reductions to rate base including deferred income taxes. The CCOS study also includes operations and maintenance (O&M) expenses, such as transmission, distribution, customer service, customer account, sales, and administrative and general expenses as well as taxes other than income taxes, such as payroll and property taxes, and income taxes.

Q. What is functionalization?

A. Functionalization consists of separating rate base and expense items into operational components that include production, storage, transmission, distribution, and customer. The functionalization process in this CCOS study followed the Federal Energy Regulatory Commission's (FERC) Uniform System of Accounts.

Gas commodity or supply costs, which include production and pipeline charges and related costs, are recovered through PGA rates and thus are not included in the CCOS study.

Q. What is classification?

A. Classification consists of separating rate base and expense items into categories based on cost drivers. Distribution-related costs are generally classified as demand-related or customer-related. Demand-related costs reflect the requirement to serve customer peak

demands, while customer-related costs reflect the requirement to provide customer access to the distribution system and provide customer services, such as metering and billing services.

Q. Please describe the classification process used in this CCOS study.

A. The classification process used in this CCOS study classified costs into one of the following categories:

- Customer-related – costs related to providing customers with access to the natural gas system as well as providing on-going customer services, such as meter reading and billing services.
- Demand-related – costs related to meeting customer peak demand or design day requirements
- Energy or Commodity-related – costs related to the quantity of gas purchased or transported

In some cases, costs were classified into one category. The cost of meter reading, for example, was classified as customer related. In other cases, costs were classified into more than one category. The cost of distribution mains, for example, was classified as both customer- and demand-related.

Q. Please describe the classification of distribution mains.

A. Distribution mains typically represent one of the largest plant investments for a gas utility. For the Company, distribution mains represent 51.4 percent of utility plant. The classification of distribution mains reflects two cost drivers. The first driver is the number of customers. Distribution mains are designed to provide customer access to the natural

gas system. The second driver is the peak day or design day demand. Distribution mains are designed to meet customer demands on the design day.[5]

The classification of distribution mains in this CCOS study was based on a zero-inch or zero-intercept analysis. It is one of the methods recognized by NARUC in classifying distribution main costs.[6]

NARUC states,

> "One argument for inclusion of distribution related items in the customer cost classification is the 'zero or minimize size main theory.' This theory assumes that there is a zero or minimum size main necessary to connect the customer to the system and thus affords the customer an opportunity to take service as he so desires…The zero-inch main method would allocate the cost of a theoretical main of zero-inch diameter to the customer function, and allocate the remaining costs associated with mains to demand"[7]

The zero-inch or zero-intercept analysis included a regression analysis that measures the relationship between the cost per foot of mains in the system and the size of the mains. The analysis was based on historical cost data of various sizes and compositions of distribution mains, adjusted to reflect current costs utilizing the Handy-Whitman Index of Public Utility Construction Costs ("Handy-Whitman").

Q. How was the estimated cost of a zero-inch main determined?

A. The estimated cost of a zero-inch main was determined by using a zero value for the size variable in the regression equation. Multiplying the estimated cost of a zero-inch main by the actual number of feet in the system yields the theoretical cost of a system comprised of

[5] Design day demand is the highest estimated gas demand for a 24-hour period and is used as a basis for designing the capacity of the transmission and distribution system.
[6] National Association of Regulatory Utility Commissioners ("NARUC"), Staff Subcommittee on Gas "Gas Distribution Rate Design Manual" June 1989. Pg. 22-23.
[7] NARUC Gas Distribution Rate Design Manual. Pg. 22-23

zero-inch mains. The customer-related portion of distribution mains was calculated as the ratio of the cost of a zero-inch mains system to the total cost of the mains system.

Q. What were the results of the zero-inch analysis?

A. The results of the zero-inch analysis show the customer-related portion of the mains investment is 43.76 percent, as shown in Figure 5 (below).

Figure 5: Results of Zero-Inch Analysis

Type	Total Type Footage	Zero-Int. Cost per Foot	Cost of Minimum System
PLASTIC	3,596,612	$ 12.70	$ 45,660,087
POLYETHYLENE	261,514	12.28	$ 3,211,948
STEEL	1,606,927	12.67	$ 20,360,075
Zero-Intercept System Costs			$ 69,232,111
Total Cost			$ 158,196,528
Zero-Intercept Costs			43.76%

The Figure shows the estimated cost of a zero-inch main for Plastic, Polyethylene, and steel was $12.70 per foot, $12.28 per foot and $12.67 per foot, respectively. Multiplying the estimated cost of a zero-inch main by the actual number of feet in the system yielded a theoretical cost of a system comprised of zero-inch mains of $69.2 million. The customer-related portion of distribution mains of 43.76 percent was calculated as the ratio of the cost of zero-inch mains of $69.2 million to the total cost of the mains of $158.2 million.

The demand-related portion of the mains investment is 56.24 percent.

Q. Please discuss the classification of other rate base items.

A. Other rate base items were similarly classified based on their underlying cost drivers. For example, meter cost, meter installation, service cost, and house regulator investments were

classified as customer-related since they provide customer access to the natural gas system. Rate base items not directly associated with one of the classification categories, such as general plant, were classified through a composite classifier based on the related costs.

Q. Please discuss the classification of O&M expenses.

A. O&M expenses were classified in a manner similar to their respective plant items, as shown in Figure 6 (below). For example, Maintenance of Services (Account 892) was allocated based on the allocation of Services plant (Account 380).

