Enbridge Gas New Brunswick
Cost of Service and Rate Design Testimony
Prepared January 15, 2010

Section 1 - Introduction

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

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Q. WHAT IS YOUR POSITION AND BY WHO ARE YOU EMPLOYED?

A. I am a Director with Enterprise Management Solutions, a Black & Veatch Corporation.

Q. ON WHOSE BEHALF ARE YOU APPEARING?

A. I am appearing on behalf of Enbridge Gas New Brunswick ("EGNB").

Q. PLEASE DESCRIBE YOUR BUSINESS AND PROFESSIONAL BACKGROUND.

A. A detailed description of my educational and business background is provided in Appendix A. Briefly, I have a Ph. D. in Economics from Virginia Polytechnic Institute and State University. I have been employed in various analytical, management and executive positions in the gas and electric industry for over 35 years. During that time, I have testified extensively on a variety of regulatory matters, including cost of service and rate design for natural gas Local Distribution Companies (LDCs) in both a bundled and unbundled service model and in Canada and the United States. I have participated as an instructor in the American Gas Association Rate Fundamentals and advanced courses on both rate and cost of service issues. I have developed rates for new service areas called economic development rates and have developed rates for alternate fuel and bypass competition.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. My testimony addresses the development of the cost of service study, both principles and practices, and a potential rate design for gas delivery service. I address certain fundamental rate design principles and how those principles are translated in to rate design for a mature utility.

Q. HOW IS THE TESTIMONY ORGANIZED?

A. The testimony is organized in the following sections:

Section 1- Introduction
Section 2- Cost of Service Principles
Section 3- The Cost of Service Process
Section 4- Results of the Cost Study
Section 5- Principles of Rate Design
Section 6- Rate Design for the Proposed Service Classes
Section 7- Summary

In addition, an exhibit consisting of six schedules is attached to the testimony.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS.

A. I recommend that the proposed cost of service study be accepted as a reasonable cost allocation study for a gas distribution utility such as EGNB. I further recommend that the proposed rate design concepts be accepted as the basis for any future transition from market based rates to cost of service rates. In addition, I recommend that the results of the cost study form a part of the assessment of the timeline for ending the Development Period.

Section 2 - Cost of Service Principles

Q. WHAT IS THE PURPOSE AND USE OF THE COST OF SERVICE STUDY?

A. There are many purposes for utility cost analysis, ranging from designing appropriate price signals to determining the share of costs or revenue requirements borne by various rate classes. In this case, the cost study provides a picture of the annual costs associated with a mature utility service area operating under the traditional rate of return regulation. The cost study illustrates the revenue required from each class to produce the allowed return for the test year 2010.

Q. PLEASE DISCUSS THE CONCEPT OF A TEST YEAR.

A. Rates are based on the cost for a test year designed to be the most reasonable estimate of the actual costs and revenues for the first twelve months after new rates take effect. This period is called the "Rate Effective Period". A future test year, as used in the cost of service study for EGNB, looks at expected costs and revenues for the Rate Effective Period and provides the best match of costs and revenues during the period. In this case, the essence of the determination of the end of the Development Period requires a review of the costs and revenues for the Rate Effective Period and beyond to determine if an end to the Development Period is appropriate. Thus, using the 2010 budget estimate for revenues and costs provides the most appropriate definition of the test year not only in theory but in practice.

Q. DOES EGNB RECOMMEND A SPECIFIC ALLOCATION OF COSTS TO RATES BASED ON THE COST OF SERVICE STUDY?

A. No. Cost of service is a guide to the rate design process. As I discuss below, there are many factors that impact the decision as to the rates for each class of service. From an economic perspective, if class rates exceed marginal cost and are less than stand alone costs, the rates are said to be subsidy free. Thus, factors other than an embedded cost of service analysis must be considered in determining class rates. For EGNB, the status of its greenfield development and the existence of cost deferrals create an additional issue related to cost of service that most utilities do not have to address. Namely, the allocation of deferred costs and the ability to recover these costs while maintaining competitive market rates.

Q. PLEASE DESCRIBE THE VARIOUS TYPES OF COST OF SERVICE STUDIES THAT MAY BE USEFUL FOR RATE DESIGN AND THE ALLOCATION OF REVENUE REQUIREMENTS.

A. In general, cost studies may be based on embedded costs or marginal cost. Embedded cost studies analyze the costs for a test period based on either the book value of accounting costs (a historical period) or the estimated book value of costs for a forecast test year. Where a forecast test year is used the costs and revenues are typically derived from budgets prepared as part of the utility's financial plan. As noted above this is the most appropriate representation of the Rate Effective Period. Typically, embedded cost studies are used to allocate the revenue requirement between jurisdictions, classes and between customers within a class.

Marginal cost studies do not reflect actual costs but rely on estimates of the expected changes in cost associated with changes in service. Marginal cost studies are forward looking to the extent permitted by available data. Marginal cost studies are useful for rate design, but not class cost allocation. Where it is important to send appropriate price signals associated with additional consumption by customers, an understanding of marginal cost may be useful. For a gas utility, detailed studies are not required to assess the impact of additional consumption since the delivery system is built for design day requirements and unless the growth increases design day requirements above an amount that existing facilities can deliver (an unlikely result in most instances) marginal cost of load growth from existing customers is zero.

