



**STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION**

Docket No. DE 16-383

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty Utilities
Distribution Service Rate Case

**DIRECT TESTIMONY
OF
JAMES D. SIMPSON
Related to the Marginal Cost of Service Study**

April 29, 2016

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1 **I. INTRODUCTION**

2 **Q. Please state your name, address, employer, position, and professional qualifications.**

3 A. My name is James D. Simpson. I am a Senior Vice President with Concentric Energy
4 Advisors, 293 Boston Post Road West, Suite 500, Marlborough, Massachusetts 01752.
5 My professional qualifications and experience have been provided in Attachment
6 RATES-1 of the Joint Rate Design Testimony that is included in the Company's rate case
7 filing.

8 **II. SCOPE OF TESTIMONY**

9 **Q. What is your responsibility in this proceeding?**

10 A. In this proceeding I am responsible for preparing the Marginal Cost Study (Marginal Cost
11 Testimony of James D. Simpson) and, together with Company Witness Heather M.
12 Tebbetts, for developing the test year billing determinants and revenues and the rate
13 design (Joint Rate Design Testimony of Heather M. Tebbetts and James D. Simpson) for
14 Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty Utilities ("Granite State" or
15 the "Company").

16 **Q. Please summarize your testimony concerning the Marginal Cost Study.**

17 A. I have prepared a Marginal Cost Study ("MCS"), which is contained in Attachments
18 JDS/MCS-1 through JDS/MCS-10. To prepare this MCS, I used approaches and
19 methodologies that are generally consistent with the marginal cost study that the
20 Company filed in its most recent distribution rate case, Docket No. DE 13-063. I made
21 some revisions and modifications to the approach that was used in Docket No. DE 13-

063 that I felt were appropriate to enhance the estimated marginal cost components, or with the intent of being consistent with principles of economic theory and marginal costs. The marginal costs that I have calculated in Attachments JDS/MCS-1 through JDS/MCS-10 are derived from data and special studies obtained from the Company.

As also shown on JDS/MCS-10, and as supported by the remainder of the JDS/MCS schedules and workpapers, the estimated annual marginal distribution costs by rate class are summarized in Table 1 below.

Table 1: Total Marginal Costs by Rate Class (\$000)

	D	D-10	G-1	G-2	G-3	M	T	V	Total
Customer	\$7,971	\$130	\$78	\$424	\$2,065	\$0	\$278	\$4	\$10,951
Capacity	\$9,234	\$190	\$7,905	\$3,883	\$2,685	\$0	\$548	\$9	\$24,456
Lighting	\$0	\$0	\$0	\$0	\$0	\$545	\$0	\$0	\$545
Total	\$17,206	\$320	\$7,983	\$4,307	\$4,750	\$545	\$827	\$14	\$35,952
	47.86%	0.89%	22.21%	11.98%	13.21%	1.52%	2.30%	0.04%	100.00%

III. MARGINAL COST STUDY

A. Economic Theory and Marginal Costs

Q. Please provide an economist’s view of marginal cost.

A. “Marginal Cost” is an economic concept; it is a measure of the additional cost that a firm incurs to provide an additional unit of a good or a service. A well-established principle of economic theory is that the price of a good that is sold in a perfectly competitive market will be set at the marginal cost to produce that good. It is a further well-established principle of economic theory that the best allocation of resources will occur,

1 and the best consumption decisions will be made, in an economy in which the prices of
2 goods are set at marginal costs.

3 Since the mid-1980s, the Commission's rate-design policy and precedent has been to
4 apply the concepts of marginal cost pricing in a rate case (a) to determine the share of
5 total rate case revenue requirement for which each rate class is responsible; and (b) to set
6 base distribution rates accordingly, in order to promote proper energy consumption
7 decisions. The basis for the Company's current allocation of revenue requirement to
8 classes, rate design, and current rate classifications was approved by the Commission in
9 Order No. 25,638 (Mar. 17, 2014) in the Company's 2013 rate case filing, Docket No.
10 DE 13-063.

