

NORTHERN UTILITIES, INC.

**DIRECT TESTIMONY OF
DEBBIE L. GAJEWSKI AND PAUL M. NORMAND**

RATE DESIGN STUDIES

EXHIBIT DLG/PMN-1

New Hampshire Public Utilities Commission

Docket No. DG 17-070

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LIST OF SCHEDULES

<u>Schedule Number</u>	<u>Description</u>
	<u>Accounting Gas Cost of Service Study</u>
DLG/PMN-1G-1	Qualifications of Debbie L. Gajewski and Paul M. Normand
DLG/PMN-1G-2	– Total Company Cost of Service Study (Reference Workpapers for Detailed Cost Allocation)
	– Detailed Revenue Reconciliation
	– Unbundled Total Class Revenue Requirements
DLG/PMN-1G-3	Total Delivery Only Cost of Service Study
DLG/PMN-1G-4	Total Production Only Cost of Service Study
DLG/PMN-1G-5	Total Functional Cost of Service Study
DLG/PMN-1G-6	Total Class Unbundled Revenue Requirements and Unit Cost Results at Existing and Uniform Proposed Rate of Return
DLG/PMN-1G-7	Tabulation of External and Internal Allocators
DLG/PMN-1G-8	Rate Design Summary
DLG/PMN-1G-9	Typical Bill Impacts
DLG/PMN-1G-10	Average Monthly Residential Bill Impacts
	<u>Marginal Cost Study</u>
DLG/PMN-2G-S	Detail List of Updated Data for Revised Marginal Study Marginal Cost Summary Results – Table 14

1 **I. INTRODUCTION**

2 **Q. Please state your names, address and position.**

3 A. Our names are Debbie L. Gajewski and Paul M. Normand. We are management
4 consultants with Management Applications Consulting (“MAC”), Inc., 1103
5 Rocky Drive, Suite 201, Reading, PA 19609.

6 **Q. Please state your qualifications.**

7 A. Our qualifications are provided in Schedule DLG/PMN-1G-1.

8 **II. SCOPE OF TESTIMONY**

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

10 A. We are responsible for preparing the accounting and marginal gas cost studies
11 submitted on behalf of Northern Utilities – New Hampshire Division (“Northern”
12 or “the Company”). We are also responsible for preparing the weather
13 normalization and annualization adjustments, developing the class revenue
14 targets, and designing rates for each of the Company’s customer classes. We also
15 support the associated bill impacts.

16 **Q. Please outline the organization of your testimony and schedules.**

17 A. Aside from the introductory material and this description of scope included in
18 Sections I and II, our testimony is organized into three major sections. Section III
19 presents a summary of our results. Section IV presents the accounting Class Cost
20 of Service Study (COSS) and describes the methods we have employed to

1 calculate costs by class of service, including the more significant allocation
2 factors. In Section V, we discuss the preparation of the updated Marginal Cost
3 Study (MCS). In the final section, Section VI, we discuss the development of the
4 proposed customer class revenue targets and the individual class proposed rates
5 and bill impacts.

6 We have provided a total of eleven schedules. Ten schedules address the
7 accounting cost of service study and rate design. They are labeled using the
8 prefix “DLG/PMN-1G-x”. One schedule, DLG/PMN-2G-S, details the updated
9 marginal cost study changes to the last study submitted in Docket No. DG 13-086
10 along with a summary of final results (Table 14). Schedule DLG/PMN-1G-1
11 details our qualifications and experience. The schedules relating to the COSS are
12 labeled sequentially beginning with Schedule DLG/PMN-1G-2. Schedule
13 DLG/PMN-1G-2 summarizes the results of our Total Company COSS. Pages 5
14 and 6 of this Schedule details each revenue component and reconciles to the total
15 Company revenue requirements. The last two pages (7 and 8) present the
16 unbundled cost of service result summaries by class of service. Page 8, column
17 23 shows the cost of service target revenues at the required equalized revenue
18 requirement as shown in Schedule DLG/PMN-1G-3, page 43, line 10. This class
19 revenue requirement detail is also provided on Schedule DLG/PMN-1G-6, pages
20 5 and 6, line 19. Column 28 of this same exhibit details the class revenue increase
21 required from existing levels to achieve a uniform class ROR equal to the
22 Company 8.3% based on accounting cost of service methods. In addition to these

1 traditional Total Company class COSS summary results, Schedule DLG/PMN-
2 1G-3 presents the more detailed results of our COSS for the delivery function
3 only. In this Schedule, we have removed supply-related costs to be recovered
4 through the Cost of Gas Adjustment (“CGA”) Clause. Schedule DLG/PMN-1G-4
5 shows a similar level of cost detail by customer class as Schedule DLG/PMN-1G-
6 3, but for only the supply-related costs (Production) instead of the delivery-related
7 cost function (Schedule DLG/PMN-1G-3). Schedule DLG/PMN-1G-5 presents a
8 similar level of cost detail as Schedules DLG/PMN-1G-3 and DLG/PMN-1G-4
9 for the total unbundled costs for the supply and delivery functions instead of by
10 rate class as shown on the horizontal. This Schedule also identifies CGA direct
11 Gas Costs and CGA Bad Debt costs included in the supply function as
12 summarized in Schedule DLG/PMN-1G-2. Schedule DLG/PMN-1G-6 presents a
13 detailed functional unbundled summary of the costs to serve for each rate class at
14 both present and equalized rates of return (ROR). Schedule DLG/PMN-1G-7
15 contains a detailed description of the allocation factors, both externally developed
16 and those developed internal to the COSS to provide a complete reference and
17 understanding of the allocation methods employed in our study.

18 Schedule DLG/PMN-1G-8 presents the details of the proposed rate design
19 calculations along with the summaries from all of the COSS results discussed
20 earlier (Schedule DLG/PMN-1G-3 and Schedule DLG/PMN-1G-6). This
21 schedule also presents the proposed rate elements for all service classes.

1 Schedule DLG/PMN-1G-9 presents the typical bill impacts with the proposed
2 rates by customer class for the summer and winter periods. Schedule DLG/PMN-
3 1G-10 presents the average monthly bill impacts for Residential only using an
4 average use.