Q. PLEASE DISCUSS THE REASON THAT COST OF SERVICE STUDIES ARE USED.

A. Cost studies represent an attempt to analyze which customer or group of customers cause the utility to incur the costs to provide service. The requirement to develop cost studies results from the nature of utility costs. Utility costs are characterized by the existence of common and joint costs[1]. In addition, utility costs may be fixed or variable costs[2]. Finally, utility costs exhibit significant economies of scale[3]. These characteristics have implications for both cost analysis and rate design from a theoretical and practical perspective. The development of cost studies, either marginal or embedded, requires an understanding of the operating characteristics of the utility system. Further, as discussed below, different cost studies provide different contributions to the development of economically efficient rates and the cost responsibility by customer class.

Q. PLEASE DISCUSS THE APPLICATION OF ECONOMIC THEORY TO COST ALLOCATION.

A. The allocation of costs using cost of service studies is not a theoretical economic exercise. It is however a practical requirement of regulation since rates must be set based on the cost of service for the utility under cost based regulatory models. As a general matter, utilities must be allowed a reasonable opportunity to earn a return of and on the assets used to serve customers. This is the cost of service standard and equals the revenue requirements for utility service. The opportunity to earn the allowed return depends on the rates applied to customers producing that revenue requirement. Using the information developed in the cost of service

[1] Common costs occur when the fixed costs of providing service to one or more classes or the cost of providing multiple products to the same class use the same facilities and the use by one class precludes the use by another class. Joint costs occur when two or more products are produced simultaneously by the same facilities in fixed proportions. In either case, the allocation of such costs is arbitrary in a theoretical economic sense.

[2] Fixed costs do not change with the level of output, while variable costs change directly with the utility output. Most non-fuel related utility costs are fixed and do not vary with changes in load.

[3] Scale economies result in declining average cost as output increases and marginal costs must be below average costs.

study to advise the development of rates for each class by understanding the allocated cost for the class is useful in the rate design process.

However, the existence of joint and common costs makes any allocation of costs arbitrary. This is theoretically true for any of the various embedded cost methods that may be used to allocate costs. Theoretical economists have developed the theory of subsidy free prices to evaluate traditional regulatory cost allocations. Prices are said to be subsidy free so long as the price exceeds marginal cost but is less than stand alone costs (SAC). The logic for this concept is that if customers' prices exceed marginal cost those customers make a contribution to the fixed costs of the utility. All other customers benefit from this contribution to fixed costs because it reduces the cost they are required to bear. Prices must be below the SAC because the customer would not be willing to participate in the service if prices exceed SAC.

SAC is an important concept for EGNB because most customers have previously met requirements for the end uses supplied by natural gas through the use of alternative fuels. In this case, the SAC may not be the cost of stand alone gas facilities, but the use of alternative energy to meet end use requirements. As a result, subsidy free prices permit all customers to benefit from the systems scale and the common costs, and all customers are better off because the system is sustainable. If the process of cost allocation results in rates that exceed stand alone costs for some customers, prices must be set below the SAC, but above marginal cost to assure that those customers make the maximum practical contribution to common costs.

SAC plays a role in addressing issues such as competitive bypass where customers may potentially exit the grid. SAC represents an element of the allocation process for cost studies and is an alternative to the concept of fully allocated costs. Unlike other more conventional allocation methods, SAC relies on estimated competitive costs rather than actual costs. In this sense, SAC becomes an element of cost allocation to competitive customers.

Q. IF ANY ALLOCATION OF COMMON COSTS IS ARBITRARY, HOW IS IT POSSIBLE TO MEET THE PRACTICAL REQUIREMENTS OF COST ALLOCATION?

A. As noted above, the practical reality of regulation often requires that common costs be allocated among jurisdictions, classes of service, rate schedules and customers within rate schedules. The key to a reasonable cost allocation is an understanding of cost causation. From a cost of service perspective, the best approach is to directly assign costs where costs are incurred for a customer or class of customers and can be so identified. Where costs cannot be directly assigned, the development of allocation factors by rate schedule, or class, uses principles of both economics and engineering. This results in appropriate allocation factors for different elements of costs based on cost causation. For example, we know from the way customers are billed that each customer requires a meter. Meters differ in size and type depending on the customer's load characteristics. These meters have different costs based on size and type. Thus meter costs are customer related, but differences in the cost of meters are reflected by using a different meter cost for each class of service.

Q. PLEASE DISCUSS THE SCALE ECONOMIES ASSOCIATED WITH GAS DISTRIBUTION SERVICE.

A. Gas system scale economies reflect the relationship between the installed cost of pipe by size and type, coupled with the increased capacity from pressure and pipe diameter. Simply doubling the size of the gas main more than doubles the available capacity of the main, at a cost approximately equal to or less than double the smaller size all else equal. For a low pressure system, increasing pipe size from two inch to four inch allows over five times the amount of gas to flow, and the flow rate increases under higher pressure by more than six times that of two inch pipe all else equal. The resulting cost causation implies that larger customers impose lower per unit costs on the distribution system than do smaller customers.

