nationalgrid

Thomas P. O'Neill
Senior Counsel

Via Hand Delivery

February 26, 2010

Debra A. Howland
Executive Director and Secretary
New Hampshire Public Utilities Commission
21 South Fruit Street, Suite 10
Concord, New Hampshire 03301-2429

Re: **DG 10-___**
EnergyNorth Natural Gas, Inc d/b/a National Grid NH
Integrated Resource Plan

Dear Ms. Howland:

In accordance with the Commission's Order No. 24, 941 dated February 13, 2009 in Docket No. DG 06-105, enclosed is an original and (9) copies of the EnergyNorth Natural Gas, Inc. d/b/a National Grid NH's Integrated Resource Plan, for review and approval by the Commission. An electronic copy will be sent under separate cover.

Also, please include Steven V. Camerino on the service list in this matter. Mr. Camerino's contact information is:

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If you should have any questions, please do not hesitate to contact me.

Yours truly,

Thomas P. O'Neill

TPO/tas
Enclosures

cc: Meredith Hatfield, Office of the Consumer Advocate

NATIONAL GRID NH

INTEGRATED RESOURCE PLAN

(November 1, 2010 – October 31, 2015)

DG 10-1__

FEBRUARY 26, 2010

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EXECUTIVE SUMMARY

This Integrated Resource Plan ("IRP" or "Plan") for the period November 1, 2010 through October 31, 2015 is filed with the New Hampshire Public Utilities Commission ("Commission") by EnergyNorth Natural Gas, Inc. d/b/a National Grid NH ("National Grid NH " or the "Company") in compliance with the Commission's Order No. 24,941 dated February 13, 2009 in Docket DG 06-105.

This IRP demonstrates that the Company's planning process ensures that it maintains a reliable resource portfolio and energy supply to meet the forecasted needs of its customers at the lowest possible cost. The Plan includes: (i) a step-by-step description of the methodology the Company uses to forecast demand on its system, (ii) a detailed description of the analysis the Company employs to determine its normal and design planning standards, (iii) a detailed description of how the Company develops its resource portfolio to meet customer requirements under design conditions, (iv) a complete inventory of the expected available resources in the Company's portfolio, including savings associated with the implementation of energy efficiency programs and (v) a demonstration of the adequacy of the portfolio to meet customer demands under a range of weather and economic conditions.

The Company's planning process begins with its methodology for forecasting demand using an econometric demand model to determine annual incremental growth for the traditional residential, and commercial industrial markets, and specific market analysis for non-traditional markets, including natural gas vehicles and large scale cogeneration projects. The econometric model uses the SAS statistical software package to perform data analysis that relates sales by class to factors such as population, labor force, gross state product and economic forecasts to develop annual incremental sales projections. The results of the incremental demand forecasting methodology indicate that, over the five year forecast period, sales in the residential market are projected to grow by an average of 87,477 MMBtu per year and sales in the commercial/industrial market are projected to grow by an average of 268,907 MMBtu per year. The Company projects no incremental growth opportunities in non-traditional markets over the forecast period. These incremental growth projections are added to the base line, or "springboard," normalized sendout figures from the April 2008 to March 2009 split year to generate the forecasted total demand requirements. The normalized sendout springboard figures are the result of a detailed regression analysis of daily sendout versus heating degree days ("HDD") that establishes a strong statistical relationship between weather and load on the Company's system. The end result of the demand forecasting process projects sendout growth over the forecast period to average 356,384 MMBtu, or 2.6 percent, per year under normal weather conditions.

To ensure that the Company maintains adequate supplies in its portfolio to meet customer demand, the planning process continues with the development of design year and design day planning standards based on a Monte Carlo statistical analysis to establish a reasonable level of reliability for firm customers. As a result of this analysis the Company defined a design year at 6,963 HDD and a design day at 72 HDD. Combining the results of the design planning standards definition and the load forecasting process, the Company is projecting design year sendout to increase over the forecast period by an average of 368,871 MMBtu, or 2.5 percent, per year, and design day sendout to increase by an average of 2,206 MMBtu/day, or 1.5 percent, per year.

After the forecast of customer requirements are determined, the Company's planning process continues with the design of a resource portfolio to meet those requirements in the most reliable and least cost manner possible. To do this the Company uses the SENDOUT® Model (a proprietary linear programming model developed by New Energy Associates) to determine the adequacy of the existing portfolio in meeting the forecasted requirements and to identify any shortfalls during the forecast period. SENDOUT® allows the Company to determine the least-cost, economic dispatch of its existing resources subject to contractual and operating constraints, and identifies the need for, and type of additional resources during the forecast period, if any. The resources available to the Company include domestic long-haul and short-haul transportation contracts, underground storage contracts, Canadian and domestic gas supply contracts, and supplemental resources. The results of this step of the process show that the existing resource portfolio is adequate to meet base case customer requirements on a design day throughout the forecast period.

The next step in the planning process is to test the adequacy of the portfolio design by evaluating how it would perform under high and low alternative demand scenarios, and a cold snap weather scenario. Under the high and low demand scenarios, the Company adjusted the annual growth rate that resulted from its base case forecast upward and downward by one percentage point. The Company's resource plan shows that the portfolio is adequate under design conditions in all years of the forecast period in both cases. For the cold snap weather scenario, the Company assumes that the coldest seven-day period experienced in the last twenty-eight years will occur in early February during an otherwise normal winter. The Company's resource plan shows that it has adequate resources available to meet cold snap sendout requirements.

In conclusion, National Grid NH's Integrated Resource Plan demonstrates that the Company's planning process ensures that it maintains a reliable resource portfolio and energy supply to meet the forecasted needs of its customers at the lowest possible cost.

I. INTRODUCTION

This is the Integrated Resource Plan (the “IRP” or “Plan”) for EnergyNorth Natural Gas, Inc. d/b/a National Grid NH (“National Grid NH”” or the “Company”) for the five-year forecasting period 2010/11 through 2014/15[1]. This filing is made in accordance with the requirement of New Hampshire Public Utilities Commission (the “Commission”) Order No. 24,941, dated February 13, 2009 in Docket DG 06-105. The persons to whom communications should be addressed concerning this IRP are:

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A. Company Background

National Grid NH is a local distribution company that provides natural gas sales and transportation service to nearly 87,000 residential and commercial customers in thirty cities and towns in the state of New Hampshire. In August 2007, National Grid NH became an indirect wholly owned subsidiary of National

1 The forecasting period is based on split years from November 1 through October 31.

Grid USA. The Company's core obligation is to provide safe, reliable and least-cost gas service to its customers.

B. Summary of the IRP Process

The purpose of this IRP is to document the process undertaken by the Company to forecast customer sendout requirements and to design and manage its gas resource portfolio to meet that obligation.

The IRP process begins with the development of a long-range forecast of customer demand. Next, the Company matches its available resources against expected demand to determine if incremental resources are required over the forecast period. If so required, the Company would identify the resources available to meet the incremental demand requirements and procure a least-cost asset or mix of assets available. In determining the least cost available assets, the Company analyzes both price and non-price factors. Examples of non-price factors include diversity of supply source, flexibility and reliability. Next, the Company looks at its currently available assets and determines if there are any "decision points" with respect to any of its contracts such as expiration dates or options to increase or decrease volumes. If so, the Company determines whether to renew those supplies or replace them with an available alternative. Finally, the Company analyzes its portfolio of expected resources against a range of weather scenarios to determine if those resources are sufficient to reliably meet sendout requirements.

C. Organization of the Filing

This document is organized into the following principal sections:

- Section II provides an overview of the National Grid process for identifying and meeting customer requirements;
- Section III reviews the Company's demand forecasting methodology and discusses the development of the forecast of customer sendout requirements;
- Section IV discusses the design of the resource portfolio, the expected available resources, and the adequacy of the portfolio in terms of meeting forecasted requirements; and,
- Section V summarizes the Company's compliance with the directives from Order No. 24,941.

II. OVERVIEW OF THE NATIONAL GRID PROCESS FOR IDENTIFYING AND MEETING CUSTOMER REQUIREMENTS

The principal objective of National Grid's gas management process is the creation and utilization of a portfolio of gas supply, interstate pipeline transportation, underground storage and supplemental resources to meet daily and seasonal firm demand requirements in the most cost-effective manner while maintaining reliability. National Grid's process of planning for and meeting customer load requirements involves the coordination of a number of activities including demand forecasting, long-term resource planning, gas supply management and gas distribution. The majority of these activities are centralized within the Energy Portfolio Management Group, which includes the Company's Gas Load Forecasting Department, Gas Supply Planning Department, and Energy Trading Organization. The Energy Portfolio Management Group coordinates closely with the Gas Control Department, which is responsible for gas deliveries across the National Grid distribution system in New England as well as the Customer Choice Group, which is responsible for management of the Supplier Service program and the Energy Efficiency Group which is responsible for the design, implementation, and management the Company-sponsored energy efficiency programs. Among the responsibilities of the Energy Portfolio Management Group are to project the resource requirements of the National Grid system and to assemble a least-cost portfolio of reliable resources to meet those requirements. The projection of resource requirements requires two steps: (1) the preparation of forecasts of long-term trends in customer requirements under normal weather conditions; and, (2) the preparation of forecasts of customer requirements under defined (design day and design year) weather conditions. Assembling the least-cost portfolio is also a two-step process involving: (1) the procurement of a sufficient and appropriate portfolio of resources to meet the design sendout requirements resulting from the demand forecasting process; and, (2) the economic dispatch of those volumes given available resources. The Company's resource portfolio provides a range of flexibility in making these determinations in the course of the day-to-day management of the portfolio.

National Grid's forecasting and gas supply planning activities are complemented by a centralized dispatch and control center. The daily process of obtaining sufficient resources to meet predicted customer needs requires a high level of coordination between the Gas Supply Planning Department and Gas Control. Each day, Gas Control provides Gas Supply Planning with projected sendout requirements that are developed based on the results of the load forecasting process. Gas Supply Planning determines the availability, reliability and pricing information necessary to satisfy the predicted customer loads taking into account both currently available projections of weather and prices as well as the possibility of design-forward conditions for the remainder of the heating season (design-forward planning). Gas Supply Planning and Gas Control then establish a daily "Game Plan" that matches available resources with sendout requirements for the National Grid system. The Game Plan is designed to balance the demand requirements of the system for the current gas day with scheduled supply volumes and also projects a three-day supply/demand balance.

National Grid NH customers receive significant benefits as a result of the coordinated and centralized gas management process because resource planning and purchasing decisions are made from an overall system perspective to meet customer requirements. Given the diversity and flexibility of the resource portfolio, this decision-making framework allows the Company to utilize its resources efficiently rather than on mere availability.

III. FORECAST METHODOLOGY

A. Introduction

National Grid NH developed its five-year forecast of customer requirements under design weather planning conditions using the following process:

1. Forecast Incremental Sendout

Incremental sendout is the additional sendout that National Grid NH forecasts to occur over the five-year forecast period above the level established for an identified actual reference year, which was 2008/09 for purposes of this plan.[1] The Company used econometric models to develop a forecast of incremental sendout for traditional markets (i.e., residential, and commercial and industrial ("C&I") customers. Incremental sendout forecasts of non-traditional markets, such as natural-gas vehicles ("NGVs") and large-scale power generation were developed outside of the econometric models because the sendout associated with these markets is not included in the historical data used to develop the econometric equations. Forecasts of incremental sendout for traditional and non-traditional markets were summed to determine the total incremental sendout over the forecast period. One change reflected in this filing as compared to the Company's previous filing in Docket DG 06-105 is the treatment of volume reductions associated with demand side management programs ("DSM"). In the past the Company treated the volume reductions associated with its DSM programs as reductions to the demand forecast. In this filing, however, in accordance with the Commission's Order No. 24,941, DSM is treated as a supply option, and optimized with other supply options in the design of the supply portfolio and is therefore not reflected in the forecast of incremental sendout.