5 The Marginal Cost Study (MCS) submitted in the Company's last rate case
6 proceeding was updated by cost inflation and revision to several key parameters
7 which are listed in detail on Schedule DLG/PMN-2G-S along with the final
8 summary results (Table 14). The MCS consists of 14 separate tables which have
9 been included in the Workpapers as Schedule DLG/PMN-2G-1. These 14 tables
10 show all of the significant calculations underlying the development of the updated
11 marginal costs based on the data changes listed as DLG/PMN-2G-S. These
12 results are provided as supporting detail cost information to establish class
13 revenue requirement targets used in the rate design process.

14 In order to facilitate a thorough review of our cost studies, we have included a
15 complete set of workpapers with this filing, labeled as "Gas Accounting Cost of
16 Service @ 12/31/16 Workpapers" and "Gas Marginal COS @ 12/31/16
17 Workpapers."

1 **III. SUMMARY OF RESULTS**

2 **Q. Could you please summarize your results and rate design proposals?**

3 **A. Our studies and proposed rate design results are as follows:**

- 4 1. Marginal cost of service results by class indicate very large revenue
5 deficiencies for Residential G-41/T-51, and G-42/T-42 classes (DLG/PMN-
6 1G-8, pages 2 and 7 of 8) when compared to existing revenues (DLG/PMN-
7 1G-8, page 2 of 8).
- 8 2. Distribution fixed costs are the majority of the Company's costs (DLG/PMN-
9 1G-8, page 7 of 8).
- 10 3. Emphasized increasing the monthly fixed costs to improve pricing efficiency
11 (DLG/PMN-1G-8, page 4 of 8).
- 12 4. Established initial class revenue targets by increasing each deficient class by
13 the amount of the capped deficiency and allocating the resulting total revenue
14 deficiency to the remaining classes based on their uniform ROR revenue
15 requirement at MCS.
- 16 5. The proposed rate design is more efficient by reflecting pricing levels that are
17 closer to the marginal cost to serve each class. However, revenue recovery
18 results continue to show some subsidy among the classes (DLG/PMN-1G-8,
19 page 3 of 8).

1 IV. ACCOUNTING COST OF SERVICE STUDY

2 Weather Normalization

3 **Q. What is the purpose of a weather normalization adjustment?**

A. For the purposes of rate making, the test year must represent typical or normal circumstances. The Testimony of David L. Chong has identified specific adjustments to the test year to reflect the expenses that normally would be anticipated in the test year. We have provided him with one of those adjustments to reflect the costs and revenues that could be expected under normal weather conditions. The Company's sales are weather sensitive. Even small variations in weather can have a material impact on the sales and revenues of the Company. The weather normalization adjustment is targeted to identify the change in sales and revenues that would have been anticipated if the actual weather in the test year had been exactly normal.

14 **Q.** How do you define normal weather?

A. In order to properly account for the year to year variations in effective degree days, normal weather is defined as the average annual effective degree days over the last 30 years. The Company has provided historical daily effective weather data. The daily normal effective degree day data provided was the most recent 30-year average as of January 2016.

20 Q. Please explain what you mean by “effective degree days”?

1 A. Effective degree days are a refinement upon heating degree days, the temperature
2 departure from 65 degrees Fahrenheit. Effective degree days incorporate a small
3 adjustment to heating degree days to reflect the impact of wind speed. Previous
4 studies have shown that effective degree days are more highly correlated to gas
5 sales than conventional degree days. As a result, the Company has been
6 employing effective degree days as its primary weather measurement for many
7 years.

8 **Q. Please describe your weather normalization calculations.**

9 A. We have summarized the weather normalization calculations in the filed
10 Workpapers which also show the monthly per-books sales data for 2016. The
11 Workpapers show the derivation of the billing cycle degree days including actual
12 and 30-year normal effective degree days by calendar month. Since monthly
13 customer billing data are recorded on a billing cycle basis, the actual sales data
14 incorporate some lag due to meter reading and billing. We computed weighted
15 average actual and normal degree days for each billing cycle within each month.
16 This process was repeated for each of the sales and transportation customer
17 classes separately with the demand calculations provided in the Workpapers.

18 **Q. Could you describe the actual weather normalization calculations?**

19 A. Yes, base load is computed as the average use per customer in the months of July
20 and August. Monthly loads above this level are considered "Heating Loads". We
21 made a minor adjustment to this calculation in those cases where the months'
22 Billing Cycle Sales were below the July and August average. If the sales were

1 below the July and August average, we did not weather normalize those months
2 because they did not show any sensitivity to weather. Monthly sensitivity to
3 degree day variations is computed by dividing the month's heating load by the
4 actual billing cycle degree days to derive the actual unit heating load per degree
5 day. This figure was then multiplied by the temperature departure from normal to
6 develop a weather adjustment. In some months, actual weather was warmer than
7 normal while in others it was colder. In total, the year was warmer than normal,
8 resulting in a positive weather adjustment to sales.

9 **Q. How did you derive the net revenue adjustment for each class?**

10 A. Starting on page 83 of the Workpapers, the therm values shown in the column
11 labeled "Weather Adjustment" on this schedule represent the monthly
12 adjustments due to the variation from normal weather (30-year average). The
13 volumetric weather adjustment was multiplied by the variable rate block
14 component of the present tariffs based on the calculated monthly average use
15 level to derive the revenue impact as shown on the right-most column of these
16 pages. Page 99 of the Workpapers presents the weather normalized billing month
17 sales under present rates. Page 100 of the Workpapers shows the adjustment to
18 base revenues from actual to normal weather conditions.

Billing Determinants

Q. Could you describe your efforts in developing the billing units for the rate design?

A. The development of billing units was straight forward. We developed the number of customers, calendar month sales, and weather adjusted sales for each class segregated between sales and transportation service. The Company's rate classes are:

Rate Designation	Description
R-6 & R-11	Residential Non-Heating and Low Income
R-5 & R-10	Residential Heating and Low Income
G-40 & T-40	Small General, High Winter Use
G-50 & T-50	Small General, Low Winter Use
G-41 & T-41	Medium General, High Winter Use
G-51 & T-51	Medium General, Low Winter Use
G-42 & T-42	Large General, High Winter Use
G-52 & T-52	Large General, Low Winter Use

Q. Have you presented calendar month sales information by rate class?

A. Yes. In order to develop allocation factors for the COSS, we adjusted billing cycle sales data to restate them on a calendar month basis. This calculation employed the same billing cycle lag factors by billing cycle and rate class used to develop billing month degree days resulting in the calendar month data in the Workpapers, page 113, at the sendout level which includes an adjustment for losses.