Q. WHAT IMPLICATIONS RESULT FROM SCALE ECONOMIES RELATED TO COST OF SERVICE AND RATE DESIGN?

A. The implication of scale economies for both cost allocation and rate design on the gas system are quite important. Namely, the cost to serve residential and the smallest general service customers (excluding gas costs) is the same regardless of the size of customer, since the minimum system installed by EGNB will serve nearly every customer in this group. As discussed below, the classes were developed based on this consideration, and combined residential and the smallest general service customers into a single homogeneous class of service.

Section 3 - The Cost of Service Process

Q. PLEASE DESCRIBE THE COST OF SERVICE PROCESS.

A. Cost of service begins with the collection of test year costs, load data (customer billing and usage records) and operating data. The cost data is analyzed using a three step process. The three steps are functionalization, classification and allocation.

Q. PLEASE DESCRIBE THE COST FUNCTIONALIZATION.

A. Functionalization is the first step of the cost analysis. Costs are functionalized based on the purpose of the costs. The cost functions are production, storage, transmission, distribution and customer (also referred to as “On site” for meter, regulator and service line installed on customer’s site). Not every gas utility invests in facilities to perform each of these functions. Some gas utilities own gas production assets such as wells and gathering facilities that would be part of the production function. The storage function may be underground storage facilities or LNG tanks and related assets. For an LDC, transmission mains are usually very large steel mains operating under pressures similar to long haul pipelines.

Distribution facilities include city gate stations, mains and related equipment such as valves. Customer facilities include a portion of service lines, meters and regulators installed on-site at the customer's premises. EGNB currently performs only the distribution and customer functions, because they have not invested resources in production, storage and transmission.

Q. PLEASE DESCRIBE COST CLASSIFICATION.

A. The second step in the cost of service process is cost classification. The purpose of this step is to classify costs based on the underlying cost causation. The four cost defining characteristics for a gas utility are demand (capacity), commodity, customer and revenue. Demand costs refer to those portions of the system that must be designed to serve the maximum demand on that portion of the system. In the case of a gas LDC the system as a whole is designed to serve the design day load requirements of its customers. Portions of the system may be designed to serve the design day load of a specific customer. Large industrial customers may have a design day that is not coincident with the system peak, in which case local facilities must serve the customer on its design day. Commodity costs are those costs that vary directly with the amount of gas consumed. Customer costs vary with specific customer requirements, the number of customers or both. Revenue related costs include costs that vary with sales revenue.

Some costs cannot be directly classified as demand, commodity, customer or revenue. These costs are classified based on the factor most closely related to cost incurrence. For example, it is possible to classify mains into a customer and demand component directly. The O&M expenses for mains are then classified in the same way the mains account is classified. General plant is most closely related to labour costs, as these costs are typically incurred in support of the utility's workforce, so that the classification of labour between customer and demand in all of the non-general plant accounts serves as the basis for classifying general plant between demand and customer. Thus the same percentage of labour classified as demand is used to classify general plant as demand and so forth. The details of classification are part of the cost study as discussed below.

Q. PLEASE DESCRIBE THE COST ALLOCATION STEP.

A. The final step of the cost of service process is the allocation of those costs that cannot be directly assigned. Cost studies use two types of allocation factors: external factors and internal factors.

External allocation factors are based on direct knowledge from data in the utility's accounting and other records. For example, distribution costs are functionalized to various distribution accounts, classified to demand and customer and are allocated by external distribution allocation factors related to design day demand and number and type of customers. Consider the example of the external allocation factor used in the allocation of mains. The cost of distribution mains are known and functionalized directly to the distribution function. Once assigned to distribution, the costs are classified as demand or customer related using the minimum system as the external factor for the customer component and the design day demand for the demand component of costs. In the case of EGNB, 77% of mains were determined to represent the cost of the minimum system requirements and 23% to meet peak demand needs. The costs are then allocated to each class of service based on the number of customers in the class for customer costs and the design day demand for the class for demand costs.

Internal allocation factors are based on some combination of external allocation factors, previously directly assigned costs and other internal allocation factors. For example, the allocation factors for property insurance costs are based on plant investment amounts assigned to each function; it is necessary to compute the amount of plant by function before property insurance costs can be assigned. Both external and internal allocation factors are used in each of the classification and allocation steps.

Q. WHAT FACTORS CAUSE THE LDC TO INCUR DISTRIBUTION COSTS?

A. Embedded costs for the distribution system are determined by two major factors: (1) the number and location of customers and (2) their demands (albeit for gas distribution the impact of demand becomes less important when pipe scale economies for residential and small commercial customers cause the minimum installation to also serve design day demand). Utility cost studies have traditionally attempted to identify a portion of distribution costs as customer-related and the remaining portion as demand-related. While it is true that marginal demand costs play a role in the installed facilities, the customer considerations play a much larger role since local facilities and policies reflect the underlying customer mix and density. The critical issue for a gas system is that the system provides sufficient capacity to meet the design day load requirements of customers. For residential and the smallest general service customers, the smallest distribution pipe installed on the system will serve the design day capacity of these customers. As a result, the cost to serve the individual customers in these classes is the same regardless of the design day demand.