2. Develop Reference Year Sendout Using Regression Equations

Next, the Company developed the reference year sendout using regression equations. The level of the Company's sendout in the 2008/09 reference year served as the "springboard" to which incremental sendout was added. The actual sendout data used for the springboard are a function of the weather conditions experienced in the reference year. Therefore, the Company uses regression equations to normalize the sendout in the reference year based on normalized weather data.

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[1] The reference year is the split year April 1, 2008 through March 31, 2009.

3. Normalize Forecast of Customer Requirements

The Company then summed the incremental sendout requirements with the weather-normalized springboard sendout requirements to determine National Grid NH's total normalized forecast of customer requirements over the five-year forecast period.

4. Determine Design Weather Planning Standards

Pursuant to Order No. 24,941, the Company based its planning standards on a Monte Carlo analysis of average daily temperature as the variable to be modeled and HDD, which is a linear transformation of average daily temperature.

5. Determine Customer Requirements under Design Weather Conditions

Using the applicable design day and design year weather planning standards, National Grid NH determined the design year sendout requirements and the design day (peak day) sendout requirements. These design sendout requirements established the Company's resource requirements over the forecast period.

Based on the foregoing process, the Company has projected incremental throughput of 1,425,535 MMBtu over the forecast period, or 356,384 MMBtu per year, assuming normal weather. (See, Chart III-A-1) Overall, this growth in firm sales represents a 10.5 percent total increase in sendout requirements over the forecast period, or 2.6 percent per year on average. The development of the Company's five-year forecast of customer sendout requirements, based on the steps set forth above is described in the following sections

B. Forecast of Incremental Sendout

1. Introduction

The first step in National Grid NH's forecast process is to prepare a five-year forecast of annual incremental sendout. Annual incremental sendout is the net increase in load that the Company expects to experience over the forecast period. This annual projection of incremental sendout is then added to the reference or "springboard" year sendout, which is derived from the Company's regression analysis of the latest split-year daily sendout and weather data, as described in Section III.C. below, to determine total firm sendout requirements.

The process used to forecast incremental sendout over the forecast period consists of five components. First, National Grid NH develops a demand forecast of loads associated with traditional residential heating, residential non heating, C&I heating and C&I non heating markets. To accomplish this, the Company developed econometric models, which are discussed in Section III.B.2 (a). Throughput in the residential sector is discussed in Sections III.B.2 (b) (i-vi), below, and the C&I sector is discussed in Sections III.B.2 (b) (vii-xii), below.

Second, National Grid NH develops a forecast for non-traditional markets that includes NGVs and large-scale power generation. While non-traditional markets are part of National Grid NH's forecasting process, the Company is forecasting no demand in the NGV and large-scale cogeneration markets (Sections III.B.3. (a) and III.B.3. (b), respectively) based on the current and anticipated lack of activity in those markets. The Company's natural gas demand forecast for traditional customers, together with its forecasts of non-traditional market demands, results in a total forecast of incremental customer demand over the 2010/11 through 2014/15 forecast period.

Third, National Grid NH monitors migration of sales customers to transportation service to determine if adjustments to its forecast are warranted (discussed in Section III.B.5, below).

Fourth, National Grid NH reviews the Sales and Marketing Group's forecast to determine if any adjustments to the forecast are necessary, as discussed in Section III.B.6, below.

Finally, National Grid NH develops two alternatives to the base case demand forecast, that represent high and low sendout cases, as discussed in Section III.B.7, below. The development of these alternative forecasts enables the Company to evaluate its ability to meet customer requirements with portfolio resources under a range of weather and economic conditions.

2. Demand Forecast for Traditional Markets

As mentioned above, the first step of the forecasting process is to prepare a five-year forecast of annual incremental sendout. To prepare this forecast, the Company first develops a demand forecast of loads associated with traditional residential heating, residential non heating, C&I heating and C&I non heating markets using econometric models. The analysis is similar to the one presented in the most recent integrated resource plan the Company filed with the Commission, except for the disaggregation of the residential and C&I classes into heat and non heat categories, and the elimination of the autoregressive integrated moving average ("ARIMA") method. The Company began by reviewing the econometric models specified in its 2006 Integrated Resource Plan filed with the Commission on August 21, 2006 in Docket DG 06-105, and then updated those models by re-estimating the parameters of the models using updated historical data for the dependent and independent variables.

(a) The Econometric Models

The statistical models used by the Company relate sales by class to economic and demographic factors such as households, housing starts, personal income, gas price and gross state product, as well as time trends, degree days and lagged variables. Historical annual sales data cover the twenty year period of January 1990 through April 2009**.** This information was used in conjunction with forecasts of economic factors provided by IHS Global Insight, Inc. to develop the sales forecast. The Company has a contract with IHS Global Insight, Inc. to provide forecasts of economic and demographic variables for its service territory along with the historic values of those variables.

The Company used the SAS statistical software package, licensed from SAS Institute, Inc., to perform the statistical data analysis that determined the relationships between the dependent variables and the explanatory variables in each of the equations used in the econometric models.

(b) The Forecast

The Company segmented its sales forecast by sector producing forecasts for residential heating sales, residential non heating sales, C&I heating sales and C&I non heating sales.

For each of the sectors, the Company tested two modeling structures. The first structure begins with forecasts of both number of customers and the use per customer for each class and multiplies the results of each to calculate total sales volumes for that class. The second structure produces a forecast of total sales volumes directly, by relating total sales to independent variables. In the first structure, the number of customers is based on growth rates of generally available variables such as households, gross state product and time trends, while use per customer captures price effects, as well as appliance saturation, and efficiency improvements through time trends. Multiplying the results of these two forecasts creates the forecast of total sales. The first structure assumes that it is easier to forecast each component separately. However, if one forecasts sales directly, it is possible that the effects of variables such as degree days, population and employment will overwhelm the effect of variables such as price. Because it is not clear which structure will produce the best forecast, the Company combined the results of the two models to minimize the errors that might be inherent in either one of them

For the modeling effort, the Company evaluated a broad range of explanatory variables from sources such as the US Bureau of the Census, the US Bureau of Labor Statistics, the US Bureau of Economic Analysis, the Energy Information Administration of the US Department of Energy and the Company's own database. In nearly all cases, the Company collected statewide New Hampshire data because data specific to National Grid NH's service territory were limited or non-existent. The variables evaluated for the residential models were:

- State population
- State personal income
- State per capita income
- State wage and salary disbursement
- Statewide employment
- Statewide housing units and statewide households
- Statewide residential fuel oil sales and unit cost
- Statewide residential natural gas sales and unit cost
- Manchester, NH normal and actual degree days
- National Grid NH therm sales and average rates to residential customers

- New Hampshire City Gate gas price

Table III-I provides additional details on these variables. Similar variables were identified for the C&I sector:

- All of the above variables except those relating specifically to the residential sector
- National Grid NH average rates for C&I customers
- National Grid NH therm sales and customer totals for C&I customers
- Other EIA energy consumption and unit cost data for the C&I sector

Table III-1

Variables Analyzed in Forecasting Practices

Index	Variable Name	Unit	Description	Source	Period Covered
Dependent Variables					
1	CUSRN		Number of Non-Heating Residential Customers	EnergyNorth Historical Records	Jan. 2003 - May 2009
2	CUSRH		Number of Heating Residential Customers	EnergyNorth Historical Records	Mar. 1990 - May 2009
3	CUSCN		Number of Non-Heat Commercial and Industrial Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
4	CUSCH		Number of Heating Commercial and Industrial Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
5	USERN	MMBTU/Customer	Gas Consumption per Non-Heating Res. Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
6	USERH	MMBTU/Customer	Gas Consumption per Heating Res. Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
7	USECN	MMBTU/Customer	Gas Consumption per Non-Heating C & I Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
8	USECH	MMBTU/Customer	Gas Consumption per Heating C & I Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
9	VOLRN	MMBTU	Gas Consumption of Non-Heating Res. Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
10	VOLRH	MMBTU	Gas Consumption of Heating Res. Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
11	VOLCN	MMBTU	Gas Consumption of Non-Heating C & I Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
12	VOLCH	MMBTU	Gas Consumption of Heating C & I Cust.	EnergyNorth Historical Records	Mar. 1990 - May 2009
Independent Variables					
13	CPI	1982-84 = 100	Consumer Price Index	Global Insight	1990Q2-2020Q4
14	GSP	Millions of $	Gross State Product--Aggregate	Bureau of Economic Analysis, Global Insight	1990Q2-2020Q4
15	GSPR	Millions of 2001 $	Real Gross State Product--Aggregate	Bureau of Economic Analysis, Global Insight	1990Q2-2020Q4
16	POP	Thousands	Total Population	Bureau of Census, Current Population Reports	1990Q2-2020Q4
17	EMP	Thousands	Employment, Total Non-Agriculture	Bureau of Labor Statistics	1990Q2-2020Q4
18	UEM	Thousands	Number Unemployed	Bureau of Labor Statistics	1990Q2-2020Q4
19	LBF	Thousands	Total Labor Force	Bureau of Labor Statistics	1990Q2-2020Q4
20	HH	Thousands	Households, Family and Non-Family	Global Insight	1990Q2-2020Q4
21	HSTM	Thousands	Housing Starts, Private Multi-Family	Global Insight	1990Q2-2020Q4
22	HSTS	Thousands	Housing Starts, Private Single Family	Global Insight	1990Q2-2020Q4
23	HSTT	Thousands	Housing Starts, Total Private	Global Insight	1990Q2-2020Q4
24	PIP	Thousands of $	Per Capita Personal Income	Bureau of Economic Analysis, Global Insight	1990Q2-2020Q4
25	PIPR	Thousands 2001 $	Real Per Capita Personal Income	Bureau of Economic Analysis	1990Q2-2020Q4
26	PI	Millions of $	Personal Income, Total, By Place of Residence	Bureau of Economic Analysis, Global Insight	1990Q2-2020Q4
27	PID	Millions of $	disposable Income	Bureau of Economic Analysis, Global Insight	1990Q2-2020Q4
28	PIR	Millions of 2001 $	Real Personal Income, Total	Bureau of Economic Analysis, Global Insight	1990Q2-2020Q4
29	PIA	Millions of 2001 $	Real Income, Residence Adjustment	Bureau of Economic Analysis, Global Insight	1990Q2-2020Q4
30	INCD	Millions of 2001 $	Real disposable Income	Bureau of Economic Analysis	1990Q2-2020Q4
31	NHOPRes	$/Dth	New Hampshire # 2 Heating Oil Price for Residential Customers	U.S. Energy Information Administration	Mar. 1990- May 2019
32	NHOPCom	$/Dth	New Hampshire # 2 Heating Oil Price for Commercial Customers		
33	NHOPInd	$/Dth	New Hampshire # 2 Heating Oil Price for Industrial Customers		
34	NHOPCI	$/Dth	New Hampshire # 2 Heating Oil Price for C & I Customers		
35	NHGPRes	$/Dth	New Hampshire Natural Gas Price for Residential Customers	U.S. Energy Information Administration	Mar. 1990- May 2019
36	NHGPCom	$/Dth	New Hampshire Natural Gas Price for Commercial Customers	U.S. Energy Information Administration	Mar. 1990- May 2019
37	NHGPInd	$/Dth	New Hampshire Natural Gas Price for Industrial Customers	U.S. Energy Information Administration	Mar. 1990- May 2019
38	NHGPCI	$/Dth	New Hampshire Natural Gas Price for C & I Customers	U.S. Energy Information Administration	Mar. 1990- May 2019
39	HDDN		Normal Callendar Degree DaysSource: EnergyNorth Billing Frequency Record	EnergyNorth Billing Frequncy Record	Mar. 1990- May 2019
40	HDDA		Actual Callendar Degree DaysSource: EnergyNorth Billing Frequency Record	EnergyNorth Billing Frequncy Record	Mar. 1990- May 2019
41	BDDN		Source: EnergyNorth Billing Frequency Record	EnergyNorth Billing Frequncy Record	Mar. 1990- May 2019
42	BDDA		Source: EnergyNorth Billing Frequency Record	EnergyNorth Billing Frequncy Record	Mar. 1990- May 2019

The Company developed models based on monthly data. This approach accounts for the seasonality of both customer and sales data. Although, SAS offers a variety of forecasting models including dynamic regression, Box-Jenkins, exponential smoothing, and moving averages, the Company focused on dynamic regression (i.e. econometrics) because it is the most commonly used method in the utility industry and allows the user to develop relationships between independent or explanatory variables and energy sales.