Figure 6: O&M Expenses and Corresponding Rate Base Items

FERC Account	Description	Corresponding Plant Accounts
874	Mains & Services Expenses	Mains (376) and Services (380) combined
878	Meter & House Regulator Expenses	Meters (381) and Regulators (383) combined
892	Maintenance of Services	Services (380)
893	Maintenance of Meters & House Regulators	Meters (381) and House Regulators (383) combined

O&M expenses not directly associated with one of the classification categories, such as administrative and general expenses, were classified through a composite classifier based on related costs.

Q. What is allocation?

A. Allocation consists of assigning rate base and expense items to each rate class based on allocators that reflect their underlying cost of service.

Q. Please describe the allocation process used in this CCOS study.

A. The allocation process used in this CCOS study was based on the costs incurred to serve each rate class. In short, cost allocation follows cost causation. This is an established

industry approach and is generally consistent with the Company's approach in its prior rate case filing.[8] The approach requires development of cost allocators that reflect the design and operation of the natural gas system.

The CCOS study in this filing reflected three types of allocators.

1. Class determinants – class characteristics, such as number of customers, usage, and revenues by rate class
2. Special studies – detailed analysis of specific plant or expense items, such as meters and services
3. Internal – composite of how other costs are allocated.

Q. Please describe the process used to develop the demand allocator.

A. The demand allocator is based on the Coincident Demand or Peak Responsibility method. It is one of the methods recognized by NARUC in allocating demand costs.[9] The demand allocator reflects each rate classes' responsibility to the peak day or design day demands of the system – and is consistent with the allocator used in the Company's most recent rate case filing in File No. GR-2009-0434.

Derivation of the Company's demand allocator consisted of four steps, as shown in Direct **Schedule TSL-3**. The Schedule shows in the first step, heat use per degree day per customer was derived based on the results of a regression analysis for each rate class of heat use per degree day per customer as a function of heating degree days. The regression analysis generally produced a strong R-squared for each rate class, which measures how much variation in the dependent variable (in this case heat use per customer) can be

[8] File No. GR-2009-0434.
[9] NARUC Gas Distribution Rate Design Manual. Pg. 27

explained by the independent variable (in this case heating degree days). Heat use per customer was calculated as the difference between actual use per customer and base use per customer, where base use per customer was the lowest average use of two consecutive months during July through September.

In the second step, heat use per degree per customer is applied to the Company's design day heating degree days ("HDD") of 81 HDD to derive design day heating use per customer. The Company uses design day heating degree days of 81 in designing its distribution system.

In the third step, the design day heating use per customer derived in the previous step was added to base use per customer to calculate total design day use per customer.

The fourth and final step, the number of customers for each class in the month of the design day was multiplied by the design day use per customer for each class to calculate total design day use by class.

Q. Please describe the process used to develop the special studies allocators.

A. There were three special studies developed to allocate meter, regulator, and service investments, as shown in Direct **Schedule TSL-4**. In aggregate, these investments represent 42.8 percent of utility plant.

- Meters and Meter Installation investments were allocated to each rate class based on the average installed cost for each rate class.
- Regulator investments were allocated to each rate class based on the average installed cost for each rate class.
- Service investments were allocated to each rate class based on the average installed cost for each rate class.

Q. Please describe the process to allocate rate base to each rate class.

A. The process to allocate rate base to each rate class consisted of the following four steps. First, gross plant investment by individual FERC account was allocated to each rate class based on an allocator that most closely reflects the underlying cost driver. Second, accumulated depreciation by individual FERC account was allocated to each rate class based on the same allocator as the gross plant investment for that account. Third, net plant investment by individual FERC account was calculated as the difference between gross plant investment and accumulated depreciation by individual FERC account. Lastly, additions and deletions to net plant investment were allocated to each rate class based on an allocator that most closely reflects the underlying cost driver to form rate base.

Gross plant investments designed to provide customer access to the natural gas system and meet customer service requirements were allocated to each rate class based on the number of customers. Gross plant investments designed to meet peak day or design day demands were allocated to each rate class based on their portion of design day demands.