Q. HOW ARE THESE PRINCIPLES TRANSLATED INTO THE COST OF SERVICE STUDY?

A. The development of allocation factors to reflect the way system costs are incurred provides the link between principles and practice. For example, the demand portion of the gas distribution system must be allocated on design day requirements. This point is discussed in the National Association for Regulatory Utility Commissioners ("NARUC") *Gas Distribution Rate Design Manual* ("NARUC Manual") as follows:

> Demand or capacity costs vary with the quantity or size of plant and equipment. They are related to the <u>maximum system requirements</u> which

> the system is designed to serve during short intervals and do not vary with the number of customers or their annual usage.[4] (Emphasis added.)

The design day demand allocation factor is developed using the maximum level of heating degree days as the basis of the demand allocator for the system facilities that are classified as a demand component. The principle of cost causation requires a reasonable allocation methodology to use design-day demand as the allocation factor for the demand portion of mains. Similarly, customer costs must be allocated to classes based on the number of customers or in some cases the weighted number of customers. Where gas commodity service is unbundled, there is no allocation of commodity costs required, as is the case for EGNB. Each choice of an allocation factor is made to reflect the practical realities of system operation and the variable, or variables that cause a particular cost category. This is the way to translate cost principles into a cost of service study.

Q. HOW DO OTHER ALLOCATION FACTORS SATISFY THESE PRINCIPLES?

A. By carefully understanding how costs are incurred, it is possible to develop allocation factors that match costs with the service or activity responsible for the costs. The following is a summary of some of the major allocation factors and the relationship to cost causation.

1. Customers- Certain costs such as meter and service line are directly related to the number of customers. The use of customers to allocate these costs ties cost causation to allocation. Similarly, some portion of the system of mains is directly related to connecting the customer to the system so it is appropriate to allocate a portion of mains to customers.

[4] *Gas Distribution Rate Design Manual*, Prepared by the NARUC Staff Subcommittee on Gas, June 1989, pp. 23-24

The cost study uses a minimum system method[5] to estimate the customer component of mains. Even within the customer allocation factor, cost analysis must correctly factor in the different unit costs among customer classes. For example there is a difference in meter costs for customers by size and type of meter. The customer allocation of meter costs reflects these differences by using a weighted customer count or actual class meter costs to reflect meter cost differences.

2. General Plant- The allocation of general plant considers the use of that plant in the allocation process. Since much of general plant is directly related to employees (office space, office equipment, tools and computer related investment), these costs are allocated on a labour allocation factor.
3. O&M Expenses- The allocation of O&M expenses follow the allocation of the plant that it supports. The rationale for this is that the plant allocation reflects the factors that cause the plant requirements. Since O&M is designed to allow the plant to operate and continue its useful life, the expenses associated with that plant are related to the classification of the plant. Thus the allocation to design day demand or customer follows directly from the allocation of the plant for which the expenses are incurred. Thus distribution operation and maintenance expenses are allocated the same way that the plant is allocated.
4. Deferral Account / Development O&M- For EGNB, one unique rate base item is the Deferral Account. Also, certain expenses associated with development were allowed to be deferred (Development O&M). These costs are essentially functionalized as other costs to keep them separate for rate making purposes, and classified as plant since they related to deferred costs associated with the operation of the distribution system. The allocation follows the plant allocation factors of demand and customer based on the weighting of the plant components because the costs are

[5] The minimum system method calculates the cost of all mains on the system at the cost of the smallest size main installed by the utility. This is usually 2 inch plastic main. These costs are compared to the actual cost of all main (in the same year dollars) to produce a percentage of main costs to be classified as customer related.

caused by the existence and operation of the underlying plant developed to serve both design day demand and customers.

The above discussion illustrates how the application of cost principles results in the allocation of costs based on cost causation.

Q. DOES THE COST OF SERVICE ANALYSIS PROVIDE INFORMATION USEFUL FOR RATE DESIGN?

A. Yes. For example, the cost of service study allows the analyst to determine appropriate service classifications for use in developing rates. For EGNB, the result of class considerations permitted the development of a small general service class that includes both residential and small commercial customers based on the size of customers. For this class, customers are served with the same type of meter, regulator, service line and main. The result is a relatively homogeneous class of customers served under the same rate design.

Section 4 - Results of the Cost Study

Q. PLEASE DISCUSS THE APPLICATION OF THE THREE STEPS IN THE COST OF SERVICE STUDY.

A. Costs are functionalized and classified in the study based on accounting data from the books and records of EGNB. Costs are allocated to classes based on a variety of allocation factors designed to reflect cost causation that ultimately reflect design day demand and customers.

Q. PLEASE DESCRIBE THE RESULTS OF THIS PROCESS AS APPLIED TO THE COST OF SERVICE DATA.

A. The following section outlines, by account, the functionalization and classification of costs. The allocation for these costs is discussed in general below.

I. Gas Plant in Service

A. <u>Intangible Plant - None</u>

B. Production Plant - None

C. Storage Plant - None

D. Transmission Plant - None

E. Distribution Plant

a. Land and Land Rights

Land and Land Rights are functionalized and classified based on other distribution accounts.

b. Services

Services are functionalized to Distribution and then classified to Distribution Customer.

c. Mains

As discussed earlier, mains are functionalized to Distribution, and then classified as either Distribution Customer or Distribution Demand. The customer component percentage was estimated using data for a mature utility of like size. By employing the minimum-size concept, 77% of the distribution mains were classified as customer related and 23% distribution demand related.

d. Measuring and Regulating Station Equipment

Measuring and regulating equipment is functionalized to Distribution and classified to Distribution Demand.

e. Meters

The plant account for meters is functionalized to Distribution and then classified to Distribution Customer.

f. Development O&M

As discussed above, these costs are classified to Distribution Demand and Distribution Customer based on plant.