In addition to the explanatory variables, SAS allows the user to incorporate both lagged variables and autocorrelation functions (“AR”) into the models to correct for serial correlation[2], and exponential autoregressive conditional heteroscedastic (“EARCH”) variables to correct for heteroscedasticity.[3] When developing a forecasting model, there will always be "error" when comparing the "fitted" data from the model to the actual data. One would expect, however, that these errors (or residuals) would be relatively small and random in nature. If the errors are not random (e.g., every fourth quarter the forecast is too high and every second quarter it is too low), then a pattern exists, and the error terms are not random. In these instances better models should be designed. Lagged variables, AR, and EARCH variables are estimated statistically to eliminate or reduce the significance the non-random components of the errors and provide a better fit of the models to the historical data.

Because SAS allows the user to develop a large number of models, it is important to develop criteria regarding what constitutes a "good" model. In general the Company applied the following criteria:

- The t-tests for all explanatory variables are significant (i.e. exceed 2.0)
- The relationship between the dependent and explanatory variable is logical and

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[2] “Serial correlation occurs in time-series studies when the errors associated with observations in a given time period carry over into future time periods. (”*Econometric Models and Economic Forecasts”*, Pindyck and Rubenfeld, at p. 159, (1998.)

[3] In an ordinary least squares analysis, there is an assumption that the error terms of the estimated equation are random variables with a normal distribution and a constant variance. When the variance is not constant over the observations, heteroscedasticity is said to exist. (id. p. 146.). The EARCH variable is the result of the SAS program formula for correcting heteroscedasticity using the generalized autoregressive conditional heteroscedasticity (GARCH) procedure.

of the correct sign (e.g., higher gas prices should produce lower sales)

- The resulting forecast is reasonable (e.g., a forecast that shows sales decreasing to zero by year 2010 would be eliminated regardless of the power of the other statistics).
- That significant autocorrelation between the residuals (errors) has been eliminated (i.e. Durbin-Watson statistic is insignificant)
- That significant heteroscedasticity among the residuals has been eliminated
- The addition of new variables does not improve model performance
- Reliable forecasts of the independent variables are available.

i. Residential Heating Customer Forecast

The Company found that there is significant seasonality to the number of residential heating customers with a higher customer base in the winter than in the summer. Therefore, while the Company found that the household variable was the most significant economic/demographic variable, the model developed for residential heating customers also contains a term for residential customers lagged one period, five AR variables to correct for serial autocorrelation, and four EARCH variables to correct for heteroscedasticity. The model also includes several monthly dummy variables to further capture the seasonality of customer counts. The details of this model are contained in Appendix A RHC, and the form of the model is presented below:

Residential Heating Customers is a function of:

Intercept

Customers lagged one month (CUSH_1)

Households (HH)

Dummy Variable for January (d1)

Dummy Variable for June (d6)

Dummy Variable for July (d7)

Dummy Variable for December (d12)

AR term of period 2 (AR2)

AR term of period 5 (AR5)

AR term of period 6 (AR6)

AR term of period 7 (AR7)

AR term of period 10 (AR10)

EARCH term 0 (EARCH0)

EARCH term 9 (EARCH9)

EARCH term 10 (EARCH10)

EARCH term 12 (EARCH12)

After completing the estimation of the parameters for the equation in the above model, the Company then applied a forecast of the explanatory variables to produce the forecast of residential heating customers. The forecasts of the explanatory variables were provided by IHS Global Insight, Inc., along with the historic values of those variables.

Using the model specification described above, the residential heating customer forecast was produced and is presented in Table III-2 below.

ii. Residential Non-Heating Customer Forecast

The Company found that the most significant independent variable related to the number of residential non-heating customers is a simple time trend. The Company included that variable, along with five monthly dummy variables to capture the seasonality on residential non-heating customer counts, and an AR variable to correct for serial autocorrelation. The details of the residential non-heating customer model are presented in Appendix A RNHC, and the form of the model is presented below:

Residential Non-Heating Customers is a function of:

Intercept
Time Trend (Date)
Dummy Variable for February (d2)
Dummy Variable for March (d3)
Dummy Variable for April (d4)
Dummy Variable for September (d9)
Dummy Variable for October (d10)
AR term of period 1 (AR1)

Using the model specification described above, the residential non-heating customer forecast was produced and is presented in Table III-2 below.

Table III-2

National Grid NH Forecast Results
Residential Customer Forecast

	Res Heating	Res Non-Heat	Total
Model	AH4a35	AN4b13	
Dependent Variable	CUSRH	CUSRN	
Independent Variables	Intercept	Intercept	
	CUSRH_1	Date	
	HH	Dummy(2,3,4,9,10)	
	Dummy(1,6,7,12)	AR1	
	AR(2,5,6,7,10)		
	EARCH(9,10,12)		
Annual Residential Customer Forecast (Split-Year from Nov. to Oct)			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2009- Oct. 2010	69,507	4,226	73,733
Nov. 2010- Oct. 2011	70,093	3,992	74,085
Nov. 2011- Oct. 2012	71,171	3,754	74,925
Nov. 2012- Oct. 2013	72,638	3,517	76,155
Nov. 2013- Oct. 2014	74,327	3,280	77,607
Nov. 2014- Oct. 2015	76,144	3,043	79,187
Average	72,313	3,635	75,949
Residential Customer Forecast -- Net Growth			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	586	-234	352
Nov. 2011- Oct. 2012	1,078	-237	841
Nov. 2012- Oct. 2013	1,467	-237	1,230
Nov. 2013- Oct. 2014	1,689	-237	1,452
Nov. 2014- Oct. 2015	1,817	-237	1,580
Average	1,327	-237	1,091
Residential Customer Forecast -- Percent Growth from Base Year (2005)			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2010- Oct. 2011	0.84%	-5.54%	0.48%
Nov. 2011- Oct. 2012	1.54%	-5.95%	1.13%
Nov. 2012- Oct. 2013	2.06%	-6.32%	1.64%
Nov. 2013- Oct. 2014	2.32%	-6.74%	1.91%
Nov. 2014- Oct. 2015	2.45%	-7.23%	2.04%
Average	1.84%	-6.36%	1.44%

The result shown in Table III-2 is a forecasted average annual growth rate in residential customers from 2010/11 - 2014/15 of 1.4 percent, or 1,091 per year, with a total of 79,187 residential customers expected in 2014/15. The complete residential customer forecast results are presented in Appendix A.

iii. Residential Heating Use-Per-Customer Forecast

For the residential heating use-per-customer forecast, there was a strong relationship between normalized use-per-customer and actual billing heating degree days, the price of gas and real personal income. Therefore, the model developed for use-per-residential heating customer used these variables as independent variables, along with nine monthly dummy variables to account for the seasonality of the use per customer, three AR variables to correct for serial autocorrelation and eight EARCH variables to correct for heteroscedasticity. The details of the use-per-residential heating customer model are presented in Appendix A RHU, and the form of the model is presented below:

Residential Heating Use-Per-Customer is a function of:

Intercept
Actual Billing Degree Days (BDDA)
Price of Gas (prcG)
Real Personal Income (PIR)
Dummy Variable for January (d1)
Dummy Variable for February (d2)
Dummy Variable for March (d3)
Dummy Variable for April (d4)
Dummy Variable for May (d5)
Dummy Variable for June (d6)
Dummy Variable for October (d10)
Dummy Variable for November (d11)
Dummy Variable for December (d12)
AR term of period 12 (AR12)
AR term of period 14 (AR14)
AR term of period 23 (AR23)
EARCH term 0 (EARCH0)
EARCH term 1 (EARCH1)
EARCH term 2 (EARCH2)
EARCH term 5 (EARCH5)
EARCH term 8 (EARCH8)
EARCH term 11 (EARCH11)
EGARCH term 6 (EGARCH6)
EGARCH term 12 (EGARCH12)

Using the model specification described above, the residential heating use-per-customer forecast was produced and is presented in Table III-3 below. The complete residential heating use-per-customer forecast results are in Appendix A RHU.

iv. Residential Non-Heating Use-Per-Customer Forecast

The Company found that the most significant independent variables related to the residential non-heating use-per-customer are actual billing degree days, and the price of gas lagged one period. The Company included these variables, along with five monthly dummy variables to capture the seasonality on residential non-heating use-per-customer, and two AR variables to correct for serial autocorrelation. There was no significant heteroscedasticity that required correction. The details of the residential non-heating use-per-customer model are presented in Appendix A RNHU, and the form of the model is presented below:

Residential Non-Heating Use-Per-Customers is a function of:

- Intercept
- Actual Billing Degree Days (BDDA)
- Price of Gas (prcG_1)
- Dummy Variable for February (d2)
- Dummy Variable for August (d8)
- Dummy Variable for September (d9)
- Dummy Variable for October (d10)
- Dummy Variable for November (d11)
- AR term of period 11 (AR11)
- AR term of period 14 (AR14)

Using the model specification described above, the residential non-heating use-per-customer forecast was produced and is presented in Table III-3 below.