11 **B. Marginal Cost Study Methodology**

12 **1. Overview**

13 **Q. Please describe the components of the Company's marginal costs that you**
14 **estimated.**

15 A. I prepared calculations and analyses to estimate the marginal Distribution Function-
16 related costs that the Company would incur (a) to serve additional demand when the
17 Company is experiencing peak conditions and (b) to serve additional customers. In
18 general terms, to estimate the costs that the Company would incur to serve additional
19 peak demand, I calculated (1) the additional capacity-related distribution plant costs and
20 (2) the additional Operations and Maintenance ("O&M") costs that would be caused by
21 an increment to peak demand. I also calculated (3) the additional general plant-related

1 costs associated with the additions to capacity-related distribution plant, and (4) the
2 additional Administrative and General (“A&G”) expenses associated with the additional
3 O&M expenses. Lastly, I calculated additional factors to account for the effects of bad
4 debt and working capital on the marginal costs that I calculated.

5 **Q. Please describe the data used to develop your estimates of the Company’s marginal**
6 **costs.**

7 A. The Company provided Concentric with (a) distribution plant and general plant balances
8 by account from 1997 to the present, and (b) distribution, customer, customer accounting;
9 A&G; and Materials and Supplies and Prepayments Expenses, also for the period 1997 to
10 the present.¹

11 **Q. Please describe each new data series that you created using data that the Company**
12 **provided.**

13 A. I created the following types of new data series:

14 1) I adjusted the Company’s data using an appropriate price index. I used a Handy-
15 Whitman index to restate plant additions in 2015 constant dollars, and I used the
16 Implicit Price Deflator for Gross Domestic Product, published by Bureau of Economic
17 Analysis, to restate expenses in constant 2015 dollars.

18 2) The Company provided two separate analyses that were used to (1) identify the amount

¹ The historical data for a few of the data series was obtained from SNL Financial which has compiled historical FERC Form 1 data for the Company.

1 of the capacity-related distribution plant additions related to growth for the years 1997-
2 2015, and (2) classify the growth-related plant additions as being related to either the
3 primary distribution system, secondary distribution system, or line transformers.

4 3) The Company provided an analysis of expense accounts that was used to functionalize
5 distribution Operations expenses and Maintenance expenses for the years 1997 to 2015
6 as either capacity-related or customer-related, and also to classify the capacity-related
7 expenses as being related to either the primary distribution system, secondary
8 distribution system, or line transformers.

9 **Q. Please describe the primary types of analysis that you used to calculate the**
10 **components of marginal cost listed in Section III.B.1, above.**

11 A. For many of the marginal cost components, I used a statistical process for estimating the
12 relationship between a specific measure of costs² and a specific “Cost Driver” variable
13 that I selected³. The general form of the regression equations that I estimated is as
14 follows:

$$15 \text{ Cost Variable} = a + b \times \text{Cost Driver variable} \quad [\text{EQ } 1^4]$$

16 Regression analyses are often used to estimate components of marginal costs because the
17 regression coefficient, the term “b” in the equation above, sometimes referred to as the

² Some of the Cost Variables that I used include capacity-related distribution plant, customer-related O&M expense, or A&G Expense.

³ Some of the “Cost Driver” variables that I used include normalized peak demand and number of customers.

⁴ This is a simplified version of the regression equations that were estimated. Each of the regression equations that are provided in Attachments JDS-MCS-1, 4, 5, and 6 may include more than one relevant and appropriate customer, peak demand, and energy-related cost driver.

1 slope of the equation, is the estimated marginal cost of the Cost Variable that is
2 associated with a small change in the Cost Driver variable.⁵ To estimate the regression
3 equations, I generally used all years' data that the Company provided.

4 For some cost components I also calculated average unit costs if I could not find a
5 reliable statistical relationship between a Cost Variable and a Cost Driver variable. The
6 general form of the average cost equation that I calculated is as follows:

$$7 \quad \text{Average Unit Cost} = \frac{\sum_{i=1}^{i=n} \text{Cost Variable}_{\text{year } i}}{\sum_{i=1}^{i=n} \text{Cost Driver}_{\text{year } i}} \quad [\text{EQ 2}]$$

8 Although average unit costs are generally not direct estimates of marginal costs in the
9 same way that regression coefficients can be, average costs are used in marginal cost
10 studies; average unit costs are also appropriate, if carefully prepared.