F. General Plant

General Plant accounts are functionalized and classified based on labour.

II. Depreciation Reserve

Depreciation Reserve accounts are functionalized and classified based on their corresponding gross plant values.

III. Other Rate Base Items

These various accounts are functionalized and classified based on labour or plant. The Deferral Account is classified as Distribution Demand and Distribution Customer as discussed above.

I. Operation and Maintenance Expenses

A. Production Expenses

1. Gas Supply Operation Expense

These expenses are classified to Distribution Demand and Distribution Customer based on distribution plant.

B. Storage Expenses- None

C. Transmission Expenses- None

D. Distribution Expenses

1. Mains/Services Expenses

Expense for mains and services are functionalized and classified proportionally based on the Main and Service plant accounts.

2. Measuring and Regulating Expenses

Measuring and Regulating expenses are functionalized to Distribution and classified to Distribution Demand.

3. General Maintenance

General Maintenance expenses are functionalized and classified based on the cost of labour for the non-general plant accounts as discussed above.

II. Sales and Marketing Expenses

1. Advertising

Advertising expenses, which includes incentives, are functionalized Onsite and classified to Customer.

2. Other Sales Promotion

Other Sales Promotion Expenses are functionalized Onsite and classified to Customer.

III. Customer Service & Information Expenses

1. Meter Reading Expenses

Meter Reading Expense is functionalized Onsite and classified to Customer.

2. Customer Billing & Accounting Expense

Customer Billing & Accounting Expense are functionalized Onsite and classified to Customer.

3. Uncollectible Account Expenses

Uncollectible Accounts Expense is functionalized Onsite and classified to Customer.

IV. Administrative and General Expenses

Administrative and General Expenses are identified in two groups: labour related, and plant related. Labour related expenses are functionalized and classified according to labour in each function. Plant related expenses are functionalized and classified according to plant in each function.

VI. Depreciation and Amortization

Depreciation and Amortization Expenses are functionalized and classified the same as the allocation of Accumulated Depreciation and Amortization. Accumulated Depreciation and Amortization follow the plant accounts for function and for classification. If a plant account is classified as Demand the accumulated depreciation logically must also be classified to Demand. If the plant is classified as both Distribution Demand and Customer, the depreciation expense and accumulated depreciation follow the plant.

VII. Taxes

A. General Tax, Real Estate Tax

General taxes are functionalized and classified based on the form of the tax. Real Estate Taxes are functionalized and classified based on Plant.

B. Franchise and Revenue Taxes: None

C. Income Taxes: None

V. Revenue and Other Revenue

Revenues were functionalized and classified based on revenue requirements.

Q. PLEASE DISCUSS THE ALLOCATIONS USED IN THE COST OF SERVICE STUDY.

A. In general, the demand allocation factors are related to design day requirements. There are no commodity related costs in the study. The customer allocation factors are based on the number of customers in each class. The final allocation for each account is summarized in the cost of service study.

Q. PLEASE DESCRIBE THE COST OF SERVICE SCHEDULES ATTACHED TO THE TESTIMONY.

A. There are five schedules attached to the testimony that provide the results of the cost of service study based on the concept of a “Mature Utility”, using accounting and cost of service assuming amortization of the deferred accounting treatment associated with the Development Period.

- Schedule HEO-1 consists of 5 pages and represents the results of the class cost of service study for the test year. Each page contains an account description or label for the accounting data indicating the category of cost. The total dollars for each account is also provided. The remainder of the page shows the proportion of each account allocated to each rate class based on the proposed class definitions. Page 4 provides the net income (line 218) and earned return (line 219) for EGNB and each rate class under current rates. Page 5 provides the total cost of service revenue requirement (line 268) for EGNB and each rate class assuming that each rate class must earn the allowed return.
- Schedule HEO-2 consists of 5 pages and provides the summary of account functionalization. As Schedule HEO-2 illustrates, all EGNB costs are functionalized as distribution and on-site (customer).
- Schedule HEO-3 consists of 6 pages and summarizes the classification of the distribution function accounts. No portion of distribution costs are related to commodity so no portion of these costs is classified as commodity.

- Schedule HEO-4 consists of 20 pages and provides the allocation of each account by classification and by rate class.
- Schedule HEO-5 consists of 4 pages and provides a summary of the allocation factors by account and function.

Q. PLEASE DISCUSS THE IMPLICATIONS OF THE COST STUDY FOR THE DETERMINATION OF THE END POINT OF THE DEVELOPMENT PERIOD.

A. The cost of service study provides a benchmark for determining the revenue requirement that must be recovered from rates in order for the utility to have a reasonable opportunity to earn the allowed return. The results demonstrate the level of revenue required to provide and sustain a mature utility. In addition, the results provide guidance related to the benefit of additional system expansion through the addition of new customers. Where adding customers produces more revenue than additional cost, the unit cost of service will decline.