Table III-3

National Grid NH Forecast Results

Residential Gas Use-Per-Customer Forecast

	Res Heating	Res Non-Heat
Model	BH4b17	BN4b23
Dependent	USERH	USERN
Independent	Intercept	Intercept
	BDDA	BDDA
	prcG	prcG_1
	PIR	dummy(2,8,9,10,11)
	dummy(1,2,3,4,5,6,10)	AR(11,14)
	AR(12,14,23)	
	EARCH(1,2,5,8,11)	
	EGARCH(6,12)	
Annual Residential Use-Per-Customer Forecast (Split-Year from Nov. to Oct)		
	Res Heating	**Res Non-Heat**
Nov. 2009- Oct. 2010	86.79	23.75
Nov. 2010- Oct. 2011	87.56	23.57
Nov. 2011- Oct. 2012	87.89	23.65
Nov. 2012- Oct. 2013	87.70	23.67
Nov. 2013- Oct. 2014	87.27	23.70
Nov. 2014- Oct. 2015	86.70	23.70
Average	87.32	23.67
Residential Use-Per-Customer Forecast -- Net Growth		
	Res Heating	**Res Non-Heat**
Nov. 2009- Oct. 2010		
Nov. 2010- Oct. 2011	0.77	-0.18
Nov. 2011- Oct. 2012	0.33	0.08
Nov. 2012- Oct. 2013	-0.18	0.02
Nov. 2013- Oct. 2014	-0.44	0.03
Nov. 2014- Oct. 2015	-0.57	0.00
Average	-0.02	-0.01
Residential Use-Per-Customer Forecast -- Percent Growth from Base Year (2005)		
	Res Heating	**Res Non-Heat**
Nov. 2009- Oct. 2010		
Nov. 2010- Oct. 2011	0.88%	-0.76%
Nov. 2011- Oct. 2012	0.38%	0.33%
Nov. 2012- Oct. 2013	-0.21%	0.10%
Nov. 2013- Oct. 2014	-0.50%	0.12%
Nov. 2014- Oct. 2015	-0.65%	-0.01%
Average	-0.02%	-0.05%

As shown in Table III-3, the result is a forecasted average annual rate of change in use per residential heating customer of -0.02 percent for the residential heating class, and -0.05 percent for the residential non-heating class. The complete residential use-per-customer forecast results are presented in Appendix A RHU and RNHU.

v. Residential Heating Sales Forecast

As mentioned previously, residential heating sales forecasts were developed by (1) combining the results of the residential heating customer model and use-per-customer model and (2) by independently forecasting residential heating sales volumes. All data on residential heating sales were normalized by the Company to account for deviations in weather.

The Company produced an initial forecast of residential heating sales using the results of the residential heating customer model multiplied by the results of the use per residential heating customer model. The product of these two forecasts yielded a calculated residential heating sales forecast reflecting an overall annual average growth rate of 1.78 percent and an increase in sales to 6.58 million MMBtu in the year 2014/15. The results of this initial volume forecast are presented in Table III-4 below.

The second approach developed a single econometric model for residential heating sales. The econometric model includes a term for billing degree days, NH gross state product and housing starts, along with nine monthly dummy variables to capture the seasonality of residential heating volumes, three AR variables to correct for serial autocorrelation and an EARCH variable to correct for heteroscedasticity. The details of the residential heating volume model are presented in Appendix A RHV, and the form of the model is presented below:

Residential Heating Volume is a function of:

Intercept

Actual Billing Degree Days (BDDA)

Gross State Product (GSP)

Housing Starts (HSTT)

Dummy Variable for January (d1)

Dummy Variable for February (d2)

Dummy Variable for March (d3)

Dummy Variable for April (d4)

Dummy Variable for May (d5)

Dummy Variable for June (d6)

Dummy Variable for October (d10)

Dummy Variable for November (d11)

Dummy Variable for December (d12)

AR term of period 1 (AR1)

AR term of period 12 (AR12)

AR term of period 23 (AR23)

EARCH term of period 0 (EARCH0)

Using the model specification described above, the residential heating volume forecast was produced and is presented in Table III-5 below.

The Company then combined the calculated residential heating sales forecast with the results of the sales volume forecast model using a weighting factor (α) derived from a variance/covariance analysis[4] on the two forecasts. Calculating the weighting factor this way minimizes the errors associated with using the two models in combination. The details of the weighting factor calculation can be found in Appendix A RHalpha. The results of the

[4] The α weighting factor is used and derived in the following respective formulae:

$$P_{c,T+j} = \alpha \cdot P_{1,T+j} + (1-\alpha) \cdot P_{2,T+j} \text{ where: } \alpha = \frac{VAR[e_{2,t}] - COV[e_{1,t}, e_{2,t}]}{VAR[e_{1,t}] + VAR[e_{2,t}] - 2COV[e_{1,t}, e_{2,t}]}$$

combined models produced the final residential heating sales forecast of 6.30 million MMBtu in 2014/15 for an annualized growth rate of 1.46 percent from 2010/11-2014/15. The results of this combined volume forecast are presented in Table III-6 below.

The complete residential heating load forecast results are presented in Appendix A RH Combined.

vi. Residential Non-Heating Sales Forecast

Similarly, the residential non-heating sales forecasts were developed by (1) combining the residential non-heating customer and use per customer forecasts and (2) by independently forecasting residential non-heating sales volumes.

The Company produced an initial forecast of residential non-heating sales using the residential non-heating customer model multiplied by the results of the use per residential non-heating customer model. The product of these two forecasts yielded a calculated residential non-heating sales forecast reflecting an overall annual average growth rate of -6.38 percent and MMBtu sales forecast of 0.072 million in the year 2014/15. The results of this initial volume forecast are presented in Table III-4 below.

Table III-4

National Grid NH Forecast Results

Residential Gas Volume Forecast

Customers Times Use-Per Customer

Annual Residential Sales (Customers * Use Per) Forecast (Split-Year from Nov. to Oct)			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2009- Oct. 2010	6,030,544	100,610	6,131,154
Nov. 2010- Oct. 2011	6,133,265	94,319	6,227,584
Nov. 2011- Oct. 2012	6,247,271	89,009	6,336,280
Nov. 2012- Oct. 2013	6,359,899	83,483	6,443,382
Nov. 2013- Oct. 2014	6,473,945	77,964	6,551,909
Nov. 2014- Oct. 2015	6,588,124	72,337	6,660,461
Average	6,305,508	86,287	6,391,795
Annual Residential Sales (Customers * Use Per) Net Growth (Split-Year from Nov. to Oct)			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	102,721	-6,291	96,430
Nov. 2011- Oct. 2012	114,006	-5,310	108,696
Nov. 2012- Oct. 2013	112,628	-5,526	107,102
Nov. 2013- Oct. 2014	114,045	-5,519	108,527
Nov. 2014- Oct. 2015	114,180	-5,627	108,552
Average	111,516	-5,655	105,861
Residential Sales (Customers * use Per) Forecast -- Percent Growth from Base Year (2005)			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	1.70%	-6.25%	1.57%
Nov. 2011- Oct. 2012	1.86%	-5.63%	1.75%
Nov. 2012- Oct. 2013	1.80%	-6.21%	1.69%
Nov. 2013- Oct. 2014	1.79%	-6.61%	1.68%
Nov. 2014- Oct. 2015	1.76%	-7.22%	1.66%
Average	1.78%	-6.38%	1.67%

The econometric model developed for residential non-heating sales includes a term for billing degree days, price of gas, real gross state product, per capita personal income, along with a lagged volume variable, several monthly dummy variables to capture the seasonality on residential non-heating volumes, and an AR variable to correct for serial autocorrelation. There was no significant heteroscedasticity that required correction. The details of the residential non-heating sales volume model are presented in Appendix A RNHV, and the form of the model is presented below:

Residential Non-Heating Volume is a function of:

Intercept

Lagged Volumes (VOLN_1)

Actual Billing Degree Days (BDDA)

Price of Gas (prcG)

Real Gross State Product (GSPR)

Per Capita Income (PIP)

Dummy Variable for January (d1)

Dummy Variable for March (d3)

Dummy Variable for December (d12)

AR term of period 11 (AR11)

Using the model specification described above, the residential non-heating volume forecast was produced and is presented in Table III-5 below.

Table III-5

National Grid NH Forecast Results

Residential Gas Sales Volume Forecast Model

	Res Heating	Res Non-Heat	
Model	CH4b27	CN4a11	
Dependent	VOLRH	VOLRN	
Independent	Intercept	Intercept	
	BDDA	VOLRN_1	
	GSP	BDDA	
	HSTT	prcG	
	dummy(1,2,3,4,5,6,10,	GSPR	
	AR(1,12,23)	PIP	
		Dummy(1,3,12)	
		AR11	
Annual Residential Volume Forecast (Split-Year from Nov. to Oct)			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2009- Oct. 2010	5,569,235	103,722	5,672,956
Nov. 2010- Oct. 2011	5,616,543	101,940	5,718,483
Nov. 2011- Oct. 2012	5,671,432	102,066	5,773,499
Nov. 2012- Oct. 2013	5,723,688	100,358	5,824,046
Nov. 2013- Oct. 2014	5,764,734	96,846	5,861,581
Nov. 2014- Oct. 2015	5,810,876	92,792	5,903,668
Average	5,692,751	99,621	5,792,372
Annual Residential Volume Net Growth (Split-Year from Nov. to Oct)			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	47,309	-1,782	45,527
Nov. 2011- Oct. 2012	54,889	127	55,016
Nov. 2012- Oct. 2013	52,256	-1,708	50,548
Nov. 2013- Oct. 2014	41,046	-3,512	37,534
Nov. 2014- Oct. 2015	46,141	-4,054	42,087
Average	48,328	-2,186	46,142
Residential Volume Forecast -- Percent Growth from Base Year (2005)			
	Res Heating	**Res Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	0.85%	-1.72%	0.80%
Nov. 2011- Oct. 2012	0.98%	0.12%	0.96%
Nov. 2012- Oct. 2013	0.92%	-1.67%	0.88%
Nov. 2013- Oct. 2014	0.72%	-3.50%	0.64%
Nov. 2014- Oct. 2015	0.80%	-4.19%	0.72%
Average	0.85%	-2.19%	0.80%

The Company then combined the calculated residential non heating sales forecast with the results of the sales volume forecast model using a weighting factor (α) derived from a variance/covariance analysis on the two forecasts. Calculating the weighting factor this way minimizes the error associated with using the two models in combination. The details of the weighting factor calculation can be found in Appendix A RNHalpha. The results of the combined models produced the final residential sales forecast of 0.082 million therms in 2014/15 for an annualized growth rate of -4.26 percent from 2010/11-2014/15. The results of this combined volume forecast are presented in Table III-6 below.

Table III-6

National Grid NH Forecast Results

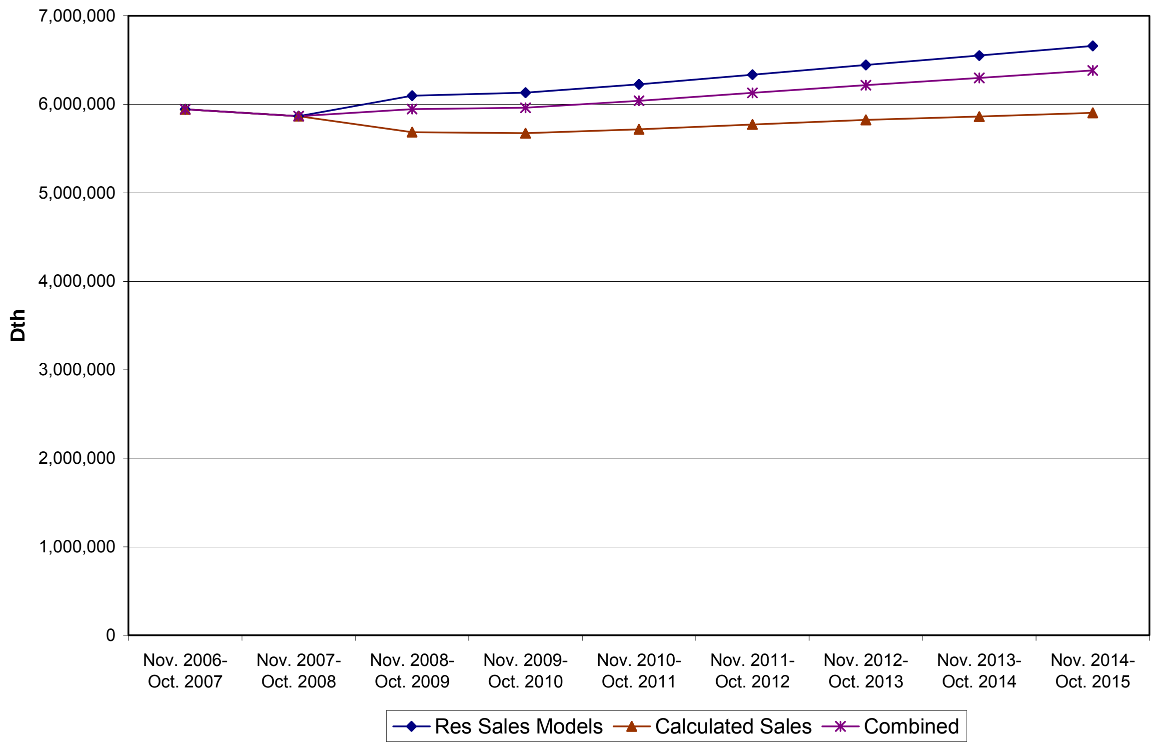
Residential Gas Sales Combined Volume Forecast