1 **Accounting Cost of Service Study**

2 **Q. Would you briefly define an Allocated Cost of Service Study or COSS?**

3 A. The cost to serve the customers of any utility company consists generally of
4 operating expenses, return on investment, and related taxes. For a historical test
5 period, these costs are recorded on the books and records of the Company, and the
6 overall cost to serve the collective customers of the utility can be readily
7 established. On the other hand, the specific cost to serve customers in the various
8 service classifications is much less apparent. Costs can vary significantly
9 between customer classes depending upon the nature of their demands upon the
10 system and the facilities required to serve them. The purpose of a COSS is to
11 assign or allocate each relevant component of Northern's overall costs of service
12 on an appropriate basis in order to determine the proper cost to serve the
13 Company's respective classes. The result is a cost matrix displaying, for each
14 cost category, the detailed costs of serving each customer class.

15 **Q. Please describe the procedure that you used in preparing your COSS?**

16 A. Through the application of a cost model developed by MAC specifically for the
17 Company's gas operations, it was possible to address each element of rate base,
18 revenue and operating expense in detail and to assign or allocate each element to
19 customer classes. This process is summarized in Schedule DLG/PMN-1G-2, page
20 1, and this Schedule mirrors Northern's total Company costs to serve as presented
21 in the Testimony of David L. Chong and summarized in our revenue
22 reconciliation, Schedule DLG/PMN-1G-2, page 5.

Description of Cost Model

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Q. How does the MAC cost model operate?

A. The cost model is essentially a matrix. The vertical dimension of the study consists of the detailed costs to serve as provided by the Company. The development of the cost of service study begins with rate base and continues with revenues, operating expenses, taxes, and the computation of a labor allocator. The cost model includes three additional reports: a summary of costs to serve, a list of the allocation factors employed in the study, and a revenue requirements section.

The horizontal dimension of the study consists of either customer classes or cost functions. Since the customer classes cannot all fit on a single page, two sub-pages are required to list all customer classes.

Each page, starting with page 1, has a column immediately preceding the numerical data marked "ALLOC," an abbreviation for ALLOCATOR. The ALLOC column contains an acronym to indicate the allocation factor used to allocate the costs shown in the Total Company column to individual customer classes. A tabulation of these allocators, typically total dollars or volumes, and as a percent of total has been provided at the end of each study beginning on page 45 of Schedules DLG/PMN-1G-3 and DLG/PMN-1G-4. In addition to a simple tabulation, these allocation factors are further presented as a unitized ratio of

1 Total Company beginning on page 61 of Schedules DLG/PMN-1G-3 and 1G-4.
2 Schedule DLG/PMN-1G-7 further describes each of these allocators.

3 Using these allocation factors, costs shown in the Total Company column are
4 assigned to each customer class or function shown on the horizontal of the cost
5 study. The cost of service information provided in the vertical column can be of
6 two forms: either per-books numbers as reported for the test year or pro forma
7 adjustments, to reflect the adjustments as identified in Mr. Chong's schedules.

8 **Cost of Service Model Allocation Methodology**

9 **Q. How did you choose allocation factors for your cost study?**

10 A. Generally speaking, we use a hierarchal approach to assign costs to customer
11 classes, choosing the highest level available to assign or allocate cost elements in
12 the cost study. The first or highest level is to identify a direct relationship
13 between the cost under study and the individual classes. For example, present
14 revenue is booked by customer class, so in the cost study, we directly assign these
15 present revenues after adjustment for weather and annualization (reference
16 workpapers) to customer classes. The second level in the hierarchy employs the
17 results of special studies. When costs cannot be directly assigned to a specific
18 class, a special study can be undertaken to replicate the intended use of specific
19 plant investments or expenses and then assign costs based on the specific use of
20 these assets in the test year. For example, services and meter investments
21 required special analyses which are detailed in the Workpapers. The next level in

1 the hierarchy employs an external allocator to serve as a basis for cost assignment.
2 For example, the cost of processing a computer generated bill is the same for all
3 classes. An external allocator representing the number of bills produced for each
4 customer class in the test year was developed to allocate these costs. The final
5 alternative, using an internal allocator for cost assignment, involves selecting
6 some combination of cost elements previously allocated in the cost study to assign
7 certain remaining costs appropriately to customer classes. An internal allocator is
8 a relationship computed from combining more than one cost already allocated in
9 the cost study. As an example, property taxes are assessed by individual taxing
10 authorities based primarily on the plant in service within their jurisdictions. In
11 order to allocate property taxes, we develop an internal allocator for the total of
12 all plant. In this case, total **PLANT** is an internal allocator composed of the sum
13 of each individual item of plant in service, each of which has been previously
14 allocated to customer classes on some rational basis. Using this costing approach,
15 we assigned each rate base operating expense item to customer classes.

16 **Rate Base Allocation**

17 **Q. Please describe the allocation of rate base to customer classes.**

18 A. Rate-base allocations are shown on pages 3 through 14 of Schedules DLG/PMN-
19 1G-3 and DLG/PMN-1G-4. Plant is shown sequentially at the 3-digit Uniform
20 System of Accounts level. The Company's intangible plant were the first items
21 allocated, followed by production plant investment. Since intangible plant could
22 not be assigned to classes using any of the first three levels in the hierarchy of

1 allocation methods, intangible plant was assigned on an internally developed
2 allocator, total labor.

3 Production plant is primarily assigned using a Design Day remaining allocation
4 factor. This is based on adjusting (reducing) the total Design Day demand lower
5 by removing a base use component (two-month average) for each rate class. This
6 approach more properly matches these incremental costs with their associated
7 usage potential.

8 Next, distribution capacity-related plant was assigned to classes on the basis of
9 allocation factors **DISTR** and **DISTRMAINS**. The **DISTR** allocation factor was
10 developed externally and is used for the allocation of distribution plant capacity-
11 related costs such as structures and improvements, compressor station equipment,
12 and measuring and regulating station equipment. The **DISTRMAINS** allocation
13 factor is used for the allocation of rights of way and mains. Both allocators,
14 **DISTR** and **DISTRMAINS**, are based on the Proportional Responsibility
15 method, whereby the normalized monthly system loads carried by the distribution
16 system are weighted so that costs are assigned to classes based on the variation of
17 sales level from peak to off-peak months.