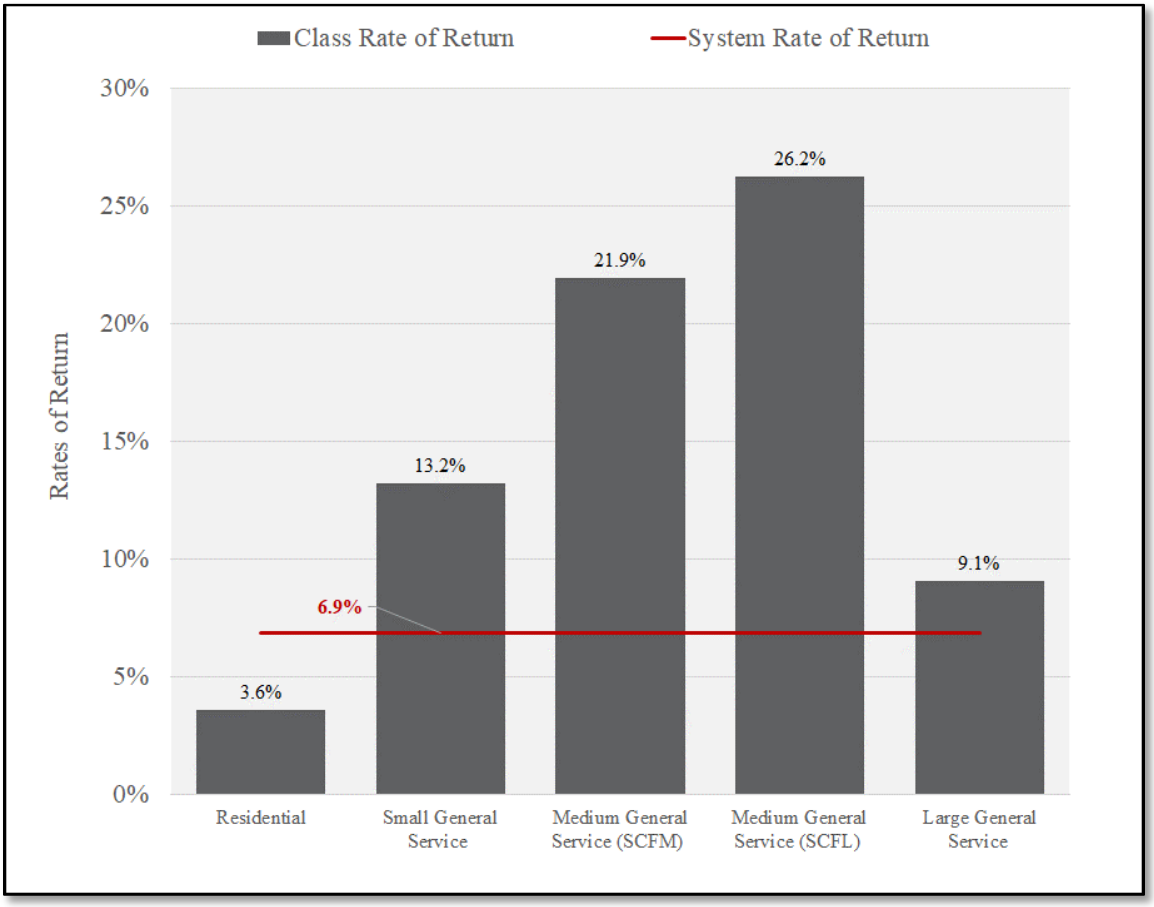
Q. Please describe the allocation of O&M expenses to each rate class.

A. The process used to allocate O&M expenses to each rate class relied on cost allocators that most closely reflected the underlying cost drivers.

Q. Please describe the results of the Company's CCOS study.

A. The results of the Company's CCOS study are shown in Figure 7 (below). The Figure illustrates the calculated Rate of Return ("ROR") for each rate class as compared to the overall or system ROR based on current rates.

Figure 7: Comparison of Class and System ROR at Current Rates



The Figure shows the Residential rate class produces a ROR below the system ROR, indicating the revenues generated by the Residential class are less than its class cost of service. By comparison, the C&I rate classes produce a ROR above the system ROR, indicating the revenues generated by the C&I rate classes are more than their respective cost of service.

Q. What does it mean when a rate class produces a ROR that is higher or lower than the system ROR?

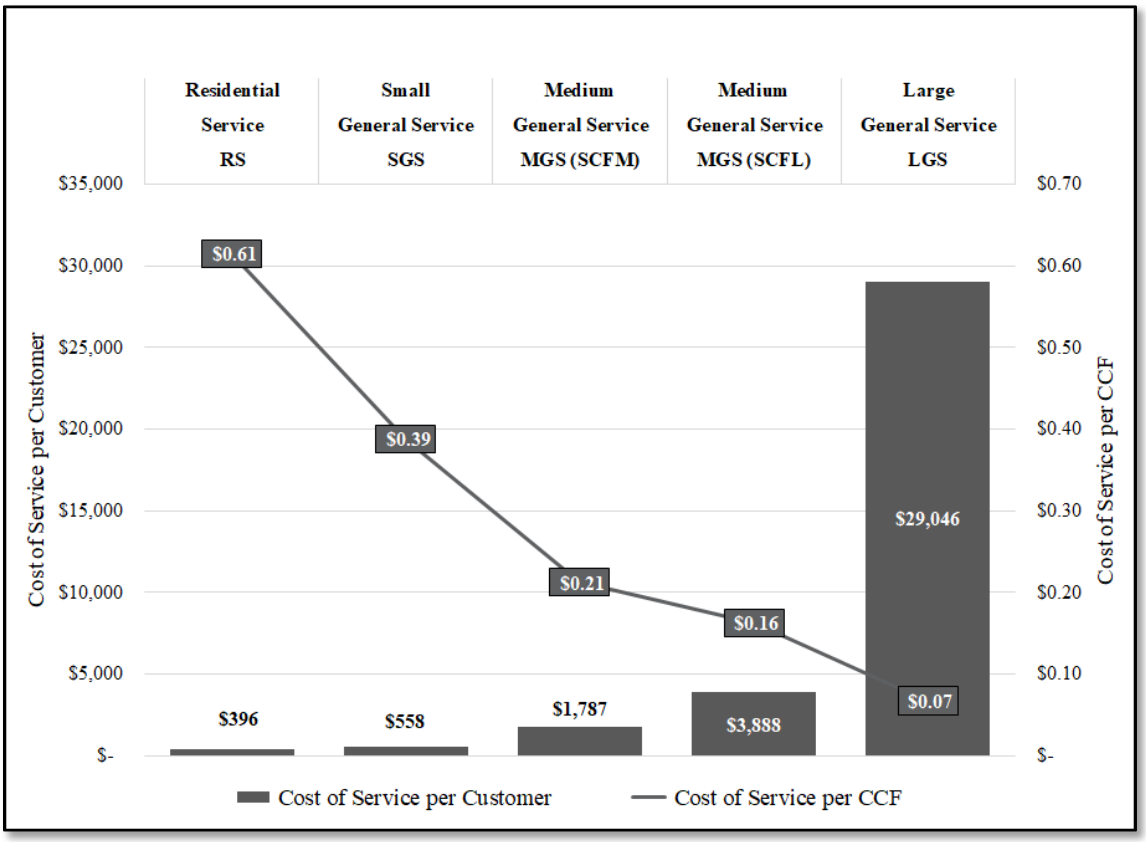
A. If a rate class produces a ROR that is lower than the system ROR it means that the class revenues at current rates are not recovering the fully allocated share of the utility's cost of