Section 5 - Principles of Rate Design

Q. PLEASE IDENTIFY THE PRINCIPLES OF RATE DESIGN YOU HAVE RELIED ON TO RECOMMEND A RATE PROPOSAL BELOW.

A. A number of rate design principles or objectives find broad acceptance in regulatory and policy literature. These include:

1. Efficiency;
2. Cost of Service;
3. Value of Service;
4. Stability;
5. Non-Discrimination;
6. Administrative Simplicity;
7. Balanced Budget.

These rate design principles draw heavily on the "Attributes of a Sound Rate Structure" developed by James Bonbright in Principles of Public Utility Rates. Each of these principles plays an important role in analyzing the rate designs discussed in my testimony. To understand the role these principles play, the following discusses each of the principles.

Q. PLEASE DISCUSS THE PRINCIPLE OF EFFICIENCY.

A. The principle of efficiency broadly incorporates both economic and technical efficiency. As such, this principle has both a pricing dimension and an engineering dimension. Economically efficient pricing promotes good decision-making by gas producers and consumers, fosters efficient expansion of delivery capacity, results in efficient capital investment in customer facilities and facilitates the efficient use of existing pipeline, storage and distribution resources. The efficiency principle benefits stakeholders by creating outcomes for regulation consistent with the long-run benefits of competition while permitting the economies of scale consistent with the best cost of service. Technical efficiency means that the development of the system is designed and constructed to meet the design day requirements of customers using the most economic equipment and technology consistent with design standards.

Q. PLEASE DISCUSS THE COST OF SERVICE AND VALUE OF SERVICE PRINCIPLES.

A. These principles each relate to designing rates that recover the total revenue requirement without causing inefficient choices by consumers. The cost of service principle contrasts with the value of service principle when certain transactions do not occur at price levels determined by embedded cost of service. In essence, the value of service acts as a ceiling on prices. Where prices are set at levels higher than the value of service, consumers will not purchase the service.

As previously noted, the calculation of a "true" cost of service is complicated by the fact that for network industries like the natural gas distribution industry, the provision of public utility service often involves joint and common costs which must be allocated (rather than directly assigned) to specific customer classes or rate schedules to develop a full cost of service study. While a good fully distributed cost of service analysis can be performed using principles of cost causation, informed judgment is nonetheless required to perform such a study. A fully distributed cost of service study, properly reflecting cost causation principles and employing sound methods, provides a reasonable tool for evaluating the allocation of the total revenue requirement to customer classes (interclass distribution) and within the customer classes (intraclass distribution). Importantly, the cost allocation must also recognize the value of service ceiling. This is particularly true for a greenfield operation where the maximum rate applicable to a customer must be less than the cost of an alternative energy source for providing the end use services from another energy source. Failure to set rates below the value of service ceiling means that customers will elect to use other energy sources to the detriment of all customers.

Q. PLEASE DISCUSS THE PRINCIPLE OF STABILITY.

A. The principle of stability typically applies to customer rates. This principle suggests that reasonably stable and predictable prices are important objectives of a proper rate design. The stability principle also incorporates the concept of gradualism in moving from one system of pricing to another. For example, under this principle changing from one rate form to another may require several steps to gradually transition to new rates in order to prevent customer rate shock that would occur if the transition resulted in significant changes for large numbers of customers. Of course, bills for heating customers and market commodity rates are not stable because of weather and market volatility. This does not mean that such rates violate the stability principle since the delivery service portion remains the same regardless of the weather or the cost of gas. Under cost of service rates, it is not unusual to reflect market fluctuations based on gas commodity costs although some utilities have purchased gas adjustment mechanisms that smooth out market fluctuations, thus sacrificing price efficiency for stability under a regulated pricing process. Given the unbundled gas supply in New Brunswick, there is no issue related to stability.

Q. PLEASE DISCUSS THE CONCEPT OF NON-DISCRIMINATION.

A. The concept of non-discrimination requires prices designed to promote fairness and avoid undue discrimination. Fairness requires no undue subsidization either between customers in the same class or across different classes of customers. As noted above, there is a range of outcomes that may be reasonable on economic grounds- between marginal cost and SAC.

This principle recognizes that the ratemaking process requires discrimination where there are factors at work that cause the discrimination to be useful in accomplishing other objectives. For example, things like the location, type of meter and service, demand characteristics, size, and a variety of other considerations are often recognized in the design of utility rates to properly distribute the total cost of service to and within customer classes.

Q. PLEASE DISCUSS THE PRINCIPLE OF ADMINISTRATIVE SIMPLICITY.

A. The principle of administrative simplicity as it relates to rate design requires prices reasonably simple to administer and understand. This concept includes price transparency within the constraints of the ratemaking process. Prices are transparent when customers are able to reasonably calculate and predict bill levels and interpret details about the charges resulting from the application of the tariff. The principle of simplicity also recognizes that different customer classes may have different tolerances for complexity. Thus, it is not unusual to have more complex rates for larger commercial and industrial classes because the more complex rates track costs better and the customers have more expertise to understand the rates.