Annual Residential Volume Forecast (Split-Year from Nov. to Oct)			
	Res Heating	Res Non-Heat	Total
Nov. 2009- Oct. 2010	5,860,048	102,096	5,962,145
Nov. 2010- Oct. 2011	5,942,290	97,959	6,040,249
Nov. 2011- Oct. 2012	6,034,447	95,245	6,129,692
Nov. 2012- Oct. 2013	6,124,762	91,543	6,216,305
Nov. 2013- Oct. 2014	6,211,828	86,982	6,298,810
Nov. 2014- Oct. 2015	6,300,861	82,107	6,382,967
Average	6,079,039	92,655	6,171,694
Annual Residential Volume Net Growth (Split-Year from Nov. to Oct)			
	Res Heating	Res Non-Heat	Total
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	82,241.21	(4,137.20)	78,104.01
Nov. 2011- Oct. 2012	92,156.98	(2,713.53)	89,443.44
Nov. 2012- Oct. 2013	90,315.25	(3,702.70)	86,612.54
Nov. 2013- Oct. 2014	87,065.59	(4,560.20)	82,505.39
Nov. 2014- Oct. 2015	89,033.34	(4,875.86)	84,157.49
Average	88,162.47	(3,997.90)	84,164.57
Residential Volume Forecast -- Percent Growth from Base Year (2005)			
	Res Heating	Res Non-Heat	Total
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	1.40%	-4.05%	1.31%
Nov. 2011- Oct. 2012	1.55%	-2.77%	1.48%
Nov. 2012- Oct. 2013	1.50%	-3.89%	1.41%
Nov. 2013- Oct. 2014	1.42%	-4.98%	1.33%
Nov. 2014- Oct. 2015	1.43%	-5.61%	1.34%
Average	1.46%	-4.26%	1.37%

See Figure III-1 below for the MMBtu load forecast summary and Appendix A for complete details of the forecast.

Figure III-1

Residential Natural Gas Sales Forecast



vii. Commercial/Industrial Heating Customer Forecast

Similar to the residential customer model, the C&I heating customer model shows seasonality, as well as a strong relationship to real gross state product, six monthly dummy variables, and three AR variables to correct for serial autocorrelation. Statistical tests indicated that there was no significant heteroscedasticity that needed correction. The details of this model are contained in Appendix A CIHC, and the form of the model is presented below:

C&I Heating Customers is a function of:

Real Gross State Product (GSPR)
Dummy Variable for February (d2)
Dummy Variable for March (d3)
Dummy Variable for April (d4)
Dummy Variable for October (d10)
Dummy Variable for November (d11)
Dummy Variable for December (d12)
AR term of period 1 (AR1)
AR term of period 4 (AR4)
AR term of period 5 (AR5)

The annual forecast results for C&I customers can be seen in Table III-7. Complete details of the C&I customer forecast results can be found in Appendix A CIHC.

viii. Commercial/Industrial Non-Heating Customer Forecast

The Company found that the most significant independent variables related to the number of C&I non-heating customers are labor force and retail sales. The Company included those variables, along with seven monthly dummy variables to capture the seasonality on C&I non-heating customer counts, three AR variables to correct for serial autocorrelation, and eight EARCH variables to correct for heteroscedasticity. The details of the C&I non-heating customer model are presented in Appendix A CINHC, and the form of the model is presented below:

C&I Non-Heating Customers is a function of:

Labor Force (LBF)

Retail Sales (RSALE)

Dummy Variable for March (d3)

Dummy Variable for May (d5)

Dummy Variable for August (d8)

Dummy Variable for September (d9)

Dummy Variable for October (d10)

Dummy Variable for November (d11)

Dummy Variable for December (d12)

AR term of period 1 (AR1)

AR term of period 4 (AR4)

AR term of period 5 (AR5)

EARCH term of period 0 (EARCH0)

EARCH term of period 2 (EARCH2)

EARCH term of period 3 (EARCH3)

EARCH term of period 5 (EARCH5)

EARCH term of period 6 (EARCH6)

EARCH term of period 12 (EARCH12)

EGARCH term of period 3 (EGARCH3)

EGARCH term of period 12 (EGARCH12)

Using the model specification described above, the C&I non-heating customer forecast was produced and is presented in Table III-7 below.

Table III-7

National Grid NH Forecast Results

Commercial and Industrial Customer Forecast

	C&I Heating	C&I Non-Heat	
Model	DH1a114	DN1a98	
Dependent	CUSCH	CUSCN	
Independent	GSPR	LBF	
	Dummy(2,3,4,10,11,12)	RSALE	
	AR(1,4,5)	Dummy(3,5,8,9,10,11,12)	
		AR(1,4,5)	
		EARCH(2,3,5,6,12)	
		EGARCH(3,12)	

Annual Commercial & Industrial Customer Forecast (Split-Year from Nov. to Oct)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010	9,082	1,165	10,247
Nov. 2010- Oct. 2011	9,232	1,174	10,406
Nov. 2011- Oct. 2012	9,544	1,192	10,736
Nov. 2012- Oct. 2013	9,854	1,211	11,065
Nov. 2013- Oct. 2014	10,127	1,228	11,355
Nov. 2014- Oct. 2015	10,392	1,246	11,639
Average	9,705	1,203	10,908

Commercial & Industrial Customer Forecast -- Net Growth			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	150	9	158
Nov. 2011- Oct. 2012	312	18	330
Nov. 2012- Oct. 2013	310	18	329
Nov. 2013- Oct. 2014	273	17	290
Nov. 2014- Oct. 2015	266	18	284
Average	262	16	278

Commercial & Industrial Customer Forecast -- Percent Growth from Base Year (2005)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	1.65%	0.76%	1.55%
Nov. 2011- Oct. 2012	3.38%	1.57%	3.17%
Nov. 2012- Oct. 2013	3.25%	1.54%	3.06%
Nov. 2013- Oct. 2014	2.77%	1.44%	2.62%
Nov. 2014- Oct. 2015	2.63%	1.45%	2.50%
Average	2.73%	1.35%	2.58%

ix. C&I Heating Use-Per-Customer

For the C&I heating use-per-customer forecast, there was a strong relationship between normalized use-per-customer and labor force. Therefore, the model developed for use-per-C&I heating customer had this variable as an independent variable, along with nine monthly dummy variables, one AR variable to correct for serial autocorrelation and six EARCH variables to correct for heteroscedasticity. The details of the use-per-C&I heating customer model are presented in Appendix A CIHU, and the form of the model is presented below:

C&I Heating Use-Per-Customer is a function of:

Labor Force (LBF)
Dummy Variable for January (d1)
Dummy Variable for February (d2)
Dummy Variable for March (d3)
Dummy Variable for April (d4)
Dummy Variable for May (d5)
Dummy Variable for June (d6)
Dummy Variable for October (d10)
Dummy Variable for November (d11)
Dummy Variable for December (d12)
AR term of period 24 (AR24)
EARCH term 0 (EARCH0)
EARCH term 1 (EARCH1)
EARCH term 2 (EARCH2)
EARCH term 8 (EARCH8)
EARCH term 12 (EARCH12)
EGARCH term 9 (EGARCH9)

Using the model specification described above, the C&I heating use-per-customer forecast was produced and is presented in Table III-8 below. The complete C&I heating use-per-customer forecast results are in Appendix A CIHU.

x. Commercial/Industrial Non-Heating Use-Per-Customer

For the C&I non-heating use-per-customer forecast, there was a strong relationship between normalized use-per-customer and lagged heating degree days and employment. Therefore, the model developed for use-per-C&I non-heating customer had these variables as independent variables, along with three monthly dummy variables, one AR variable to correct for serial autocorrelation, and three EARCH variables to correct for heteroscedasticity. The details of the use-per-C&I non-heating use-per-customer model are presented in Appendix A CINHU, and the form of the model is presented below:

C&I Non-heating Use-Per-Customer is a function of:

- Lagged Heating Degree Days (HDDA_1)
- Employment (EMP)
- Dummy Variable for February (d2)
- Dummy Variable for June (d6)
- Dummy Variable for September (d9)
- AR term of period 3 (AR3)
- EARCH term 0 (EARCH0)
- EARCH term 7 (EARCH7)
- EARCH term 12 (EARCH12)

Using the model specification described above, the C&I non-heating use-per-customer forecast was produced and is presented in Table III-8 below. The complete C&I non-heating use-per-customer forecast results are in Appendix A CINHU.

Table III-8

National Grid NH Forecast Results

Commercial and Industrial Use-Per-Customer Forecast

	C&I Heating	C&I Non-Heat
Model	EH1a128	EN1a68
Dependent	USECH	USECN
Independent	LBF	HDDA_1
	dummy(1,2,3,4,5,6,10,11,12)	EMP
	AR24	dummy(2,6,9)
	EARCH(1,2,8,12)	AR3
	EGARCH9	EARCH(7,12)
Annual Commercial & Industrial Use-Per-Customer Forecast (Split-Year from Nov. to Oct)		
	C&I Heating	**C&I Non-Heat**
Nov. 2009- Oct. 2010	566.14	978.77
Nov. 2010- Oct. 2011	565.44	983.86
Nov. 2011- Oct. 2012	566.03	994.30
Nov. 2012- Oct. 2013	567.44	1,006.31
Nov. 2013- Oct. 2014	568.59	1,015.28
Nov. 2014- Oct. 2015	569.59	1,021.59
Average	567.20	1,000.02
Commercial & Industrial Use-Per-Customer Forecast -- Net Growth		
	C&I Heating	**C&I Non-Heat**
Nov. 2009- Oct. 2010		
Nov. 2010- Oct. 2011	(0.70)	5.09
Nov. 2011- Oct. 2012	0.59	10.44
Nov. 2012- Oct. 2013	1.41	12.00
Nov. 2013- Oct. 2014	1.15	8.98
Nov. 2014- Oct. 2015	1.00	6.31
Average	0.69	8.56
Commercial & Industrial Use-Per-Customer Forecast -- Percent Growth from Base Year (2005)		
	C&I Heating	**C&I Non-Heat**
Nov. 2009- Oct. 2010		
Nov. 2010- Oct. 2011	-0.12%	0.52%
Nov. 2011- Oct. 2012	0.10%	1.06%
Nov. 2012- Oct. 2013	0.25%	1.21%
Nov. 2013- Oct. 2014	0.20%	0.89%
Nov. 2014- Oct. 2015	0.18%	0.62%
Average	0.12%	0.86%

xi. Commercial/Industrial Heating Sales Forecast

As with the residential models, the Company forecast C&I heating sales in MMBtu normalized for weather. Models were developed by combining the results of the C&I customer and use-per-customer forecasts, as well as directly using econometric methods. The Company produced an initial forecast of C&I heating sales using the C&I heating customer model multiplied by the results of the use per C&I heating customer model. The product of these two forecasts yielded a calculated C&I heating sales forecast reflecting an overall annual average growth rate of 2.79 percent and a sales forecast of 5.908 million MMBtu in the year 2014/15. The results of this initial volume forecast are presented in Table III-9 below.