service. Conversely, if a rate class produces a ROR that is higher than the system ROR, it means that the class revenues at current rates are recovering more than the fully allocated share of the utility's cost of service. As discussed below, the results of the CCOS study were used as a guide to establish revenue targets that move the Company's rates in aggregate closer to equalized rates of return and help to improve equity across customer classes.

Q. Is there variation in the cost of service across the different rate classes?

A. Yes, there is variation in the cost of service across the different rate classes, as shown on Figure 8 (below). The Figure shows variation in the unit cost of service on a 'per customer' and 'per CCF' basis across the rate classes.

Figure 8: Revenue Requirement by Rate Class



The Figure shows the Residential cost of service is $396 per customer, while the Large Volume cost of service is $29,046 per customer. By comparison, the Residential cost of service is $0.61 per CCF while the Large Volume cost of service is $0.07 per CCF.

Q. Does the Company have any other observations regarding the results of the Company's CCOS study?

A. Yes, the Company notes similarities in the Medium and Large General Service rate class cost of service. Specifically, the unit cost of service of the Medium General rate class is $0.21 per CCF while the unit cost of service of the Large General Service rate class is $0.16 per CCF. The unit cost of service difference of $0.05 per CCF is approximately one-fourth of the difference between the Residential and Small General Service rate classes of $0.22 per CCF and one-third of the difference between the Small and Medium General Service rate classes of $0.18 per CCF.

Q. What is the Company's recommendation regarding the Medium and Large General Service rate classes?

A. The Company recommends consolidation of the Medium and Large General Service rate classes for three reasons. First, there are similarities in the unit cost of service for the Medium and Large General Service rate classes, as discussed earlier. Second, there are similarities in the monthly usage of the Medium and Large General Service rate classes, as illustrated in Figure 3 (above). Third, the average annual usage of the consolidated Medium and Large General Service rate classes of 10,499 CCF is generally consistent with the average annual usage of 11,346 CCF of the Medium rate class of the Company's

Missouri gas utility affiliate, Liberty Utilities (Midstates Natural Gas) Corp. ("Liberty Midstates").[10]

The Company also notes that the proposed consolidation of the Medium and Large General Service rate classes does not produce substantial bill impact concerns.

Q. What is the Company's rationale for consolidating the Medium and Large General Service rate classes?

A. The Company's rationale for consolidating the Medium and Large General Service rate classes is to simplify the rate structure while maintaining distinct rate classes for those with significant cost of service differences.

The proposed consolidation is consistent with industry literature on developing sound rate structures.[11] The NARUC Gas Distribution Rate Design Manual notes,

> "In order to design rates, it is first necessary to divide the utility's customers into various rate classes. This is done by defining rate classes according to certain characteristics which are common to all members of the class. The specific factors used to define rate classes will depend upon the characteristics of the customer population and the goals to be achieved. Factors which have been used to define rate classes include: (1) size, (2) customer type, (3) type of usage, (4) interruptible or firm service, (5) load factor, and (6) alternate fuel capability…. In determining which factors to use in setting rate classes, it is necessary to consider the objectives to be achieved. In theory utility rates could be designed for only a single rate class. However, an appropriate division of customers into rate classes can achieve a

[10] Reflects the combined average annual usage of Liberty Midstates's three divisions: Northeast Missouri, Western Missouri, and Southeastern Missouri.

[11] See e.g., Bonbright, James, Danielsen, Albert, and Kamerschen, David. "Principles of Public Utility Rates." Public Utilities Reports, Inc. pp. 377-407 (2nd ed. 1988).

variety of goals, including economic efficiency, fairness and equity, reflection of costs, social needs, competitiveness, operating efficiency, business climate development, rate stability, conservation and political feasibility. The need for a reasonable division of rate classes to achieve these goals exists whether the rates are designed based on cost of service principles or some other means."[12]

[12] National Association of Regulatory Utility Commissioners, Staff Subcommittee on Gas. "Gas Distribution Rate Design Manual" pp. 15-17 (June 1989).

IV. PROPOSED RATE DESIGN

Q. Please describe the principles used to guide the proposed rate design.

A. The proposed rate design was guided by several principles common throughout the industry, including: (a) rates should recover the overall cost of providing service; (b) rates should be fair, minimizing inter- and intra-class inequities to the extent possible; and (c) rate changes should be tempered by rate continuity concerns.[13]

Because these principles can conflict, the rate design process also includes a level of judgment to balance these principles.

Q. How were the principles applied in the proposed rate design?

A. First, rates were designed to recover the overall cost of service. This was done by developing customer, energy and demand charges based on test year bills, usage, and demands. In addition, rates were designed to be fair and equitable. This was done by setting revenue targets at a level in aggregate closer to the system ROR. As discussed earlier, the results of the CCOS study showed the Residential rate class produces a ROR less than the system ROR. The proposed rate design reduces that deficiency. Another rate design objective is to maintain pricing stability by minimizing the impact of rate changes. This objective was considered in setting both the revenue targets and proposed rates.