18 **Q. Please describe briefly the Proportional Responsibility method?**

19 A. This method, often abbreviated as the “PR” method, has a long history of
20 acceptance as an appropriate distribution capacity allocator for gas distribution
21 utilities in New Hampshire and other states.

1 The PR method uses monthly normalized system throughput whereby the
2 calculation recognizes the monthly sendout levels for the test year and calculates a
3 weighting for each month. The resulting monthly ratios are then allocated to each
4 customer class use for that month and then summed to arrive at a final composite
5 allocation by class for the test year. A more complete discussion with our
6 example and calculations has been provided in the accounting cost study
7 Workpapers.

8 **Q. Please describe your summary results of the PR allocation procedure.**

9 A. The PR procedure essentially results in an overall weighting of 85.1% to the
10 winter period and a complementary 14.9% to the summer period as shown in the
11 Workpapers. The winter period consists of the months of November through
12 April, with the remaining months being included in the summer period.

13 **Q. What are the customer-related plant allocation factors included in your cost**
14 **study?**

15 A. Customer-related distribution plant items were allocated using **CUST**-prefixed
16 allocators for services, meters, and other such customer-related items. These
17 factors, taken from the Company's continuing property records, general
18 accounting records, and any other available sources, serve to allocate the specific
19 customer-related costs incurred for each customer class.

20 The allocation of Services (Account 380) was based on current installed-cost-per-
21 customer class using historical Company data with recognition of the total

1 number of services in arriving at the final number of services per class. Similarly,
2 the allocation of Meters (Account 381) was developed by identifying the typical
3 replacement cost new for meters used to serve customers in each rate class. The
4 supporting details have been provided in the Accounting Workpapers.

5 A list of the direct customer-related allocation factors is presented on pages 49
6 and 50 of Schedules DLG/PMN-1G-3 and DLG/PMN-1G-4 of the cost of service
7 studies with a description and explanation of each also presented in Schedule
8 DLG/PMN-1G-7.

9 **Q. How were the general and common plant items allocated on pages 5 and 6 of**
10 **Schedules DLG/PMN-1-G-3 and DLG/PMN-1G-4?**

11 A. The general plant items, excluding the METSCAN and ITRON communication
12 equipment (Account 397), were allocated on an internally developed labor
13 allocation factor (**LABOR**) and a Distribution Plant allocator (**DISTRPLT**) for
14 the Distribution-related items. The labor allocator is based on labor expensed and
15 capitalized for each account in the test year. The labor portion of each Operation
16 and Maintenance function was identified and allocated separately in the same
17 manner as the corresponding total expense accounts were allocated. Similarly,
18 capitalized labor costs were assigned to classes on the same basis as the plant
19 function. The allocated labor costs were then subtotaled by class to arrive at the
20 composite allocation factor, **LABOR**. The detailed development of this allocator
21 is presented on pages 37 through 42 of Schedules DLG/PMN-1G-3 and
22 DLG/PMN-1G-4 of the cost of service studies.

1 **Q. How was each account of reserves for depreciation allocated?**

2 A. Each account of reserves was allocated on the subtotal of the corresponding
3 allocated costs of its respective plant item.

4 **Q. What other elements of rate base were included in your study?**

5 A. Additions to net plant included materials and supplies and an allowance for cash
6 working capital. The deductions from net plant were customer deposits, customer
7 advances, and a reserve for deferred federal income taxes. Each item was
8 allocated on the most appropriate allocation factor. Customer Deposits were
9 directly assigned to rate classes. (See Workpapers.)

10 **Operating Revenue Allocations**

11 **Q. Could you discuss the allocation of operating revenues?**

12 A. Revenue details are shown on pages 15, 16, 59, and 60 of our cost studies in
13 Schedules DLG/PMN-1G-3 and DLG/PMN-1G-4. The actual and weather
14 normalized CCF sales and revenues for each firm rate class are detailed in the
15 filed Workpapers. Revenues associated with special contracts were included and
16 allocated to all firm classes on the distribution plant allocator **DISTR**.

17 Late payment charges represent charges for paying bills beyond their normally
18 scheduled due date. The Company provided an assignment of these charges by
19 customer class for use in the cost of service study. (See filed Workpapers for
20 details.)

Operating Expense Allocation

Q. How were operating and maintenance expenses allocated?

A. The allocation of O&M expenses follows the method by which these expenses were incurred. Therefore, the plant-related capacity expenses are allocated using the same allocators used for their associated plant investment.

Q. How were the gas costs assigned?

A. The direct gas costs were assigned to rate classes based on the revenues billed during the test year, which are based on the Company's Simplified Market Based Allocation ("SMBA"). The gas revenues and direct gas costs exactly offset by rate class. The O&M costs associated with Propane (LPG) and Liquefied Natural Gas (LNG) were allocated on the DEMLPG and DEMLNG factors, which are each based on a Design Day remaining calculation, as previously discussed, with plant costs. The details relating to these expenses are developed in Schedules DLG/PMN-1G-4 and DLG/PMN-1-G-5. A summary of these functional revenue requirements is presented on Schedule DLG/PMN-1G-2, page 7 of 8.

Q. How were the remaining operation and maintenance expenses allocated?

A. Distribution O&M expenses follow the corresponding allocation of distribution plant. Customer Accounts, Sales Expenses, and Administrative and General Expenses were allocated using a variety of methods based on direct assignments, revenues, sales, gas costs, number of bills and number of customers. Whenever possible, specific information detailing class cost responsibilities was utilized in

1 order to develop the most accurate cost study possible. A&G expenses are
2 allocated partly on labor, revenue requirements, gas costs and plant in service, all
3 developed internally.

4 Schedule DLG/PMN-1G-7 contains a complete description of each allocator
5 utilized in the cost of service study.

6 **Q. What are the remaining operating expenses?**

7 A. The remaining operating expenses consist of depreciation and amortization
8 expenses, taxes other than income taxes, interest on customer deposits, state
9 income taxes, and federal income taxes.