Q. PLEASE DISCUSS THE PRINCIPLE OF THE BALANCED BUDGET.

A. Finally, there is the critical principle that rate design permits the utility a reasonable opportunity to recover the allowed revenue requirement based on the cost of service. Proper design of utility rates is a necessary condition to enable an effective opportunity to recover the cost of providing service included in the revenue requirement authorized by the regulatory authority. This principle is very similar to the stability objective previously discussed from the perspective of customer rates. Under the balanced budget principle, recognition is given to the fact that rates are set prospectively. As previously noted, the first twelve months of the new rates is referred to as the "Rate Effective Period". This principle recognizes that the costs and revenues from a test period are intended to be an estimate of the costs and revenues in the Rate Effective Period. It is incumbent on the regulatory process to be assured that the rates provide a reasonable opportunity to earn the allowed return in that Rate Effective Period. When rates fail to meet this test, the rates are unreasonable.

Q. AT TIMES, CAN THE OBJECTIVES EMBEDDED IN THESE PRINCIPLES COMPETE WITH EACH OTHER?

A. Yes, like most principles that have broad application, these principles can compete with each other. This competition, or tension, requires further judgment to strike the right balance between the principles. Detailed evaluation of rate design alternatives and rate design recommendations must recognize the potential and actual competition between these principles. Indeed, Bonbright discusses this tension in detail. Rate design recommendations must deal effectively with such tension. For example, as noted above, there are tensions between cost and value of service principles.

Q. PLEASE DESCRIBE THE CONFLICT BETWEEN MARGINAL COST PRICE SIGNALS AND THE RECOVERY OF THE REVENUE REQUIREMENT.

A. The conflict between good price signals based on marginal cost and a balanced budget or revenue recovery principle arises because marginal cost is below average cost due to economies of scale. Where fixed delivery service costs do not vary with volume of gas sales, marginal costs for delivery equal zero. Marginal customer costs equal the additional cost of providing the entire delivery service to the customer. Marginal cost tends to be either above or below average cost in both the short run and the long run. This means that marginal cost-based pricing will produce either too much or too little revenue to support the revenue requirement. This suggests that efficient price signals may require a multi-part tariff designed to meet the revenue requirements while sending marginal cost price signals related to consumption decisions. Properly designed, a multi-part tariff may include elements such as access charges, facilities charges, demand charges, consumption charges and the potential for revenue credits. In the case of a gas LDC, for residential and small general service customers the combination of scale economies and class homogeneity permits the use of a single fixed annual charge that meets all of the requirements for an efficient rate and recovers the embedded cost revenue requirement as an additional rate option. For larger customers, a combination of these elements permit good price signals and revenue recovery; however, the tariff design becomes more difficult to structure and likely will no longer meet the requirements of simplicity. Therefore, sacrificing some economic efficiency for a customer class in order to maintain simplicity represents a reasonable compromise. For larger customers the added complexity of a demand charge is not a concern. Further, for the largest customers where costs and load characteristics differ significantly, the cost of metering is customer specific and each customer creates its own unique requirements for distribution service based on factors such as distance from the city gate, pressure requirements and contract demand.

Q. ARE THERE OTHER POTENTIAL CONFLICTS?

A. Yes. There are potential conflicts between simplicity and non-discrimination and between value of service and non-discrimination. Simple rates for classes that are not homogeneous often result in intraclass subsidies because of different load characteristics and facility requirements. Other potential conflicts arise where utilities face unique circumstances that must be considered as part of the rate design process.

Q. HOW ARE THESE PRINCIPLES TRANSLATED INTO THE DESIGN OF GAS DISTRIBUTION RATES?

A. The process of developing rates within the context of these principles and conflicts requires a detailed understanding of all the factors that impact rate design. These factors include:

1. System cost characteristics such as the embedded customer, demand and commodity related costs by type of service;
2. Customer load characteristics such as peak demand, load factor, seasonality of loads, and quality of service;
3. Market considerations such as elasticity of demand, competitive fuel prices, end-use load characteristics and bypass alternatives related to alternate fuels in the case of EGNB; and
4. Other considerations such as the value of service ceiling/marginal cost floor, unique customer requirements, areas of under-utilized facilities, opportunities to offer new services and the status of competitive market development.

In addition, the development of rates must consider existing rates and the customer impact of modifications to the rates.

In each case, a rate design seeks to recover the authorized level of revenue based on the actual billing determinants occurring during the test period used to develop the rates.

Section 6 - Rate Design for the Proposed Service Classes

Q. PLEASE DESCRIBE THE EXISITNG EGNB RATES.

A. Currently, EGNB has the following rate schedules:

1. Small General Service Residential Electric (SGSRE)
2. Small General Service Residential Oil (SGSRO)
3. Small General Service Commercial (SGSC)
4. General Service (GS)
5. Contract General Service (CGS)
6. Contract Large General Service LFO (CLGS-LFO)
7. Contract Large General Service HFO (CLGS-HFO)
8. Off Peak Service (OPS)
9. Contract Large Volume Off Peak Service (CLVOPS)
10. Natural Gas Vehicle Fueling (NGVF)

For the various schedules applicable to smaller customers, the schedules consist of a Monthly Distribution Customer Charge and a flat Monthly Distribution Delivery Charge that is a volumetric charge per GJ. The contract service rates consist of a two part Monthly Distribution Delivery Charge, with a demand charge per GJ of the greater of contract demand or the actual billing demand and a flat charge per GJ for delivered volumes. Rate CLGS-LFO has a declining block charge per GJ for delivered volumes.