Q. Please summarize the steps taken to develop the proposed rates.

A. The first step to develop the proposed rates was to establish the overall revenue requirement to be recovered from the delivery or base rates. The next step was to set revenue targets for each rate class based on the results of the CCOS study. Rates for each rate class were

[13] See Bonbright, James, Danielsen, Albert, and Kamerschen, David. "Principles of Public Utility Rates." Public Utilities Reports, Inc. pp. 377-407 (2nd Ed. 1988).

then developed to recover the revenue target for each rate class based on test year customers and usage.

Q. What was the total revenue requirement used as a starting point to set the revenue targets for each rate class?

A. The total revenue requirement used as a starting point to set the revenue targets for each rate was $21.8 million, as described in the Schedules of EDG Witness Dana Liner.

Q. Please describe the process to setting the revenue targets for each rate class.

A. The starting point to setting the revenue targets for each rate class was to utilize the results of the CCOS study. The proposed revenue targets for those rate classes where the class ROR was less than the system ROR, namely the Residential rate class, resulted in a higher than overall rate increase to move those rate classes closer to their revenues at equalized rates of return. The proposed revenue targets for those rate classes where the class ROR was more than the system ROR, namely the General Service rate classes, resulted in a lower than overall rate increase to move those classes closer to their revenues at equalized rates of return.

Q. In general, how did you determine the proposed rates for each rate class?

A. The proposed rates for each rate class were designed to recover 100.0 percent of the proposed revenue targets for each rate class. Specifically, rates were designed by first reviewing the customer charge to evaluate what level of fixed cost is reasonable to recover customer-related costs.

Once the customer charge was established, the remaining revenue target for each rate class (except the Large Volume or Large General Service) was recovered through

energy charges. The remaining revenue target for the Large General Service rate class was also recovered through a demand charge.

V. RATE DESIGN AND BILL IMPACT ANALYSIS

Q. Please describe the process used to set the revenue targets for each rate class.

A. The process to set the revenue targets for each rate class started with the results of the CCOS study, as shown in Figure 9 (below) and Direct **Schedule TSL-5**. The target revenues of $21.6 million were based on the Company's revenue requirement of $21.8 million less Other Revenues of $0.2 million.

Figure 9: Target Revenues by Rate Class

Empire District Gas Company Target Revenues	Total Company	Residential Service RS	Small General Service SGS	Medium General Service MGS (SCFM)	Medium General Service MGS (SCFL)	Large General Service LGS
Target Revenues						
Class Revenues at EROR	21,643,686	15,008,654	2,662,457	1,055,806	359,179	2,557,589
Current Class Revenues	20,281,334	12,261,766	3,128,128	1,640,903	633,122	2,617,415
Difference ($)	1,362,351	2,746,888	(465,672)	(585,097)	(273,942)	(59,826)
Difference (%)	6.7%	22.4%	-14.9%	-35.7%	-43.3%	-2.3%
Target Revenues	21,643,686	13,470,397	3,189,812	1,665,364	641,443	2,676,669
Current Revenues	20,281,334	12,261,766	3,128,128	1,640,903	633,122	2,617,415
$ Difference	1,362,351	1,208,631	61,684	24,461	8,321	59,254
% Difference	6.7%	9.9%	2.0%	1.5%	1.3%	2.3%

The Figure shows current class revenues and class revenues to achieve the system ROR (or equalized ROR) for each rate class.

The Figure also shows Residential rates presently generate revenues of $12.3 million. The Company would need to increase Residential rates by $2.7 million, or 22.4 percent, to achieve the system ROR. Due to rate continuity considerations, the Company proposes to increase revenues for the Residential rate class by only $1.2 million, or 9.9 percent. The increase reflects a 44.0 percent movement to achieving the system ROR.

The Figure also shows the General Service rates presently generate revenues that exceed the system ROR. For example, the Company would need to decrease the Small General Service rates by $0.5 million, or 14.9 percent, to achieve the system ROR. To achieve the overall revenue target of $21.6 million, the Company proposes to increase revenues for each General Service rate class to recover the revenue requirement increase not recovered from the Residential rate class of $153,720 based on current class revenues at EROR. Specifically, the Company proposes to increase revenues for the Small General Service rate class by $61,684, or 2.0 percent. The Company also proposes to increase revenues for the Large Volume or Large General Service rate class by $59,254, or 2.3 percent.

As discussed earlier, the Company proposes to consolidate the Medium and Large rate classes; thus, the proposed revenue targets for the new Medium General Service rate reflected the sum of the Medium and Large Commercial rate class revenue targets.

Q. Please describe the proposed rate design for each rate class.

A. The proposed rate design for each rate class is described below.

Residential

The proposed Residential rates were based on revenue target of $13.5 million, which reflects an increase in revenues of $1.2 million, or 9.9 percent. The Company proposes to increase the customer charge and energy charges by the overall class increase, as shown in Direct **Schedule TSL-6**.

Small General Service

The proposed Small General Service rates were based on revenue target of $3.2 million, which reflects a revenue increase of $61,684, or 2.0 percent. The Company proposes no

change to the customer charge and to recover the remaining portion of the target revenues through the energy charge, as shown in Direct **Schedule TSL-6**.

Medium General Service

As discussed earlier, the Company proposes to consolidate the former Medium and Large Commercial rate classes. The proposed Medium General Service rates were based on a consolidated revenue target of $2.3 million, which reflects a combined revenue increase of $32,782, or 1.4 percent. The Company proposes a customer charge of $120.00 per month and to recover the remaining portion of the target revenues through the energy charge, as shown in Direct **Schedule TSL-6**.