10 **Q. How were they allocated?**

11 A. Depreciation and amortization expenses were allocated on the basis of plant in
12 service similar to the allocation of depreciation reserves. Taxes Other Than
13 Income Taxes that are plant-related were allocated on **PLANT**, and those that are
14 labor-related were allocated on the **LABOR** allocator discussed earlier. Interest
15 on Customer Deposits was allocated on customer deposits (CUSTDEP). Federal
16 income taxes and state franchise taxes were computed for each customer class
17 based on their individual revenues less allocated expenses.

18 **Q. Could you summarize the results of your overall Schedule DLG/PMN-1G-2**
19 **cost of service study at present class revenue levels?**

1 A. The results of this study demonstrate that the rates presently in effect generate
2 very different rates of return for each customer class (reference lines 22 and 23 of
3 pages 1 and 2). As Schedule DLG/PMN-1G-2 demonstrates, the Company's
4 current rates produce inequities between major rate classes.

5 **Unbundled Costs to Serve**

6 **Q. How does your COSS relate to the development of unbundled cost to serve**
7 **the gas supply and transportation functions?**

8 A. Our COSS addresses cost to serve as a three dimensional array. So far, we have
9 discussed only two dimensions, the accounting cost dimension, showing the
10 details of the rate base and expense items, which determine total cost to serve and
11 the second dimension, the class dimension, showing how each of these costs is
12 allocated to customer classes.

13
14 In order to provide unbundling cost details and provide a useful guide to delivery
15 rate design efforts, the COSS must also identify costs by major functions such as
16 Supply and Delivery. Allocations to the class and function dimensions are
17 performed automatically and simultaneously within the COSS model. For
18 example, the allocation of metering investment was determined to be related to
19 the distribution function alone and not to the gas supply function. The meter
20 allocator was defined as 100% distribution customer-related and at the same time
21 these costs were allocated to individual customer classes. Although many of the
22 allocators used in the COSS were assigned directly to one function or another,

1 other allocators were developed internally in the cost study as composites of other
2 allocated costs and result in allocations to more than one functional cost category.
3 This sub-detail is simply a matrix of cost recognition throughout the allocation
4 process for each identified cost element.

5 **Q. Have you prepared any unbundling functional cost of service studies as part**
6 **of your efforts to analyze the Company's overall costs?**

7 A. Yes, we have. Following the standard cost allocation procedures outlined earlier
8 in our testimony, we have aggregated costs and prepared complete unbundled
9 functional cost of service results for the Delivery (Schedule DLG/PMN-1G-3) and
10 Supply (Schedule DLG/PMN-1G-4) functions.

11 The completed functional cost study results, Schedule DLG/PMN-1G-5, shows
12 the allocation of each item contributing to revenue requirements, summarized into
13 the Production and Delivery cost functions. The allocation factors used to
14 develop this study are listed, beginning on page 23 of the functional cost of
15 service study. Please note that Schedule DLG/PMN-1G-5 is also the exact result
16 for the total columns only from the class Delivery and Supply unbundled studies,
17 Schedules DLG/PMN-1G-3 and DLG/PMN-1G-4 for class cost study details.
18 The functional revenue requirements from Schedule DLG/PMN-1G-5, page 22,
19 line 10, are further detailed by cost function and class of service in Schedule
20 DLG/PMN-1G-2, pages 7 and 8.

1 **Q. How do you determine the gas supply and delivery-related costs from the**
2 **unbundled cost of service study results you have presented?**

3 A. The fixed delivery cost components to serve consists solely of the distribution
4 capacity, customer costs, and Base Uncollectible Costs, as shown on Schedule
5 DLG/PMN-1G-3, Delivery only cost of service. The remaining costs, shown on
6 Schedule DLG/PMN-1G-4, are gas-supply related. The gas revenues and
7 associated gas costs presented in the cost of service studies are based on actual
8 results from the Company's test year data.

9 **Q. How do the delivery revenue requirements compare to existing base rates**
10 **when embedded gas costs are removed?**

11 A. Existing base rates were previously unbundled to include only distribution costs
12 and exclude production-related costs. Therefore, the costs shown on Schedule
13 DLG/PMN-1G-3 are directly comparable to the proposed revenues produced by
14 base rates. These same summary results are also presented in the more detailed
15 class unbundled cost summary results, Schedule DLG/PMN-1G-6 (line 19).
16 Please note that Schedule DLG/PMN-1G-6 contains results at both the existing
17 ROR (pages 1 through 4) and the proposed (pages 5 through 8) equalized ROR.
18 A complete revenue reconciliation showing each cost component has also been
19 provided in Schedule DLG/PMN-1G-2, pages 5 through 8.

20 **Q. What are the indicated results from your unbundled class accounting cost**
21 **study presented in Schedule DLG/PMN-1-G-6?**

1 A. The unbundled class cost results from this study detail clearly show that the
2 Distribution delivery costs to serve Northern's customers are essentially fixed in
3 nature and are either capacity or customer related. These results indicate that the
4 cost recovery and pricing should strongly emphasize fixed monthly charges,
5 especially for smaller customers where fixed investments are necessary regardless
6 of total consumption. Any proposed fixed monthly charges should therefore
7 reflect a consideration for both a monthly customer charge and a separate fixed
8 monthly facility charge.

9 **Q. Are you saying that the majority of a Distribution Company's costs are**
10 **fixed?**

11 A. Yes, that is exactly what we are saying. Distribution capacity investments have
12 little to do with variable consumption and are much more directly related to
13 maximum daily (hourly) consumption. We emphasize this as the major
14 underlying cost driver for investments in distribution facilities. For gas utilities,
15 usage levels are six to ten times higher in winter months when compared to
16 summer months. (Reference Workpapers, page 113.)

17 **Q. Have you broken down your calculated costs into additional levels of fixed**
18 **costs?**

19 A. Yes, we have. As we just mentioned, the two major Distribution fixed costs
20 components are customer related (services and meters) which are closest to the
21 customer and capacity or demand related which are connecting the customers'
22 delivery requirements to the Company's distribution facilities all the way back

1 through mains, regulatory stations, and gate stations. We have identified, a
2 portion of these capacity costs to represent a backbone level of facilities required
3 to provide local service to customers.