11 **Q. Please describe any additional data series that were created and used as Cost Driver**
12 **variables in the regression equations.**

13 A. I created and used several additional data series in the regression equations. For many of
14 the explanatory variables that I planned to test for their power to explain changes in the
15 dependent variable, I expected to observe a strong statistical relationship between the
16 dependent and explanatory variables, based on my knowledge of electric and gas
17 distribution activities. What I could not reasonably determine before performing the

⁵ The term “a” is the intercept of the equation. It is the level of the Cost Variable that is constant, regardless of the level of the Cost Driver variable.

1 analyses was the exact form of the explanatory variable that would have the greatest
2 explanatory power. For example, I did not know the measure of peak demand that would
3 best explain the Company's annual capacity-related primary distribution plant additions.
4 Therefore, I determined that I should consider the following different measures of peak
5 demand:

6 1) Actual annual peak demand

- 7 a. Current year
8 b. Lagged 1 year, 2 years
9 c. Rolling two year averages, three year averages

10 2) Weather normalized peak demand

- 11 a. Current year
12 b. Lagged 1 year, 2 years
13 c. Rolling two year averages, three year averages

14 The approach that I used in creating additional forms of a variable, and the specific forms
15 that I created, are common practice in statistical analysis.

16 **Q. Please describe the general approach used in performing the marginal cost study**
17 **regression analyses.**

18 A. I reviewed the regression equations that I developed to ensure that the estimates were
19 reasonable and that they did not violate important statistical requirements.

1 Specifically, I tested each equation to ensure that there is no statistically significant level
2 of autocorrelation in the regression equation. Autocorrelation is a violation of the
3 requirements of regression analysis⁶, which would inappropriately affect the regression
4 statistics, if not corrected. The statistical software that I used, SPSS, can identify and
5 correct for autocorrelation.

6 I also tested each equation to look for “structural shifts,” which are changes in the
7 relationship between the Cost Variable and Cost Driver variable starting in a specific year
8 and continuing for a number of years. I specifically looked for structural shifts that might
9 have been related to the 2012 acquisition of Granite State by Liberty. If I determined that
10 a Cost Variable did have a structural shift, I tested additional regression equations that
11 allowed the slope and intercept terms to be different for the time periods before and after
12 the time of the structural shift. If a regression equation with terms addressing the
13 structural shift was superior to other regression equations, I used the slope coefficient of
14 the structural shift regression equation as the marginal cost estimate.

15 **Q. What criteria did you use to accept or reject a regression equation?**

16 A. To assess whether a regression equation provided a reliable estimate of the marginal cost
17 component, I reviewed the regression equation statistics. Specifically, I reviewed the
18 following:

⁶ Autocorrelation is a violation of the assumption that the regression equation error terms are uncorrelated. In the presence of autocorrelation, the regression does not produce Best Linear Unbiased Estimates.

- 1 • The reasonableness of the regression equation results. I considered that an equation
2 was reasonable if the slope coefficient had the “right sign”⁷ and was the “right size”⁸.
- 3 • The explanatory power of the regression equation as a whole, as measured by the R-
4 squared statistic.
- 5 • The explanatory power of the slope coefficient, as measured by the t statistic.

6 **Q. Did you also prepare alternative analyses to estimate the Company’s marginal costs**
7 **to serve?**