The second approach developed a single econometric model for C&I heating sales. The econometric model includes a term for billing degree days, and NH gross state product, along with six monthly dummy variables to capture the seasonality of C&I heating volumes, an AR variable to correct for serial autocorrelation and four EARCH variables to correct for heteroscedasticity. The details of the C&I heating volume model are presented in Appendix A CIHV, and the form of the model is presented below:

C&I Heating Volume is a function of:

Intercept

Actual Billing Degree Days (BDDA)

Gross State Product (GSP)

Dummy Variable for February (d2)

Dummy Variable for March (d3)

Dummy Variable for May (d5)

Dummy Variable for October (d10)

Dummy Variable for November (d11)

Dummy Variable for December (d12)

AR term of period 11 (AR11)

EARCH term of period 0 (EARCH0)

EARCH term of period 2 (EARCH2)

EARCH term of period 3 (EARCH3)

EARCH term of period 12 (EARCH12)

Using the model specification described above, the C&I heating volume forecast was produced and is presented in Table III-10 below.

See Figure III-2 for the C&I MMBtu load forecast summary and Appendix A CIHV for complete details of the forecast.

xii. Commercial/Industrial Non-Heating Sales Forecast

As with the earlier models, the Company forecast C&I non-heating sales in MMBtu normalized for weather. Models were developed by combining the results of the C&I non-customer and use-per-customer forecasts, as well as directly using econometric methods. The Company produced an initial forecast of C&I non-heating sales using the C&I non-heating customer model multiplied by the results of the use per C&I non-heating customer model. The product of these two forecasts yielded a calculated C&I non-heating sales forecast reflecting an overall annual average growth rate of 2.22 percent and a sales forecast of 1.270 million MMBtu in the year 2014/15. The results of this initial volume forecast are presented in Table III-9 below.

Table III-9

National Grid NH Forecast Results

Commercial/Industrial Gas Volume Forecast

Customers Times Use-Per Customer

Annual Com/Ind Sales (Customers * Use-Per_Customer) Forecast (Split-Year from Nov. to Oct)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010	5,150,005	1,138,939	6,288,944
Nov. 2010- Oct. 2011	5,208,599	1,152,900	6,361,500
Nov. 2011- Oct. 2012	5,386,440	1,183,438	6,569,877
Nov. 2012- Oct. 2013	5,580,270	1,216,353	6,796,623
Nov. 2013- Oct. 2014	5,748,227	1,244,920	6,993,147
Nov. 2014- Oct. 2015	5,908,024	1,270,801	7,178,826
Average	5,496,927	1,201,225	6,698,153
Annual Com/Ind Sales (Customers * Use-Per_Customer) Forecast (Split-Year from Nov. to Oct)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	58,594	13,961	72,556
Nov. 2011- Oct. 2012	177,840	30,538	208,378
Nov. 2012- Oct. 2013	193,830	32,915	226,745
Nov. 2013- Oct. 2014	167,957	28,567	196,524
Nov. 2014- Oct. 2015	159,798	25,881	185,679
Average	151,604	26,372	177,976
Com/Ind Sales (Customers * Use-Per_Customer) Forecast -- Percent Growth from Base Year (2005)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	1.14%	1.23%	1.15%
Nov. 2011- Oct. 2012	3.41%	2.65%	3.28%
Nov. 2012- Oct. 2013	3.60%	2.78%	3.45%
Nov. 2013- Oct. 2014	3.01%	2.35%	2.89%
Nov. 2014- Oct. 2015	2.78%	2.08%	2.66%
Average	2.79%	2.22%	2.69%

The second approach developed a single econometric model for C&I non-heating sales. The econometric model includes terms for NH gross state product, along with six monthly dummy variables to capture the seasonality of C&I non-heating volumes, one AR variable to correct for serial autocorrelation and two EARCH variables to correct for heteroscedasticity. The details of the C&I non-heating volume model are presented in Appendix A CINHV, and the form of the model is presented below:

C&I Non-heating Volume is a function of:

Gross State Product (GSP)

Dummy Variable for January (d1)

Dummy Variable for February (d2)

Dummy Variable for April (d4)

Dummy Variable for July (d7)

Dummy Variable for August (d8)

Dummy Variable for October (d10)

AR term of period 24 (AR24)

EARCH term of period 0 (EARCH0)

EARCH term of period 8 (EARCH8)

Using the model specification described above, the C&I non-heating volume forecast was produced and is presented in Table III-10 below.

Table III-10

National Grid NH Forecast Results

Commercial/Industrial Gas Sales Volume Forecast Model

	C&I Heating	C&I Non-Heat	Total
Model	FH1a47	FN1a88	
Dependent	VOLCH	VOLCN	
Independent	Intercept	GSP	
	BDDA	Dummy(1,2,4,7,8,10)	
	GSP	AR24	
	dummy(2,3,5,10,11,12)	EARCH8	
	AR11		
	EARCH(2,3,12)		
Annual Commercial & Industrial Volume Forecast (Split-Year from Nov. to Oct)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010	5,538,185	1,189,701	6,727,886
Nov. 2010- Oct. 2011	5,725,823	1,233,855	6,959,678
Nov. 2011- Oct. 2012	5,979,890	1,299,987	7,279,877
Nov. 2012- Oct. 2013	6,245,890	1,366,349	7,612,239
Nov. 2013- Oct. 2014	6,509,852	1,430,645	7,940,497
Nov. 2014- Oct. 2015	6,778,797	1,497,108	8,275,905
Average	6,129,740	1,336,274	7,466,014
Annual Commercial & Industrial Volume Forecast (Split-Year from Nov. to Oct)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	187,638	44,154	231,792
Nov. 2011- Oct. 2012	254,067	66,132	320,199
Nov. 2012- Oct. 2013	266,000	66,362	332,362
Nov. 2013- Oct. 2014	263,962	64,296	328,258
Nov. 2014- Oct. 2015	268,945	66,463	335,408
Average	248,122	61,481	309,604
Commercial & Industrial Volume Forecast -- Percent Growth from Base Year (2005)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	3.39%	3.71%	3.45%
Nov. 2011- Oct. 2012	4.44%	5.36%	4.60%
Nov. 2012- Oct. 2013	4.45%	5.10%	4.57%
Nov. 2013- Oct. 2014	4.23%	4.71%	4.31%
Nov. 2014- Oct. 2015	4.13%	4.65%	4.22%
Average	4.13%	4.71%	4.23%

The Company then combined the calculated C&I non-heating sales forecast with the results of the sales volume forecast model using a weighting factor (α) derived from a variance/covariance analysis on the two forecasts as described in above in residential heating volume forecast section. Calculating the weighting factor this way minimizes the errors associated with using the two models in combination. The calculation of the weighting factor for the C&I non heating volumes can be found in Appendix A CINHalpha. The results of the combined models produced the final C&I non-heating sales forecast of 1.377 million MMBtu in 2014/15 for an annualized growth rate of 3.45 percent from 2010/11-2014/15. The results of this combined volume forecast are presented in Table III-11 below.

Also shown in Table III-11, is the total C&I volume forecast, C&I heating plus non heating, of 7.67 million MMBtu in 2014/15, and an average annual growth rate of 3.43 percent.

Table III-11

National Grid NH Forecast Results

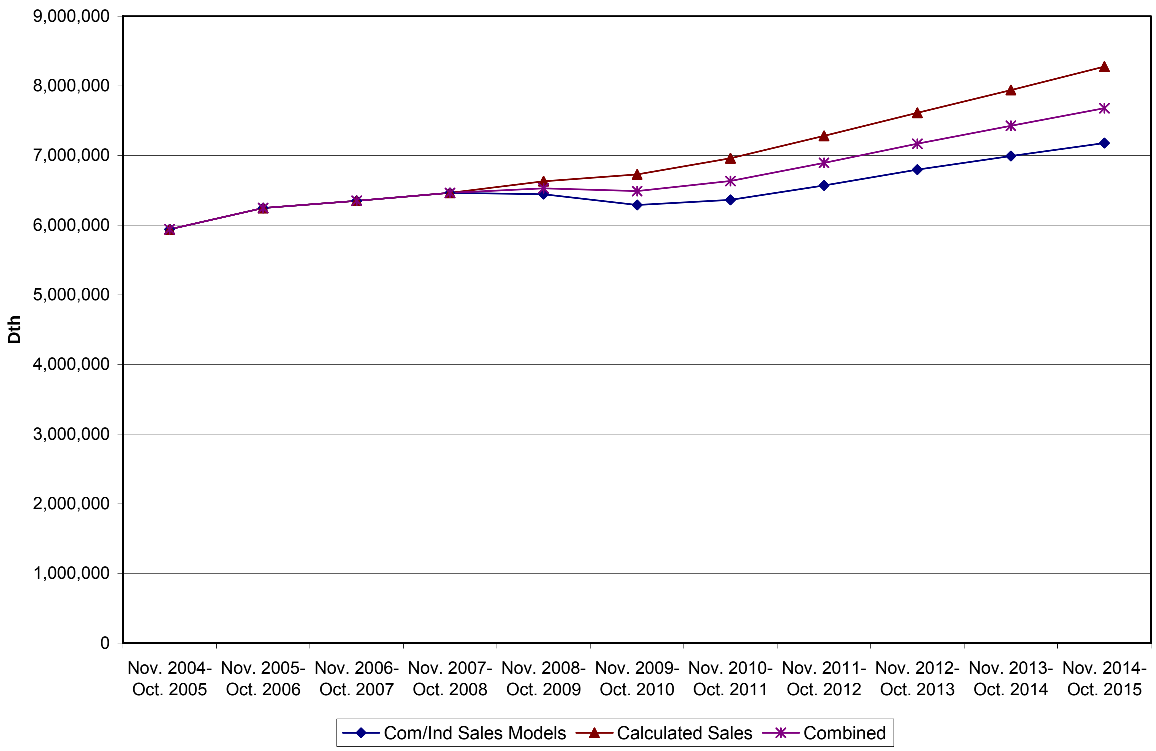
Commercial/Industrial Gas Sales Combined Volume Forecast

	C&I Heating	C&I Non-Heat	Total
Nov. 2009- Oct. 2010	5,325,349	1,162,940	6,488,289
Nov. 2010- Oct. 2011	5,442,234	1,191,177	6,633,410
Nov. 2011- Oct. 2012	5,654,506	1,238,544	6,893,050
Nov. 2012- Oct. 2013	5,880,936	1,287,273	7,168,209
Nov. 2013- Oct. 2014	6,092,259	1,332,733	7,424,992
Nov. 2014- Oct. 2015	6,301,359	1,377,802	7,679,162
Average	5,782,774	1,265,078	7,047,852
Annual Com/Ind Combined Volume Forecast (Split-Year from Nov. to Oct)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	116,884	28,237	145,121
Nov. 2011- Oct. 2012	212,273	47,367	259,640
Nov. 2012- Oct. 2013	226,430	48,730	275,159
Nov. 2013- Oct. 2014	211,323	45,460	256,783
Nov. 2014- Oct. 2015	209,100	45,069	254,169
Average	195,202	42,973	238,175
Com/Ind Combined Volume Forecast -- Percent Growth from Base Year (2005)			
	C&I Heating	**C&I Non-Heat**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	2.19%	2.43%	2.24%
Nov. 2011- Oct. 2012	3.90%	3.98%	3.91%
Nov. 2012- Oct. 2013	4.00%	3.93%	3.99%
Nov. 2013- Oct. 2014	3.59%	3.53%	3.58%
Nov. 2014- Oct. 2015	3.43%	3.38%	3.42%
Average	3.43%	3.45%	3.43%

See Figure III-2 for the C&I MMBtu load forecast summary and Appendix A for complete details of the forecast.