4 **Q. Have you identified any of these fixed costs in preparing your unbundling**
5 **costs results mentioned earlier?**

6 A. In order to more properly reflect the next “slice” of the delivery system closest to
7 the customer that is truly fixed in nature and should also be recovered with a
8 monthly charge similar to a customer charge approach, we identified a skeletal or
9 backbone system that is basic to all customers which should, as a minimum, be
10 recovered in a fixed monthly charge which we are calling a facility charge.

11 **Q. How did you segregate the costs responsibility associated with your backbone**
12 **system?**

13 A. As we mentioned earlier, the majority of all costs are fixed for a distribution
14 utility. In order to further separate a portion of the remaining noncustomer-
15 related fixed costs, we reviewed the Company’s plant Distribution history and
16 discussed current planning standards with respect to Mains (Account 376). We
17 concluded that the smaller diameter, up to 2” diameter mains are primarily used to
18 provide local service. We have included the summary details in the filed
19 Workpapers with the following summary results:

<u>Pipe Size</u>	<u>\$</u>	<u>%</u>
Equal to or less than 2”	24,619,312	23.04
Total	106,849,866	100.00

1 **Q. How did you apply these factors in your calculations?**

2 A. In identifying a backbone system for mains, we identified 23.04% of the mains
3 investment as being related to the backbone distribution system that should be
4 recovered in a fixed monthly charge similar to the customer charge results. We
5 then segregated the mains unbundled revenue requirement costs into a Facility
6 Charge component with the remaining costs left as capacity related. The details
7 supporting these calculations are shown in the rate design, Schedule DLG/PMN-
8 8, page 7, and the filed Workpapers Local Distribution Fixed Facility Charge
9 Factor.

10 **Q. Does the cost of service study provide additional information needed to**
11 **update the Company's CGF?**

12 A. Yes. The cost study presented in Schedule DLG/PMN-1G-4 segregates Indirect
13 Gas Supply Costs from delivery revenue requirements to aid in the updating of
14 the Cost of Gas Factor (CGF). Since these Indirect Gas Supply Costs are
15 associated with providing Supply service, it is important to update these costs to
16 incorporate into the CGF (reference Schedule DLG/PMN-1G-2, page 7 of 8).

17 First, the study identifies the costs associated with the owning and operating of
18 the Company's manufactured gas facilities. For the most part, these LP- and
19 LNG-related costs are incurred to provide gas supplies on extremely cold days.
20 Consequently, the LP and LNG costs were assigned to the Supply function.

1 The second item addresses operations and maintenance expenses associated with
2 the gas acquisition and gas dispatching costs, including any associated legal
3 expenses. The gas dispatching, gas acquisition and legal costs are booked in
4 Accounts 813, 851, 923, and 928. The operations and maintenance expenses
5 associated with gas supply must be unbundled from the transportation rates.
6 Consequently, our cost study explicitly removes these supply-related costs from
7 the delivery revenue requirement and assigns them to gas supply function. A
8 detailed derivation of these costs is also contained in the filed Workpapers.

9 The third item concerns overhead costs such as general plant and administrative
10 and general expenses. Although the majority of these costs are associated with
11 the delivery function, it is obvious that a portion of these costs must be gas
12 supply-related as well. We have automatically assigned a portion of general plant
13 and administrative and general expenses to the gas supply function through the
14 allocation process by the selection of internally developed allocators. As an
15 example, the labor allocator includes the labor associated with LP and LNG plant
16 operations and maintenance expenses, which are primarily gas supply-related
17 costs. Consequently, the overheads allocated on the basis of labor will properly
18 include an assignment of these costs to the gas supply function. Schedule
19 DLG/PMN-1G-2, pages 7 and 8, presents the class summary revenue
20 requirements completely unbundled at the Company's uniform ROR of 8.3%.

1 **V. MARGINAL COST OF SERVICE STUDY**

2 **Overview of Marginal Cost Study**

3 **Q. Please summarize the objectives of a marginal cost study.**

4 A. A marginal cost study provides an estimate of the cost of providing an additional
5 unit of service in the long run. These cost estimates are then applied to
6 appropriate usage characteristics to derive class revenue requirements which can
7 be utilized as a benchmark or reference in setting proposed rates to the extent
8 allowed by considerations of intra-class equity and efficient pricing. The use of
9 marginal costs pricing in ratemaking tends to result in prices that best promote
10 economically rational consumption decisions, and thereby promotes an efficient
11 allocation of society's resources. Sending customers accurate price signals
12 regarding the costs that will result from their consumption decisions furthers this
13 efficiency goal. Customers, in turn, will be able to make informed decisions on
14 their use of utility services.

15 **Q. How is a marginal cost study used in the rate design process?**

16 A. The Northern Utilities New Hampshire Marginal Cost Study (NUMCS)
17 establishes marginal revenue levels and prices for each rate class on the basis of
18 marginal costs, adjusted using the Equi-Proportional Method (EPM) to recover
19 the allowed total Distribution Delivery revenue requirements requested by the
20 Company as shown on Schedule DLG/PMN-2G-1, Table 14. The proposed total
21 system and class Delivery service revenue requirements are established at the
22 adjusted test year Distribution revenue levels. Delivery service marginal costs by

1 class (which differ from the revenue requirement) are then adjusted to equal the
2 delivery system total revenue requirement (Schedule DLG/PMN-1G-2, page 5 of
3 7) on a pro-rata basis using the EPM approach. This calculation is made on
4 Schedule DLG/PMN-2G-1, Table 14 (Workpapers and schedule DLG/PMN-2G-
5 S). The resulting scaled marginal costs by class and cost component then become
6 the theoretical initial revenue targets for the design of Delivery service rates.
7 These results are presented as a final comparison in the rate design process on
8 Schedule DLG/PMN-1G-8, page 7 of 8.

9 **Q. Would you please summarize the approach you employed in this filing?**

10 A. We developed the Company's current filed MCS (workpapers) based on the filing
11 in Docket DG 13-086. Using this model, we updated key cost parameters which
12 include measures of inflation and rate of return, depreciation, and updated other
13 non-cost parameters like sales and customer statistics, etc., as detailed in our
14 summary Schedule DLG/PMN-2G-S. The completed updated MCS has been
15 provided in the workpapers as Schedule DLG/PMN-2G-1 with the Summary
16 Results presented in Exhibit DLG/PMN-2G-S (Table 14) in this direct testimony.
17 All of the marginal costs results (Tables 1 through 14) have been included in the
18 Workpapers.