Q. PLEASE DESCRIBE THE PROPOSED NEW RATE CLASSES.

A. The proposed new rate classes consist of the following:

1. Small General Service (SGS)
2. Mid General Service (MGS)
3. Large General Service (LGS)
4. Contract General Service (CGS)
5. Industrial Contract General Service (ICGS)
6. Off Peak Service (OPS).

Q. HOW DO UTILITIES DETERMINE THE NUMBER AND TYPE OF RATE CLASSES?

A. The determination of rate classes may be accomplished in a variety of ways. Classes may be determined based on customer end use characteristics such as residential, commercial and industrial. Rate classes are designed to group customers together so that the groups are relatively homogeneous in terms of load characteristics and methods of taking service. This is of particular concern where rates must be relatively simple since such rates cannot track variations in costs within rate schedules with limited rate components. In determining the rate classes for EGNB, the process focused on the fundamental principles of class homogeneity in terms of load characteristics and the method of taking service (the size and type of delivery facilities).

Q. PLEASE DESCRIBE THE DETERMINATION OF THE PROPOSED RATE CLASSES.

A. By grouping homogeneous customers together, the proposed rate classes provide a reasonable basis for cost determination. The SGS rate includes the former residential rates as well as the smallest general service customers. The SGS customers have similar load characteristics based on the end use of gas behind the meter and are served using similar facilities. The other rate classes are delineated by customer size based on peak month usage as a proxy for design day demand, and recognize that customer size is a significant element in the determination of the cost to serve customers and the impact of scale economies. The following table summarizes the classification for each class.

Table 1

Rate Classification Based on Size

Rate Class	Minimum Size Peak Month Use	Maximum Size Peak Month Use
SGS	None	Less than 60 GJ
MGS	60 GJ	Less than 250 GJ
LGS	250 GJ	None
CGS	1,000 GJ	Less than 10,000 GJ
ICGS	10,000 GJ	None

Rates SGS, MGS, LGS and OPS consist of a customer charge and, with the exception of SGS, a declining block rate charge, and as such require more homogeneity within the class to track intraclass costs. The other rates have a contract demand charge and a declining block rate charge. The declining block rate charge recognizes the scale economies associated with delivery service. As with any new rate designs, it may be necessary to incorporate other features such as additional rate blocks, graduated customer charges and potentially other rate designs to track costs more precisely as the utility becomes a mature utility. Specifically, it is proposed that the LGS rate class have at least two different customer charges based on meter type and size to reflect the cost of service. A seasonally differentiated tail block for the non-heating season to adequately track costs for high load factor customers in the class is also proposed for the LGS rate class. Finalizing these types of determinations will be part of the cost of service/ rate design process for a mature utility and the transition away from the Development Period.

Q. DOES USING SIZE AS THE BASIS FOR RATE CLASSES CREATE AN ISSUE RELATIVE TO THE CROSSING POINTS AMONG THE RATES?

A. Yes. Using size to determine the rate applicable to customers creates an issue for customers whose usage is near a breakpoint in the rates. For this reason, it is useful to define rate provisions so that customers do not switch between rate schedules when there is a short term benefit of doing so. For example, a customer with one or two winter months when the temperature is colder than normal may exceed 60 GJ and thus would be eligible for the MGS rate. However, the MGS rate would not be the proper rate for the customer except in cold winter months. The solution to this type of issue is to require a 12 month term of service for any rate schedule to prevent rate shopping by customers. In addition, the use of minimum bills also prevents customers from shifting to a different rate without class load characteristics reflective of that rate. Minimum bills may be more than the customer charge. For example, the LGS minimum bill might be the customer charge plus 10 GJ of consumption each month of the year or possibly during the winter months of December through March. This would assure that only large customers would use this rate schedule. By using a term of service and a minimum bill, issues related to the crossing points are resolved.

Q. HAVE YOU DEVELOPED PROTOTYPE RATES BASED ON THE COST OF SERVICE STUDY AS EXAMPLES OF RATE OPTIONS?

A. No. At this time, there is no proposal to move from market based rates. The final design and costing of the first cost of service rates will depend on many factors that should be reviewed at the time of transition, rather than in the abstract, when significant changes may occur in the elements of the rates and levels of costs based on a variety of factors during the Development Period. Rather, we have provided a summary of the average cost per GJ for delivery service based on cost of service revenue requirements less other revenues to illustrate the approximate magnitude of rates resulting from strict adherence to the cost study. Schedule HEO-6 provides this information.

Q. HOW SHOULD THESE RATES BE USED?

A. These rates should be the basis of a comparison of cost of service plus expected gas costs to alternate fuel prices for determining if the cost of service is sustainable over the long term. Based on the results of the cost study and the unit costs to be recovered under cost based rates, it is reasonable to conclude that such rates are not currently viable or sustainable across all rate classes. Continued expansion of the system is critical to achieving sufficient scale necessary to end the Development Period. In addition, given the use of market based rates, some transition period will be necessary to move to the end state based on sound rate design principles.

Section 7 - Summary

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. My testimony discusses both the theory and application of gas cost of service and rate design. I demonstrate that the cost of service methodology properly reflects cost causation and produces reasonable results related to the costs for each class of service. The cost of service also produces the annual revenue requirement for EGNB based on the 2010 test year. This information is useful relative to the required level of rates and the potential timing of the end of the Development Period.

Q. DOES THIS COMPLETE YOUR TESTIMONY?

A. Yes.