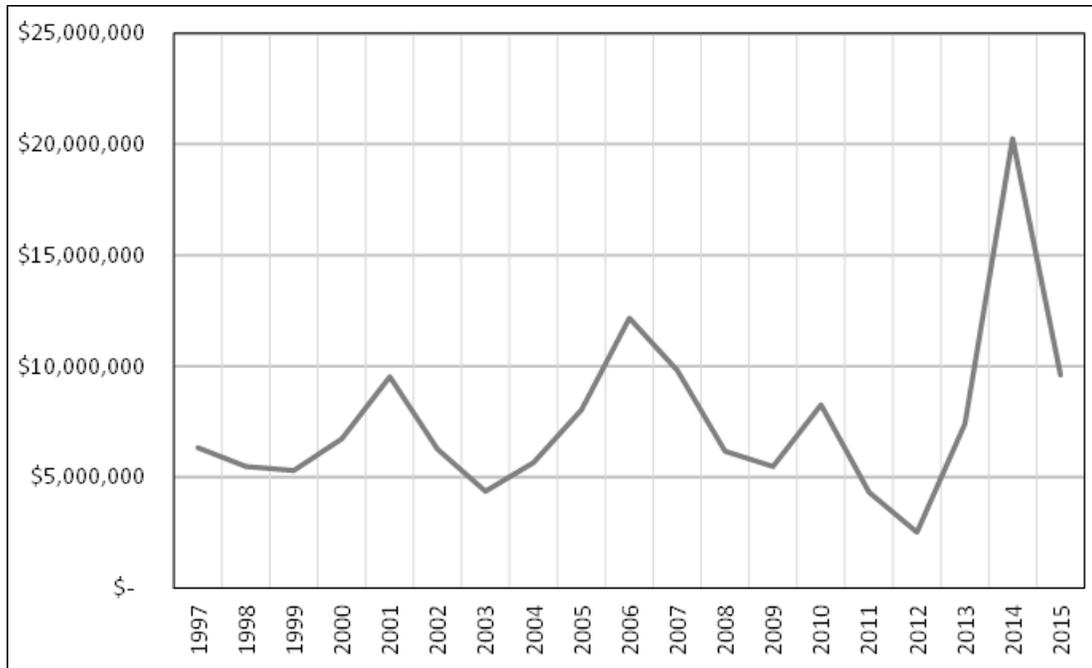
8 A. Yes, I also calculated average unit costs for the most recent three years. I prepared these
9 alternative analyses because I observed that there was a general overall pattern to the
10 Company’s historical plant additions and expenses that affected the estimates of marginal
11 costs that were being produced by the regression analyses. I have provided Chart 1 to
12 demonstrate the pattern that I observed in the Company’s historical plant additions and
13 expenses.

⁷ The slope coefficient is the “right” sign if the coefficient is positive. A negative slope would mean, for example, that as design day demand increased, the distribution mains plant additions in a year would decrease.

⁸ The “right size” is a subjective test to ensure that the slope coefficient is not implausibly large or small.

1

Chart 1: Total Capacity-related Distribution Plant Additions (\$2015)



2

3

As a result, the marginal costs that I estimated by regression analyses were unusually large and not in line with the Company's total embedded cost to serve, nor with estimates of marginal costs that I am familiar with for other similarly-situated electric distribution companies.

6

7

Thus, in the following Section C, I explain the results of the regression analyses that I prepared, and I also provide the results of the alternative marginal cost estimates, the average unit costs, based on Company data for 2013 to 2015.

9

1 **C. Marginal Cost Study Results**

2 **1. Overview**

3 **Q. Please describe how you have organized the marginal cost study.**

4 A. The schedules that make up the Marginal Cost Study are provided in the List of
5 Attachments on page ii of this testimony. Table 2 provides a summary of the Marginal
6 Cost Study schedules.

7 **Table 2: Summary of Marginal Cost Study Schedules**

Attachment	Pages	Topics
JDS/MCS-1	1 - 3	Calculation of marginal Capacity-related Plant Additions
JDS/MCS-2	1	Calculation of marginal Customer-related Plant Additions
JDS/MCS-3	1 - 5	Calculation of marginal cost of Outdoor Lighting
JDS/MCS-4	1 - 6	Calculation of marginal Distribution Capacity-related Expenses
JDS/MCS-5	1 - 5	Calculation of marginal Customer-related Expenses
JDS/MCS-6	1 - 3	Development of loading factors
JDS/MCS-7	1 - 9	Calculation of Levelized Fixed Charge Rates
JDS/MCS-8	1 - 3	Summary of Marginal Capacity Costs
JDS/MCS-9	1	Summary of Marginal Customer Costs
JDS/MCS-10	1	Summary of Marginal Cost Estimates

8
9 **2. Marginal Distribution Capacity-related Plant Addition Costs**

10 **Q. Please explain how you prepared regression analyses to estimate the marginal cost**
11 **of capacity-related distribution plant additions attributed to growth.**