19 **Q. Why have you chosen this approach to providing a marginal cost study in**
20 **this filing?**

21 A. As stated above, the MCS submitted in this proceeding is an update of the MCS
22 submitted in the Company's last base rate case proceeding. This is because that

1 study is a recent vintage and the Settling Parties in DG 13-086 agreed to use it as
2 the basis for estimating marginal costs in this proceeding. Further, this approach
3 provides a considerable savings to all parties, the Commission and the Company's
4 customers. I note that filing a recent MCS with cost inflation and non-cost
5 updates is similar to what the Company's affiliate, Fitchburg Gas and Electric
6 Light Company, does in Massachusetts and is what the Company's Maine
7 Division did in its current rate case proceeding before the Maine Public Utilities
8 Commission.

9 Since the Company completed a very detailed MCS in their rate filing using a
10 2012 calendar year adjusted to the rate year, we simply updated the key
11 parameters to recalculate these recent marginal results to the new projected rate
12 year. This approach provides updated price levels at the requested revenue levels
13 in this filing to establish initial class revenue targets and an overall pricing level
14 guide for rate design.

15 **Q. Have you developed a Local Distribution Facility Charge Factor similar to**
16 **what was proposed for the COSS discussed earlier in your testimony?**

17 A. Yes, we have. Marginal costs to serve include two types of cost – costs that vary
18 with the number of customers and costs that vary with the design day demands of
19 customers. In essence, the utility must construct a distribution system capable of
20 handling the anticipated loads of customers under extreme weather conditions.
21 These costs are incurred regardless of the actual weather occurring in the test
22 period and are also independent of the volumes consumed by customers

1 throughout the test year. Therefore, it is more appropriate to recover these costs
2 through a demand charge, or in the absence of demand data, a fixed monthly
3 charge rather than a volumetric charge.

4 The factor that we utilized for local distribution costs was the same as the
5 accounting study and applied to growth-related investments. (See Workpapers –
6 Accounting – Local Distribution Facility Charge.) This factor was then applied to
7 the fixed marginal capacity cost on the rate design Schedule DLG/PMN-1G-8,
8 page 7, column L.

9 **VI. RATE DESIGN**

10 **Q. Your cost studies provide a wealth of information. Could you highlight the**
11 **most relevant cost data that will be considered in the overall rate design**
12 **process?**

13 A. Yes, these can be reviewed as follows:

14

<u>Schedule</u>	<u>Description</u>	<u>Page</u>
DLG/PMN-1G-2	Class ROR Results	1 & 2
	Existing Revenue Requirements and Equalized ROR	3 & 4
	Revenue Reconciliation Details	5 & 6
	Unbundled Class Revenue Requirements	7 & 8
DLG/PMN-1G-3	Delivery Class Cost of Service Study	
DLG/PMN-1G-6	Unbundled Class Cost of Service	
	– Existing Rate of Return	1 to 4
	– Uniform Rate of Return	5 to 8
DLG/PMN-1G-8	Rate Design Summary and Calculations	
DLG/PMN-2G-2	Marginal Cost – Table 14	

1 The above schedules provide all of the detail required to design rates to produce
2 the overall class revenue requirements for delivery of \$36,378,086 based on an
3 equalized 8.3% ROR. This represents a \$4,419,189 increase on existing base
4 Delivery revenues of \$36,378,086 (Schedule DLG/PMN-1G-2, page 5 of 8, lines
5 13, 14, 16, and 28).

6 **Revenue Targets**

7 **Q. How have you determined the target class revenue requirements you are**
8 **proposing in the rate designs?**

9 A. Normally, we would develop class revenue targets as a discrete step in the rate
10 design process. The step following revenue targets would normally be specific
11 class rate designs. The overall class rate design calculations are presented on
12 Schedule DLG/PMN-1G-8. Our initial derivation of class revenue targets was
13 based on the goal of setting all customer class revenue requirement levels at the
14 adjusted marginal levels as shown on Schedule DLG/PMN-1G-8, page 2 of 8,
15 columns (S) through (V). Our initial derivation is based on NH history. Before
16 proceeding, we carefully examined the relationship between existing rates by
17 function and the functional costs to serve from our studies. We noticed that the
18 present rates have lower customer charges when compared to the costs developed
19 in our two cost studies. We then determined that our first goal was to set
20 proposed rates closer to cost of service and to moderate the deficient classes'
21 total revenue increases to a lower level which we based on a 125% cap limitation.

1 Schedule DLG/PMN-1G-8 contains eight pages of detail calculations as follows.
2 This increase cap limit of 17.23% ($13.78\% * 1.25$) results in a revenue deficiency
3 for Residential, G-41/T-41, and G-42/T-42 which was then redistributed to all
4 remaining classes on their respective MCS revenue targets.

Page Description

- 1 Class Summary of Billing Units and Blocking Levels
- 2 Summary of Cost of Service Results and Derivation of Class Revenue Targets
(Schedule DLG/PMN-1G-2, pages 1-2, and Schedule DLG/PMN-1G-3, pages
43-44)
- 3 Summary of the Proposed Increases by Customer Class (Column AB-
uniform) with a Rate of Return Comparison at Existing (Column AD) and
Proposed Revenue Levels (Column AC)
- 4 Summary of Existing Charges and Proposed Fixed Customer Charges,
Existing Block Pricing Levels, and Differentials
- 5 Summary of Proposed Seasonal Block Charges, Percent Increases over
Existing Levels and Proposed Block Differential Compared to Existing
- 6 Final Proposed Revenue Recovery by Rate Component for Each Rate Class
(column (x) shows the fixed customer revenue levels from the cost of service
at a uniform ROR compared to the actual recovery of these fixed costs based
on the proposed customer charges in column (y))
- 7 Summary Results of Accounting and Marginal Cost of Service Studies
(Revenue Requirements (Schedule DLG/PMN-1G-8, page 7 of 8) from
Schedules DLG/PMN-1G-3, DLG/PMN-1G-6, and Schedule DLG/PMN-2G-
2, Table 14
- 8 Summaries of the Proposed Rates and Block Differential Targets used to
Establish the Proposed Charges

5 **Q. How did you establish your class revenue targets?**

6 A. We reviewed all aspects of both cost of service studies and their results as
7 summarized on Schedule DLG/PMN-1G-8, page 7 of 8. Next, we utilized the
8 results of the class marginal cost of service study as our starting point as shown
9 on page 2 of this Schedule. We limited or capped residential, medium annual

1 high winter use (G-41/T-41), and high annual high winter use (G-42/T-42) as our
2 starting point for the class deficiency category. Note that both studies present
3 final results that are reasonably supportive of each other for the smaller classes
4 which ensures that the proposed revenue targets and rate levels are properly
5 priced. Both cost studies also emphasize a major increase in fixed cost recovery
6 and a corresponding decrease in fixed costs recovery through the volumetric
7 charges.