Large General Service

The proposed Large General Service rates were based on revenue target of $2.7 million, which reflects a revenue increase of $59,254, or 2.3 percent. The Company proposes no change to the customer charge and to recover the remaining portion of the target revenues through a proportional increase in the energy and demand charges, as shown in Direct **Schedule TSL-6**.

Q. Have you examined the impact of the proposed rates on customer bills?

A. Yes. As shown in Direct **Schedule TSL-6**, the Company prepared a bill impact analysis to evaluate the impact of the proposed rate changes. The bill impact analysis evaluated a range of customer usage within each rate class. The bill impact analysis was prepared in two ways:

1. Proposed base rates as compared to the current base rates; and
2. Proposed total rates as compared to the current total rates, where the total rates reflect the base rates plus the PGA rate.

Overall, the proposed base rates will increase a monthly bill for a Residential customer using 54 CCF per month by $2.71 per month.

VI. WEATHER NORMALIZATION ADJUSTMENT RIDER (WNAR)

Q. Please summarize the Company's proposal for a Weather Normalization Adjustment Rider ("WNAR").

A. The Company proposes to implement a Weather Normalization Adjustment Rider ("WNAR"). The WNAR helps mitigate a basic misalignment between the structure of the Company's costs and its rates. Specifically, utility costs are largely fixed and change very little in the short run with changes in usage levels. However, utility rates have a significant variable or usage-based component that changes revenues (and cost recovery) with changes in usage levels. The WNAR helps correct for this misalignment by adjusting the Company's actual revenues for the impact of revenue changes due to weather.

Q. Has the WNAR been implemented at other gas utilities in Missouri?

A. Yes, the proposed WNAR is generally consistent with the WNAR approved by the Commission for Liberty Midstates.[14] Specifically, the proposed WNAR would apply to the Company's Residential and Small General Service rate classes, similar to Liberty Midstates. The WNAR is also generally consistent with the WNAR approved by the Commission for Spire; however, Spire's WNAR applies only to the Residential rate class while the Company proposes to apply the WNAR to the Residential and Small General Service rate classes.[15]

[14] Link to Liberty Midstates WNAR tariff: https://missouri.libertyutilities.com/uploads/MO%20Liberty%20Tariff%2004.01.19.pdf
[15] Link to Spire's WNAR tariff: https://www.spireenergy.com/sites/default/files/2020-07/MOEastTariffs.pdf

Q. Does the Company propose a change to the WNAR methodology that was approved by the Commission for Liberty Midstates?

A. Yes, the Company proposes to change the WNAR methodology to an annual rather than semiannual mechanism. The weather normalization amount would continue to be calculated monthly, but the WNAR rate would be calculated annually rather than semiannually. The Company believes the proposed change to an annual mechanism would better facilitate administration of the WNAR and be more easily communicated to customers.

Q. Please explain the misalignment between utility costs and rates.

A. Utilities incur three types of costs in providing service to customers:

- Fixed costs – including meter, billing and a portion of distribution costs that generally varies by the number of customers
- Demand-related costs – including transmission and distribution costs that generally vary by demand and
- Energy-related costs – including variable O&M expenses that generally varies by energy consumed.

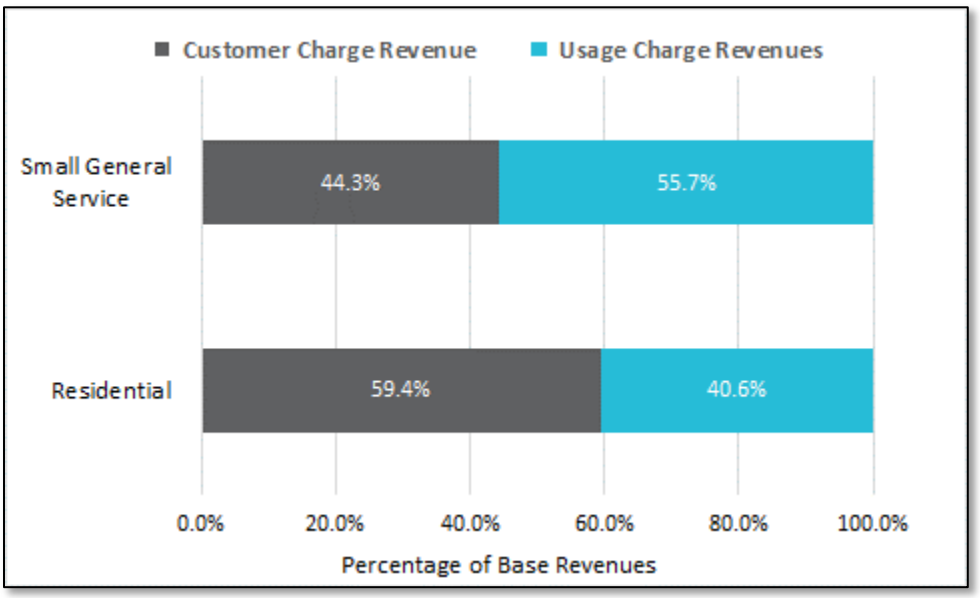
Utility rates are designed to recover all of these costs. However, especially for residential and small general service customers, a significant portion of the costs are recovered on the basis of consumption charges reflecting usage (based on normal weather) at the time rates are established (*i.e.*, rates are based on a level of historical usage). Thus, to the extent that actual usage is significantly lower than the level of usage assumed in rates, then utility rates no longer recover the cost of service. Conversely, to the extent that

actual usage is significantly higher than the level of usage assumed in rates, then utility rates recover revenues in excess of the cost of service.