12 A. I prepared regression analyses to estimate the statistical relationship between normalized
13 peak demand and the following types of growth-related distribution plant addition costs:
14 (1) capacity-related primary distribution plant additions, (2) capacity-related secondary
15 distribution plant additions, and (3) capacity-related line transformer plant additions. The

1 regression analyses utilized the historical data from 2003 to 2015. The regression results
2 are located on Attachment JDS/MCS-1, pages 1 through 3. However, as explained in
3 Section B above, I did not use the regression results to estimate the marginal cost of the
4 capacity-related distribution plant additions. Instead, I used the average unit cost per
5 peak kW of primary distribution plant additions, secondary distribution plant additions,
6 and line transformer plant additions, calculated from 2013 to 2015. The analysis that I
7 prepared is provided in Attachment JDS/MCS-1, pages 1 through 3.

8 **Q. In summary, what is the marginal cost of distribution capacity-related plant**
9 **additions attributed to growth?**

10 A. The total marginal cost of distribution capacity-related plant additions attributed to
11 growth is summarized in Table 3 below.

12 **Table 3: Marginal Cost of Distribution Capacity-related Plant Additions**

Marginal Plant additions Component	\$ per MW	Source
Primary	\$385,700	JDS/MCS-1 page 1
Secondary	\$76,282	JDS/MCS-1 page 2
Line Transformers	\$68,983	JDS/MCS-1 page 3
Total cost of Marginal Plant additions	\$530,965	

13
14 **3. Marginal Customer-related Plant Addition Costs**

15 **Q. Please explain how you estimated marginal Customer-related plant addition costs.**

16 A. Marginal Customer-related plant addition costs measure the marginal cost to connect a
17 customer, which includes the current installed cost of a meter and a service. Because the
18 cost of a meter and a service is generally correlated with the size of the customer, I asked

1 the Company to provide an analysis of the current installed cost of a meter and installed
 2 cost of a service that is typical for each rate class. The Company was able to provide data
 3 for the current installed cost of a meter that is typical for each rate class. Proxy data from
 4 other utilities in the Northeast were used for the current installed cost of a service that is
 5 typical for each rate class. The customer-related plants additions analysis is provided in
 6 Attachment JDS/MCS-2.

7 **Q. In summary, what is the marginal cost of customer-related plant additions?**

8 A. The total marginal cost of customer-related plant additions is summarized in Table 4
 9 below.

10 **Table 4: Marginal Cost of Customer-Related Plant Additions**

	D	D-10	G-1	G-2	G-3	T	V
Service	\$614.65	\$614.65	\$747.65	\$717.61	\$614.65	\$614.65	\$614.65
Meter	\$77.55	\$350.20	\$1,111.00	\$900.80	\$630.20	\$195.20	\$290.20
Total	\$692.20	\$964.85	\$1,858.65	1,618.41	\$1244.85	\$809.85	\$904.85

11 Source: JDS/MCS-2, Page 1, Lines 4, 8, 9

12 **4. Marginal Outdoor Lighting Costs**

13 **Q. Please explain how you estimated the total Marginal Cost of Outdoor Lighting.**

14 A. Marginal outdoor lighting costs measure the marginal cost to provide service to outdoor
 15 lighting customers, which includes the current installed costs of the luminaire and of the
 16 pole and accessories. Because the cost of a luminaire and of a pole is dependent on the
 17 size and type of luminaire and pole that is installed, I asked the Company to provide an
 18 analysis of the current installed cost for each size and type of (a) luminaire, and (b) pole

1 and accessory listed in the Company's tariff. The Company's analysis is provided in
2 Attachment JDS/MCS-3.

3 I estimated the total marginal cost for outdoor lighting by applying the fixed carrying
4 charge rate (as discussed in Section III.C.9 below) to the marginal cost for each size and
5 type of (a) luminaire, and (b) pole and accessory to develop a levelized annual cost,
6 which was then adjusted for inflation. The calculated levelized annual costs were
7 multiplied by the total number of luminaires and poles and accessories by size and type to
8 arrive at a total marginal cost for outdoor lighting, which is provided in Attachment
9 JDS/MCS-3, pages 1 through 5.