8 The most straightforward and simple approach to recover these fixed distribution
9 costs is by applying an increase in the fixed monthly charge. In adopting this
10 pricing approach to the proposed rate design, we also recognized that the revenue
11 increase impact must be moderated to temper the level of increase to a customer
12 class. Traditionally, residential customers have shown an extremely lower rate of
13 return when compared to commercial and industrial customers or to the system
14 average rate of return. In other words, residential customers, and especially the
15 non-heating residential, were being significantly subsidized by larger users. In
16 order to properly incorporate a tempered class revenue target goal, we increased
17 Residential, G-41/T-41, and G-42/T-42 using a traditional 125% cap which set an
18 increase limit of 17.23% ($13.78\% * 1.25$) with the remaining classes recovering
19 the resulting revenue deficiencies (Schedule DLG/PMN-1G-8, page 3).

20 **Q. Are the current rates cost based?**

21 A. Current rates for Residential are not cost based. Both the marginal and
22 accounting cost studies show that the majority of the costs are fixed and should

1 therefore be recovered through a monthly charge. In fact, only a very small
2 portion of these costs are currently being recovered as fixed monthly charges
3 (Schedule DLG/PMN-1G-8, pages 2 and 8). The majority of these fixed costs are
4 being recovered in the existing volumetric rates and through subsidies from other
5 classes.

6 Individual Rate Designs

7 **Q. Could you please summarize your approach to the design of individual rates?**

A. Our process employed five steps. First we established class revenue targets using a 125% cap rate increase. Second, we determined the rate structure for the proposed rates. Due to the level of the Company's total dollar increase and emphasis on fixed cost recovery for Distribution, we proposed no changes to the existing block structure breaks as identified on Schedule DLG/PMN-1G-8, page 1 of 8, columns G and H. The third step was to establish proposed customer charges more reflective of our cost study results. The fourth step was to derive proposed block prices. This fourth step also maintained current block differentials. The final step was to increase all block prices to achieve the targeted revenue levels. Once these charges were derived, we simply calculated the achieved revenue levels based on the Company's billing statistics and compared these results to our revenue targets as shown on page 6, columns (AD) through (AF) to calculate the revenue variance to targets (column (AG)).

21 **Q. How did you establish customer charges?**

1 A. We determined customer charges with consideration of several conflicting goals –
2 to establish customer charges at the levels indicated in the marginal cost of
3 service study. By setting proposed prices towards costs (higher fixed cost), we
4 are improving pricing efficiency which will reduce the existing large fixed cost
5 recovery through current volumetric charges. While proposed monthly customer
6 charges are still somewhat less than costs to serve for Residential classes, they do
7 reflect a continued improvement in fixed cost recovery as shown on Schedule
8 DLG/PMN-1G-8, page 4 of 8, columns X through AD. This pricing goal of fixed
9 cost recovery (Distribution) is paramount to reducing the rather large intra-class
10 subsidies that currently exist in the Company's rate structures through the
11 recovery of these costs in current volumetric charges.

12 **Q. Are you also proposing to introduce a new monthly facility charge to recover**
13 **the additional fixed costs you identified and discussed earlier in your**
14 **testimony?**

15 A. No, we are not at this time. Our efforts are primarily to identify and point out that
16 most of the Company's delivery system costs are fixed in nature whether they be
17 customer or capacity related. The regulatory process has historically required that
18 a large portion of fixed costs be recovered in the variable usage component of
19 approved pricing levels. This approach simply promotes inefficiencies while
20 maintaining somewhat large discounts for lower consumption levels. This occurs
21 by simply establishing volumetric prices at a much higher level by including fixed
22 costs recovery which ultimately provides the consumer with incorrect and inflated

1 pricing levels with which to make consumption decisions. Our effort in this
2 proposed rate design is to begin the important process of placing greater emphasis
3 on the proper and equitable recovery of fixed costs from an inter-class and intra-
4 class basis.

5 **Q. Do your proposed class customer charges recover your calculated accounting**
6 **and marginal monthly costs?**

7 A. No, they do not. For Residential, the proposed recovery is still much lower than
8 costs, but an increase has been proposed to reduce these inequities. Schedule
9 DLG/PMN-1G-8, page 6 of 8, columns X and Y, shows the calculated costs
10 versus the proposed. As can be noted at the bottom total for each column, the
11 proposed total fixed customer costs' under-recovery is still approximately \$5.4
12 million. The proposed customer charge for the C&I classes was increased to
13 recover this rather large fixed cost shortfall from Residential.

14 **Q. How did you establish the block rate pricing levels?**

15 A. The proposed rate block prices are based on essentially maintaining the existing
16 blocking differential for each rate as shown on Schedule DLG/PMN-1G-8, page 5
17 of 8, columns (S) and (T). The percentages shown on this page represent the
18 proposed changes from the corresponding existing base. The remaining revenue
19 requirement for each class, after subtracting the proposed monthly customer, is
20 then the basis for the proposed final block pricing. The specific seasonal and
21 block differential associated with G- and T-51 are detailed separately on page 8 of
22 8.

1 **Q. Have you prepared bill impacts that compare your proposed rates with your**
2 **current approved rates?**

3 A. Yes, we have. Schedule DLG/PMN-1G-9 presents the typical summer and winter
4 bill impacts for each of the Company's rates based on existing and proposed rates.

5 **Q. Have you prepared a separate bill impact for Residential customer classes?**

6 A. I have prepared a more detailed monthly bill impact for Residential rates using an
7 average use each month in Schedule DLG/PMN-1G-10.

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

9 A. Yes, it does