Figure III-2

Commercial & Industrial Firm Sales & Transportation Forecast



xiii. Summary of Final Forecast

For the final forecast, the Company adds the results of the combined sales volumes forecast for the residential heating, residential non-heating, C&I heating and C&I non-heating forecast to obtain the total Company forecast.

Table III-12 summarizes the National Grid NH forecast by residential and C&I sector. Because the analysis thus far has been on customer billed sales volumes, the figures presented in Table III-12 are billed sales before adjusting for unaccounted-for-gas.

Table III-12

National Grid NH – Five Year Forecast

(Billed Sales Before Adjusting for Unaccounted-for-Gas)

Annual Total Volume Forecast (Split-Year from Nov. to Oct)			
	Residential	Commercial & Industrial	Total
Nov. 2009- Oct. 2010	5,962,145	6,488,289	12,450,433
Nov. 2010- Oct. 2011	6,040,249	6,633,410	12,673,659
Nov. 2011- Oct. 2012	6,129,692	6,893,050	13,022,742
Nov. 2012- Oct. 2013	6,216,305	7,168,209	13,384,514
Nov. 2013- Oct. 2014	6,298,810	7,424,992	13,723,802
Nov. 2014- Oct. 2015	6,382,967	7,679,162	14,062,129
Average	6,171,694	7,047,852	13,219,547
Annual Total Volume Forecast (Split-Year from Nov. to Oct)			
	Residential	**Commercial & Industrial**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	78,104	145,121	223,225
Nov. 2011- Oct. 2012	89,443	259,640	349,083
Nov. 2012- Oct. 2013	86,613	275,159	361,772
Nov. 2013- Oct. 2014	82,505	256,783	339,289
Nov. 2014- Oct. 2015	84,157	254,169	338,327
Average	84,165	238,175	322,339
Total Volume Forecast -- Percent Growth from Base Year (2005)			
	Residential	**Commercial & Industrial**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	1.31%	2.24%	1.79%
Nov. 2011- Oct. 2012	1.48%	3.91%	2.75%
Nov. 2012- Oct. 2013	1.41%	3.99%	2.78%
Nov. 2013- Oct. 2014	1.33%	3.58%	2.53%
Nov. 2014- Oct. 2015	1.34%	3.42%	2.47%
Average	1.37%	3.43%	2.47%

To align these figures with throughput figures needed for resource planning, the Company next applies an unaccounted-for-gas factor of 2.6 percent[5] to them to derive the throughput figures presented in Table III-13 below.

[5] The formula for adjusting billed sales volumes to throughput is:

$$Throughput = BilledSales * \left[1 / (1 - 0.026) \right]$$

Table III-13

National Grid NH Natural Gas, Inc. – Five Year Forecast

(Throughput After Adjusting for Unaccounted-for-Gas)

Annual Total Throughput Volume Forecast (Split-Year from Nov. to Oct)			
	Residential	**Commercial & Industrial**	**Total**
Nov. 2009- Oct. 2010	6,121,298	6,661,488	12,782,786
Nov. 2010- Oct. 2011	6,201,487	6,810,483	13,011,970
Nov. 2011- Oct. 2012	6,293,318	7,077,053	13,370,372
Nov. 2012- Oct. 2013	6,382,243	7,359,558	13,741,801
Nov. 2013- Oct. 2014	6,466,951	7,623,196	14,090,146
Nov. 2014- Oct. 2015	6,553,355	7,884,150	14,437,504
Average	6,336,442	7,235,988	13,572,430
Annual Total Throughput Volume Forecast (Split-Year from Nov. to Oct)			
	Residential	**Commercial & Industrial**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	80,189	148,995	229,184
Nov. 2011- Oct. 2012	91,831	266,570	358,401
Nov. 2012- Oct. 2013	88,925	282,504	371,429
Nov. 2013- Oct. 2014	84,708	263,638	348,346
Nov. 2014- Oct. 2015	86,404	260,954	347,358
Average	86,411	244,532	330,944
Total Throughput Volume Forecast -- Percent Growth from Base Year (2005)			
	Residential	**Commercial & Industrial**	**Total**
Nov. 2009- Oct. 2010			
Nov. 2010- Oct. 2011	1.31%	2.24%	1.79%
Nov. 2011- Oct. 2012	1.48%	3.91%	2.75%
Nov. 2012- Oct. 2013	1.41%	3.99%	2.78%
Nov. 2013- Oct. 2014	1.33%	3.58%	2.53%
Nov. 2014- Oct. 2015	1.34%	3.42%	2.47%
Average	1.37%	3.43%	2.47%

(c) Forecast of Incremental Demand for Traditional Markets

National Grid NH's incremental demand forecasts (base case) for traditional markets are presented in Chart III-B-1. The incremental demand forecast is calculated as the year-to-year change in demand that results from the econometric forecast models. The Company adds the annual incremental demand determined in this way to the reference year sendout described in Section III C. As set forth in Chart III-B-1, the Company projects total net throughput additions over the forecast period (2010/11 through 2014/15) of 1,425,535 MMBtu for traditional core markets. Overall, this growth in traditional-market firm sales represents a 10.5 percent increase in sendout requirements over the forecast period, or 2.6 percent per year on average (see Chart III-A-1).

The following sections describe the specific steps involved with the development of National Grid NH's incremental demand forecast for traditional market segments, including residential, and C&I customers.

(i) Residential Market

Chart III-B-1 presents the Company's demand forecast for residential customers. This forecast shows 351,867 MMBtu of net incremental load additions over the forecast period. Chart III-B-1 shows that National Grid NH is projected to add an average of 87,967 MMBtu net load annually, between 2010/11 and 2014/15. As shown on Chart III-A-1, this growth in residential sales represents an overall increase in residential sendout of 1.4 percent per year on average or 5.5 percent over the forecast period.

(ii) Commercial and Industrial Market

Chart III-B-1 presents National Grid NH's updated C&I demand forecast. This forecast shows 1,073,667 MMBtu of net incremental load over the forecast period. Chart III-B-1 shows that the Company is projected to add an average of 268,417 MMBtus net load annually between 2010/11 and 2014/15. As shown on Chart III-A-1, this increase in C&I sales represents an overall increase in C&I sendout of 3.7 percent per year on average, or 14.8 percent over the forecast period.

3. Demand Forecast for Non-Traditional Markets

(a) Natural Gas Vehicles

As shown on Chart III-B-1, the Company's forecast indicates no incremental demand in the natural gas vehicle market in the National Grid NH service territory. The Company's forecast of demand in the NGV market is driven by governmental regulations requiring or encouraging NGV use among certain commercial and governmental vehicle fleets, and the Company's marketing efforts with those vehicle fleet operators. At the time that this forecast was prepared, the Company's marketing representatives did not anticipate any significant demand in this market.

(b) Large-Scale Cogeneration Market

National Grid NH's assessment of the large-scale cogeneration market is that the natural gas required to meet the demands of the potential customers in this market during the forecast period will not have an impact on the Company's sendout requirements or resource plan. National Grid NH is not currently aware of any large-scale gas-fired cogeneration facilities planned for locations within the Company's service territory over the forecast period that do not yet have their natural gas requirements in place. However, consistent with National Grid NH's recent experience, if a new gas-fired cogeneration power plant were to be located in the Company's service territory, the Company believes that the gas requirements of such facilities would likely be served by third-party gas suppliers in conjunction with a transportation only service provided by National Grid NH from the city gate to the facility. Accordingly, National Grid NH's forecast shows no demand for the large-scale cogeneration market and no impact on the resource plan.

4. Demand-Side Management

National Grid NH is approximately half way through a twenty (20) month energy efficiency program approved by the Commission in Order No. 24,995 dated July 31, 2009 in Docket DG 09-049. A copy of the program description is attached in Appendix B. Subject to Commission review and approval, the Company expects to continue its efficiency program beyond the December 31, 2010 expiration of the current plan through to the end of the forecast period. In past filings the Company treated the impact of its energy efficiency programs as a reduction to its forecasted demand because they are driven by specific incentives that occur outside of the normal operation of the energy market in its territory. In this filing, in accordance with Commission Order No. 24,941, the Company is treating demand side management as a resource integrated with its available supply-slide resources. A more detailed description of this integration process is presented in Section IV-B and IV-D below. However, the Company used the energy efficiency program currently in effect as a starting point in this integration process to quantify demand side management savings volumes and the costs to acquire them.

5. Transportation Migration

(a) Introduction

Since the introduction of the National Grid NH's C&I transportation program in 2001, the Company has gained nearly eight years of experience with unbundled transportation service in New Hampshire. See Chart III-B-5 for the Company's transportation customer activity since 2001. National Grid NH currently has in place a comprehensive customer-choice program that provides C&I customers with an opportunity to share in the benefits provided by increased competition in the retail market for natural gas.

(b) Impact of Transportation Migration on Sendout Requirements

The Company's resource portfolio is currently structured to have a high level of flexibility to adapt to changing market conditions and regulatory obligations. This is especially true with respect to the Company's domestic gas commodity commitments. Generally speaking, National Grid NH enters into agreements that allow it the flexibility to eliminate up to 100 percent of its existing domestic gas commodity purchases in less than a twelve-month period. With respect to capacity resources, the Company currently has an obligation to plan for the needs of firm customers whether they receive sales, or transportation-only services. Therefore, the Company plans for the needs of sales customers and assigns a pro-rata share of pipeline capacity, underground storage capacity and supplement resources to third-party suppliers on behalf of those sales customers who convert to Supplier Service.[6] Under the Company's Delivery Terms and Conditions, capacity is assigned to third party suppliers, on behalf of migrating sales customers, in block increments based on the profile of the aggregated customer group served by the supplier (rather than on a customer-by-customer basis). The supplier is assigned an initial block of capacity that is subject to monthly changes consistent with increases or decreases (in increments of 200 MMBtu) in the customer load served by the supplier. National Grid NH retains recall rights on the capacity contracts that are released to suppliers on behalf of their customers to ensure that the capacity remains

[6] In accordance with the Company's Delivery Terms and Conditions, new customers (as defined by a meter location) who have not previously been served by the Company as a sales customer, may opt directly to Supplier Service, and therefore, are not eligible for mandatory capacity assignment.

available to serve load within the Company's service territory. In addition, the Company monitors the addition of transportation customers who elect Supplier Service directly and are not eligible for mandatory capacity assignment, as well as any migration of grandfathered customers, who were exempted from the capacity assignment requirements established by the Commission in connection with the unbundling of capacity and supply services, to sales service. For National Grid NH, the customer load opting directly for Supplier Service (without first becoming a Sales Service customer) is relatively small in proportion to the Company's overall firm sendout. From 2001 through the end of 2009, the total annual volumes of such load, 223,000 MMBtu, represents 1.7 percent of total annual sendout forecast for the 2009/10 split year. For the calendar year 2009, there were no customers that opted to go directly to Supplier Service. Moreover, the Company has not noted any significant movement of grandfathered firm transportation customers back to sales service.