10 **5. Marginal Distribution Capacity-related Operations and Maintenance**
11 **Expense**

12 **Q. Please explain how you estimated the Marginal Cost of Capacity-related**
13 **Distribution Operations and Maintenance Expense.**

14 A. I prepared six regression analyses to estimate the statistical relationship between
15 normalized peak demand and the following types of capacity-related distribution
16 operations and maintenance expense: (1) primary operations expense, (2) secondary
17 operations expense, (3) line transformers operations expense, (4) primary maintenance
18 expense, (5) secondary maintenance expense, and (6) line transformers maintenance
19 expense. The regression analyses used historical data from 2002 to the present that was
20 provided by the Company. The regression results are summarized on Attachment
21 JDS/MCS-4, pages 1 through 6. However, as explained in Section B above, I did not use

1 the regression results to estimate the marginal cost of the capacity-related distribution
2 plant additions. Instead, I used the average unit cost of O&M expenses per peak kW,
3 calculated from 2013 to 2015. The analysis that I prepared is provided in Attachment
4 JDS/MCS-4, pages 1 through 6.

5 **6. Marginal Customer-related Operations and Maintenance Expense**

6 **Q. Please explain how you estimated Marginal Customer-related Distribution**
7 **Operations and Maintenance Expenses.**

8 A. I prepared a regression analysis to estimate the statistical relationship between (a) the
9 customer-related distribution operations and maintenance expense associated with
10 operating and maintaining customer meters and services and (b) the number of annual
11 customers based on historical data from 2003 to 2015 that the Company provided. The
12 regression results are summarized on Attachment JDS/MCS-5, page 1, lines 1 to 24.
13 Based on this analysis, I determined that the marginal cost of customer-related
14 distribution operations and maintenance expense should be estimated as the average from
15 2013-2015 on Line 26 of Attachment JDS/MCS-5, page 1. Again, as explained in
16 Section B above, I did not use the regression results to estimate marginal cost of
17 customer-related distribution operations and maintenance expense.

18 I prepared an additional analysis, which is provided in Attachment JDS/MCS-5, page 2,
19 to allocate the customer-related O&M expense to rate classes in a way that reflects that
20 the cost to maintain meters and services is related to the size of the meter and service,
21 which varies by rate class. As shown in Attachment JDS/MCS-5, page 2 Column (C), the

1 marginal customer-related O&M expense was allocated to rate classes based on the
2 marginal service and meter plant per customer, JDS/MCS-2, page 1. The results of this
3 allocation process are shown in Attachment JDS/MCS-5, page 2 Column (G).

4 **7. Marginal Customer Accounting Expenses**

5 **Q. Please explain how you estimated Marginal Customer Accounting Expenses.**

6 A. I prepared a regression analysis to estimate the statistical relationship between (a)
7 customer accounting expenses, excluding bad debt expense and (b) the number of annual
8 customers, based on historical data from 2003 to 2015 that the Company provided. The
9 regression results are summarized on Attachment JDS/MCS-5, page 3, lines 1 to 22.
10 Because the regression analysis did not provide reasonable estimates of marginal
11 customer accounting expense, I prepared an alternative analysis, which is provided on
12 Lines 23 to 26, to estimate marginal customer accounting expenses based on unit average
13 costs per customer, measured from 2013 to 2015.

14 I prepared an additional analysis, which is provided in Attachment JDS/MCS-5, page 4,
15 where the Company directed me to use the relative weighting factors for each rate class
16 from the Company's 2013 MCS to allocate the customer accounting expenses. The
17 results of this allocation process are shown in Attachment JDS/MCS-5, page 4 Column
18 (F).

19 Lastly, I prepared JDS/MCS-5, page 5, to calculate the pro forma bad debt expense rate
20 by rate class, based on data provided by the Company.

1 **8. Marginal Loading Factors and Adjustment Factors**

2 **Q. Please explain how you estimated Marginal Loading Factors.**

3 A. I calculated several loading factors to account for the following four cost components that
4 are relatively small or for which it is difficult to develop marginal cost-type statistical
5 relationships: (a) plant-related A&G expense; (b) non-plant-related A&G expense; (c)
6 M&S and prepayments; and (d) general plant. For each of these loading factors I
7 prepared regression analyses for the period 1999 to 2015, or 2002 to 2015, using the
8 loading factor cost component as the dependent variable, and an appropriate measure of
9 cost, utility plant, or total O&M expense as the independent variable. The loading factor
10 analyses for (a) plant-related A&G expense; (b) non-plant-related A&G expense; (c)
11 M&S and prepayments; and (d) general plant are provided in Attachments JDS/MCS-6,
12 pages 1 through 3.