Q. Do the Company's rate schedules exhibit this misalignment between utility costs and rates?

A. Yes, the Company's rates Schedule this misalignment between utility costs and rates, as shown in Figure 10 (below).

Figure 10: Customer and Usage Revenues as Percentage of Base Rate Revenues



The Figure shows a significant portion of the Company's Residential and Small General Service base rate revenues are recovered through usage charges. Specifically, the Figure shows that 40.6 percent and 55.7 percent of Residential and Small General Service base rate revenues, respectively, are recovered through usage charges.

Q. Why is this misalignment a problem?

A. The misalignment between utility costs and rates is a problem for two reasons. First, increases or decreases in consumption will likely cause utilities to over- or under-collect their cost of service. Warmer than normal weather during the winter, for example, will

likely result in sales that are below historical test year levels, reducing the likelihood that utilities recover their Commission-authorized revenues. Conversely, colder than normal weather during the winter will likely result in sales that are above historical test year levels, increasing the likelihood that utilities recover more than their Commission-authorized revenues.

Second, the mismatch between utility costs and rates also creates bill volatility for customers since customer bills are lower in warmer than normal weather during the winter and higher in colder than normal weather during the winter.

Q. How is the WNAR a solution to the mismatch between utility costs and rates?

A. The WNAR is a "partial" solution to the mismatch between utility costs and rates because it separates or "decouples" the weather portion of the relationship between the amount of gas delivered by a utility and the revenues it receives from such delivery. Thus, changes in the Company's sales due to weather do not lead to an under- or over-collection of revenues.

Q. You mentioned that the WNAR is a "partial" solution to the mismatch between utility costs and rates. What factors other than weather contribute to changes in utility sales and revenues?

A. The WNAR is only a "partial" solution to the mismatch between utility costs and rates because the Rider mitigates only changes in utility sales and revenues due to weather. Other factors can result in changes in utility sales, such as energy conservation. The WNAR does not mitigate the impact of other changes in utility sales and revenues.

Q. Do sales volumes related to the Company's Residential and Small General Service rate classes vary with changes in weather?

A. Yes. There is a strong statistical relationship between Residential and Small General Service sales and HDD. Specifically, we performed a regression analysis of HDD on Residential and Small General Service sales to quantify the relationship between HDD and Residential and Small General Service sales.

Q. What did the regression analysis show?

A. The regression analysis showed a strong statistical relationship between Residential and Small General Service sales and HDD. A regression analysis produces an R-Square, which measures the extent to which changes in a dependent variable (in this case Residential and Small General Service sales) can be explained by changes in an independent variable (in this case HDD). The R-Square results are shown in Figure 11 (below).

Figure 11: Results of Regression Analysis: HDD on sales

R-Square	Residential	Small Commercial Sales	Small Commercial Transportation
North-South Region	98.63%	95.67%	97.22%
Northwest Region	96.41%	93.58%	

The Figure shows that 98.6 percent and 96.4 percent of variations in Residential sales in the North-South and Northwest regions, respectively, can be explained by variations in HDDs across the regions. The Figure also shows that more than 93.5 percent of variations in Small General Service sales in the North-South and Northwest regions can be explained by variations in HDDs across the regions. The results of the regression analysis show there is a strong correlation between Residential and Small General Service sales and HDDs. As a result, the Company proposes to include both classes in the WNAR.

Q. Please provide a brief description of the WNAR proposed by the Company.

A. The WNAR adjusts customer bills for variations from normal weather since the Company's rates are designed based on customer usage under normal weather conditions. Normal weather is measured based on HDDs. Under warmer than normal temperatures, the WNAR will result in a surcharge or increase to customer bills (when customer bills are otherwise lower due to warmer weather), while under colder than normal temperatures, the WNAR will result in a credit or reduction to customer bills (when customer bills are otherwise higher due to colder weather). In this manner, the surcharge and credit will help stabilize customer bills and the Company's revenues.

Q. How will the Company calculate the weather normalization adjustment?

A. The Company proposes to calculate the weather normalization adjustment using the same methodology as Liberty Midstates. The proposed formula for the weather normalization adjustment is shown in Figure 12 (below).

Figure 12: Weather Normalization Adjustment Formula

$$WNA_i = \sum_{j=1}^{18} \left(NDD_{ij} - ADD_{ij}\right) . C_{ij}) . \beta$$

Where:

i	=	The applicable billing cycle month
WNA_i	=	Weather Normalization Adjustment
j	=	The billing cycle
NDD_{ij}	=	The total normal HDDs based on daily normal weather as determined in the most recent rate case
ADD_{ij}	=	The total actual heating degree days, base 65°
C_i	=	The total number of customer charges charged in billing month i
β	=	The coefficient representing use per customer per heating degree day

The Figure shows that the weather normalization adjustment is based on two components: (1) the difference between Actual and Normal Heating Degree Days ("HDD"); and (2) the use per customer per HDD, which is represented by a Beta (β) Coefficient. The β

coefficient is based on a regression analysis of actual HDD per day on actual use per customer per day. In other words, the β coefficient represents change in use per customer per day resulting from a change in actual HDDs.