13 **Q. Please explain why you used loss factors to adjust the marginal capacity-related**
14 **costs.**

15 A. The measures of capacity-related marginal cost that are used in the MCS are calculated
16 unit costs per kW of normalized peak demand, measured at customers' meters. The total
17 distribution system demand is greater than the demand measured at customers' meters
18 because some energy is lost in the process of transmitting and distributing electricity to
19 customers. Losses are greatest for those customers taking service at secondary voltage,
20 and somewhat less for customers that are taking service at primary or higher voltages.
21 The Company provided separate loss factors for primary and secondary service. I

1 developed an analysis to apply the loss factors to the marginal capacity-related costs,
2 which is provided in Attachment JDS/MCS-8, page 2.

3 **9. Fixed Carrying Charge Rate**

4 **Q. Please explain how you calculated the Fixed Carrying Charge Rates.**

5 A. The marginal cost that I calculated for primary and secondary capacity-related
6 distribution plant, line transformers, services, meters, and street lighting is the initial cost
7 of an asset that is placed into service. Fixed carrying charge rates (“FCCR”) are used to
8 convert the marginal cost of plant additions from a cost that represents the estimated
9 marginal investment into the levelized annual cost of that investment. Attachment
10 JDS/MCS-7, page 1, is a summary of the FCCRs for (a) primary and secondary capacity-
11 related distribution plant, (b) line transformers, (c) services, (d) meters, and (e) street
12 lighting. This page shows Economist’s and Engineer’s FCCR results.

13 An Economist’s FCCR is based on annual streams of costs that are fixed in real dollars,
14 and therefore vary in nominal dollars. An Engineer’s FCCR is based on annual streams
15 of costs that are constant in nominal dollars, and therefore vary in real dollars. However,
16 the present values of the Economist’s and Engineer’s costs and revenues are identical.
17 For marginal cost analyses, the Economist’s FCCR calculations are generally accepted as
18 being the appropriate version because the Economist’s FCCR appropriately accounts for
19 the reduced value of the revenue requirements of that plant addition in future years, due
20 to price inflation, and therefore better reflects the economic and financial implications of
21 regulated ratemaking.

1 Attachment JDS/MCS-7, pages 2 through 9, provide the assumptions that were used in
2 the calculation of the FCCR and the detailed calculations of the five FCCRs. The
3 calculations of the FCCR follow standard rate making principles to determine revenue
4 requirements associated with plant additions, including return, taxes, depreciation,
5 salvage value, etc.

6 **D. Summary of Marginal Cost Study Results**

7 **Q. Please explain the schedules that you have prepared to summarize the Marginal**
8 **Cost results.**

9 A. Attachment JDS/MCS-8, page 1, shows the calculation of unit marginal distribution
10 capacity costs, including all loading factors and adjustments.

11 Attachment JDS/MCS-8, page 2, shows the calculation of the loss-adjusted marginal
12 capacity costs.

13 Attachment JDS/MCS-8, page 3, shows the calculation of the loss-adjusted marginal
14 capacity costs by rate class.

15 Attachment JDS/MCS-9, page 1, shows the calculation of unit marginal customer costs,
16 including all loading factors and adjustments.

17 Attachment JDS/MCS-10, page 1, shows the calculation of unit marginal customer and
18 capacity costs, adjusted for bad debts. Attachment JDS/MCS-10, page 1, also shows the
19 calculation of total marginal costs by rate class, which is used in designing the

1 Company's proposed base distribution rates in this proceeding to allocate the Company's
2 requested distribution revenue requirement to firm rate classes.⁹

3 **Q. Does this conclude your testimony?**

4 **A. Yes, it does.**

⁹ As explained in the Joint Rate Design Testimony of Heather Tebbetts and James D. Simpson, the equiproportional adjustment method was used to adjust total marginal costs by rate class to the Company's proposed distribution revenue requirement in this proceeding.