The Company proposes to calculate a weather normalization adjustment separately for the Residential, Small General Service sales and Small General Service transportation classes in the North-South region and the Residential and Small General Service sales classes in the Northwest region. The regional distinction is necessary since the regions rely on different weather stations. The weather normalization adjustments will be aggregated by the Residential and Small General Service rate classes for purposes of calculating the weather normalization factor since the North-South and Northwest regions have the same base rates and will have the same rider rates. Figure 13 (below) shows the derivation of the proposed β coefficient for the Residential class in North-South region using 2020 data.

Figure 13: β coefficient for the North-South Residential Rate Class

North-South Region Residential Customers	Usage CCF	Number of Customers	Usage per Day	Actual Customer * HDD per Day	Use per Customer per Day	Actual HDD per Day
Jan	3,331,676	32,918	100,960	847,888	3.0670	25.7576
Feb	4,027,771	32,966	134,259	1,016,452	4.0727	30.8333
Mar	3,732,494	32,944	116,640	1,017,146	3.5406	30.8750
April	2,401,874	32,979	75,059	625,570	2.2760	18.9688
May	1,491,248	32,938	49,708	434,782	1.5091	13.2000
Jun	726,104	32,878	22,003	176,346	0.6692	5.3636
Jul	317,822	32,717	10,252	-	0.3134	0.0000
Aug	298,892	32,441	9,963	-	0.3071	0.0000
Sep	295,507	32,291	8,691	950	0.2692	0.0294
Oct	328,601	32,479	10,600	47,147	0.3264	1.4516
Nov	1,188,813	32,532	37,150	310,071	1.1420	9.5313
Dec	1,865,348	32,928	62,178	503,798	1.8883	15.3000
12ME Dec'20	20,006,149	393,011			β Coefficient	0.1138846

The Figure shows a β coefficient for the Residential class in North-South region of 0.1138846.

Q. How will the WNAR formula be applied to calculate the weather normalization adjustment?

A. Figure 14 (below) illustrates how the WNAR formula will be used to calculate the weather normalization adjustment for the North-South Residential rate class. The weather normalization adjustment is based on the difference between Actual and Normal HDDs, multiplied by the β coefficient, the number of customers and the revenues per CCF. Colder-than-normal weather (*i.e.,* higher than normal HDDs) would produce a downward adjustment to rates, all other things the same, while warmer-than-normal weather (*i.e.,* lower than normal HDDs) would produce an upward adjustment to rates.

Figure 14: Weather Normalization Adjustment for the North-South Residential Rate Class

Residential	Number of Customers	Number of Actual HDD	Number of Normal HDD	Normal HDD - Actual HDD	Use per Customer per HDD (β Coefficient)	WNA Sales Adj. (CCF)
	(a)	(b)	(c)	(d) = (c) - (b)	(e)	(f) = (a) x (d) x (e)
Jan	32,918	850	966	116	0.1138846	433,118
Feb	32,966	925	1,061	136	0.1138846	509,699
Mar	32,944	988	1,025	37	0.1138846	137,692
April	32,979	607	717	110	0.1138846	412,919
May	32,938	396	363	(33)	0.1138846	(124,788)
Jun	32,878	177	155	(22)	0.1138846	(84,122)
Jul	32,717	-	13	13	0.1138846	49,183
Aug	32,441	-	0	0	0.1138846	1,355
Sep	32,291	1	1	(0)	0.1138846	(1,471)
Oct	32,479	45	36	(9)	0.1138846	(31,933)
Nov	32,532	305	235	(70)	0.1138846	(260,331)
Dec	32,928	459	561	102	0.1138846	381,874
12ME Total	393,011	4,753	5,131	378		**1,423,194**
Residential Service: Commodity Rate $/CCF					(g)	0.2072
Revenue Adjustment					(h) = (g) x Sum of (f)	**$294,900**

Q. Has the Company prepared a WNAR tariff?

A. Yes. The Company's proposed WNAR tariff is included in Direct **Schedule TSL-7**. The proposed WNAR tariff is generally consistent with the corresponding Liberty Midstates

tariff, except for the change to an annual rather than semiannual methodology, as discussed earlier.

Q. Is the proposed WNAR consistent with Missouri statute?

A. Yes. Although I am not an attorney, my reading of the following section of the relevant statute suggests that the WNAR is consistent with Missouri statute. Specifically, Statute 386.266.3 states that

> "…any gas corporation may make an application to the commission to approve rate schedules authorizing periodic rate adjustments outside of general rate proceedings to reflect the non-gas revenue effects of increases or decreases in residential and commercial customer usage due to variations in either weather, conservation, or both."

Q. What are the primary benefits of the WNAR?

A. There are two primary benefits of the WNAR. First, the WNAR promotes bill stability for customers. Customers pay no more or less than the amount they would have paid under normal weather conditions. The WNAR formula reflects the relative difference between actual and normal HDDs in the heating season. The second benefit is the WNAR promotes revenue stability for the Company. Similar to customer benefits, the Company receives base rate revenues that are no more or less than the amount they would have received under normal weather conditions.

VII. NODAWAY COUNTY ANALYSIS

Q. Has the Company prepared a class cost of service study and revenue requirement for the Nodaway County service area in compliance with the Commission's order in File No. GA-2012-0111?

A. Yes. The Company has prepared a cost study for the Nodaway County service area in compliance with the Commission's order in File No. GA-2012-0111. The results of the study are summarized in Direct **Schedule TSL-8**.

VIII. CONCLUSION

Q. Does this complete your direct testimony?

A. Yes.

VERIFICATION

I, Timothy S. Lyons, under penalty of perjury, on this 23rd day of August, 2021, declare that the foregoing is true and correct to the best of my knowledge and belief.

/s/ Timothy S. Lyons