In Order No. 24,941 at page 19, the Commission noted that the Staff and the Company agreed that it is not appropriate to plan for a capacity reserve to meet the potential supply needs of grandfathered firm transportation customers. Further, the Commission ordered the Company in this filing to address whether circumstances have changed such that a capacity reserve is warranted. The Company has noted no change in circumstances that would warrant a establishing a capacity reserve.

The Company will continue to monitor growth in new transportation load opting directly for Supplier Service to determine whether, in the future, the Company's growth forecasts should be adjusted. To the extent that the Company projects a need for incremental capacity on the peak day, the Company will consider the trend in these transportation loads as a factor in determining the best way to meet that need. In the interim, the Company will rely on the Commission approved penalties for under-deliveries by suppliers serving the Company's customers as an appropriate deterrent to prevent suppliers from failing to meet their supply obligation to customers.

6. Advertising and Marketing Incentives

National Grid plans on marketing gas conversions to low use customers and prospects in the Nashua, Concord and Manchester areas during fiscal year 2011. These marketing efforts will be primarily in the form of direct mail with several campaigns planned during the year. The estimated budget for these marketing initiatives is $60,000 based upon the number of prospects and low use customers that the Company plans on mailing to (approximately 15,000), the number of campaigns during the year (approximately 4) and a cost per prospect per mailing ($1.00). In addition, the fiscal year 2011 forecasted budget for National Grid NH for incentive rebates is $125,000. Rebates are offered to prospective new conversion customers and/or low use upgrade prospects. Incentives are offered only where a four year payback on the conversion can be achieved after taking into account the incentive. The Company has not prepared forecasts of advertising and marketing incentives beyond fiscal year 2011. Because these amounts are relatively small and not likely to have a significant impact on the forecasted model results, which would include the impact of historic marketing activities, the Company did not make any adjustments to the forecast results to account for this activity.

7. Sensitivity Analysis

(a) Overview

National Grid NH's resource portfolio must be designed to have adequate and reliable resources available to meet forecasted demand at the lowest possible cost. Because the future cannot be predicted with precision, the Company evaluates whether the portfolio resources will be adequate and reliable when actual experience departs from the forecast. Specifically, the Company considered the levels of uncertainty in the demand and sendout forecasts and developed high- and low-demand scenarios relative to the base case forecast to determine the impact a range of alternatives would have on its resource portfolio. A comparison of the average annual load additions for the base case, high- and low-demand scenarios is presented in Chart III-B-2.

(b) Development of Demand Scenarios

National Grid NH used the results of the econometric models to develop the high and low demand scenarios. The growth rates of the combined results of econometric model for customers, use per customer and sales, for the residential heating and non heating and C&I heating and non heating classes were adjusted up and down by 1 percentage point. For the high case, the Company increased the growth rates on the resulting forecast by 1 percentage point to calculate the high demand values. Similarly, for the low case, the Company decreased the growth rates on the resulting forecast by 1 percentage point to calculate the low demand values.

(i) High-Demand Scenario

The high-demand scenario, shown in Chart III-B-3, results in total net additions of 2,417,629 MMBtu, or 513,523 MMBtu per year, compared to 1,425,534 MMBtu, or

356,384 MMBtu per year, in the base case (see Chart III-B-1). For the high-demand scenario, National Grid NH increased the annual growth rates that resulted from the base case forecast by 1 percentage point. For example, the average annual growth rate in the base case is 2.6 percent and in the high case it is 3.8 percent.

(ii) Low-Demand Scenario

The low-demand scenario, shown in Chart III-B-4, results in total net additions of 940,609 MMBtu, or 210,551 MMBtu per year, compared to 1,425,534 MMBtu, or 356,384 MMBtu per year, in the base case (see Chart III-B-1). For the low-demand scenario, National Grid NH decreased the annual growth rates that resulted from the base case forecast by 1 percentage point. For example, the average annual growth rate in the base case is 2.6 percent and in the low case it is 1.5 percent.

C. Regression Analysis

In the second step of National Grid NH's forecasting methodology set forth in Section III.A, above, the Company uses regression equations of daily sendout versus daily temperature for the most recent twelve months to calculate the reference-year "springboard." This serves as the most accurate starting point for National Grid NH to forecast its future customer requirements. Once this step is completed, the incremental sendout requirements developed in Section III.B can be added to the reference-year sendout requirements to determine National Grid NH's normal year forecast of customer requirements over the forecast period for gas cost recovery purposes and to determine National Grid NH's design year forecast of customer requirements over the forecast period for resource planning purposes. To perform its regression analysis, the Company used version 2.10.1 of the R statistical software package.[7]

To establish normal-year springboard sendout requirements, the Company developed a linear-regression equation using data for the reference-year period April 1 2008 through March 31, 2009. Its regression equation uses sendout as its dependent variable and temperature as its independent variable.[8]

Through the use of the linear-regression equation, the Company is able to normalize daily sendout. Specifically, the actual daily firm sendout is regressed against heating degree day ('HDD") data as calculated from hourly temperature data from the National Weather Service, HDD data lagged by one day, and a weekend dummy variable. These data elements were selected for the regression analysis since these elements have been, and continue to be, the major explanatory variables underlying National Grid NH's daily sendout requirements.

National Grid NH selected the Manchester, New Hampshire weather station (KMHT) as the source of the weather data that is used as the principal explanatory variable in its regression equations. The Manchester weather station was selected because it is close to the center of the Company's service territory, on a load-weighted basis. Specifically, the Company used the HDD value calculated from the average of the hourly air temperature readings measured for each 24-hour period of 10 a.m. to 10 a.m., which constitutes the gas day and therefore corresponds to the same daily time

[7] "R is a language and environment for statistical computing and graphics. It is a GNU project which is similar to the S language and environment which was developed at Bell Laboratories (formerly AT&T, now Lucent Technologies)... R can be considered as a different implementation of S. There are some important differences, but much code written for S runs unaltered under R. R is available as Free Software under the terms of the Free Software Foundation's GNU General Public License in source code form. It compiles and runs on a wide variety of UNIX platforms and similar systems (including FreeBSD and Linux), Windows and MacOS." (Source: The R Project for Statistical Computing)

period of observation of the sendout data. Throughout its regression analysis, the Company defined HDD as 65^{o} F minus the daily average air temperature without setting values less than zero to zero (left-truncation) as is done in the standard definition of HDD.

Based on its observations of the relationship between sendout and HDD over the split years 2001/02 through 2008/09, the Company chose to develop its regression equation as a segmented model, a *"regression model where the relationships between the response and one or more explanatory variables are piecewise linear, namely represented by two or more straight lines connected at unknown values: these values are usually referred as breakpoints."* (Source: "segmented: an R package to fit regression models with broken-line relationships," R News, Volume 8/1, May 2008, page 20). Since a significant portion of the Company's sendout is due to space heating usage and space heating only occurs when average air temperatures fall below a certain level, the segmented model serves as an excellent starting point for modeling the relationship between sendout and HDD.

The results of regressing sendout vs. HDD alone over the split years 2001/02 through 2008/09 show how significant temperature is as an explanatory variable for Company sendout as R^2 values over the period range from 0.97 to 0.98 (Table III.C.1 below).

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[8] Sendout includes both sales and supplier service customer requirements

Table III.C.1: Segmented Regression Results for sendout vs. HDD						
Split Year	Intercept	Slope1	Slope2	Standard Error	Adjusted R^2	Breakpoint HDD
2001/02	11,209.90	228.60	1,671.10	2,974	0.9767	9.25
2002/03	10,725/33	189.11	1,832.30	3569	0.9841	8.78
2003/04	11,982.32	334.44	1,874.30	3,623	0.9831	9.70
2004/05	11,444.23	225.98	1,923.94	3,085	0.9868	9.33
2005/06	11,801.62	191.28	1,803.81	3,116	0.9833	7.75
2006/07	13,032.92	308.79	1,957.23	3,430	0.9829	10.31
2007/08	11,292.85	166.81	1,874.25	3,347	0.9837	7.70
2008/09	11,931.39	318.08	1,883.55	3,658	0.9825	9.17

In Table III.C.1, *Intercept* is the MMBtu sendout predicted at HDD=0, *Slope1* is the MMBtu/HDD usage below the Breakpoint HDD level, *Slope2* is the MMBtu/HDD usage above the Breakpoint HDD level, the *Standard Error* is expressed in MMBtus, and the *Breakpoint HDD* is the HDD value at which space heating equipment is observed to turn on. The signs of the Slope1 and Slope2 coefficients (positive) imply that as temperatures get colder and HDD increases in value, then sendout will increase, which agrees with what the Company observes.

From the frequency plot (periodogram) of the residuals of the sendout vs. HDD regression, the Company observed a significant peak at frequency 0.14 (and its harmonic at 0.28), which indicates a correlation in the error term once in 1/0.14, or 7, days, confirming the Company's observations that weekday and weekend sendout requirements are different at similar HDD levels. Examining the average of the 2008/09 residuals by day of the week (Table III.C.2), the Company added a second independent variable, a weekday/weekend dummy variable set to zero for Mondays through Thursdays, 1 on Fridays and Sundays, and 2 on Saturdays.

Table III.C.2: Average Residual By Day of the Week for 2008/09 (MMBtu/day)	
Monday	908
Tuesday	1539
Wednesday	1353
Thursday	898
Friday	-914
Saturday	-2,658
Sunday	-1,067

The introduction of the second independent variable added an incremental improvement in the adjusted R^2 of the equations and, more importantly, eliminated the 7-day correlation of the residuals. Table III.C.3 lists the regression results after adding the weekend dummy variable. The sign of the coefficient (negative) implies that there is a reduction in sendout on weekend days versus weekday days at similar temperatures, as has been observed by the Company.

Table III.C.3: Segmented Regression Results for sendout vs. HDD and Weekend							
Split Year	Intercept	Slope1	Slope2	Weekend	Standard Error	Adjusted R^2	Breakpoint HDD
2001/02	11,998.00	215.31	1,654.49	-1,643.69	2,726	0.9804	8.81
2002/03	11,522,34	197.78	1,824.12	-1,358.36	3,434	0.9853	8.72
2003/04	12,661.35	323.47	1,871.17	-1,367.45	3,484	0.9844	9.50
2004/05	12,357.52	231.80	1,923.48	-1,559.93	2,869	0.9886	9.37
2005/06	12,913.03	208.71	1,808.79	-1,727.54	2,853	0.9860	7.98
2006/07	14,196,94	308.40	1,947.13	-2,254.98	3,011	0.9868	10.06
2007/08	12,383.46	176.01	1,879.34	-1847.24	3,067	0.9863	7.82
2008/09	12,935.28	286.60	1,878.51	-1,976.01	3,366	0.9852	8.82

Lastly, the Company observed a correlation between lagged temperature and the residuals of the above equation and it investigated adding a third independent variable. Its three choices were: (1) the difference between HDD on day t and HDD on day t-1, (2) the difference between HDD on day t and mean of the HDD on day t-1 and day t-2, or (3) the difference between HDD on day t and the mean of the HDD on day t-1 and day t-2 and day t-3. The differences were used in lieu of the actual lagged values to avoid correlation among the independent variables. The Company chose option (2) as the optimal additional independent variable. The underlying theory of this analysis is that heating requirements increase as two consecutive days of cold weather occur, which cools down structures to a greater degree than would be experienced on a single day. Table III.C.4 lists the regression results after adding the lagged HDD-difference variable. The sign of the coefficient (negative) implies that, if a day is colder than the previous day, the increase in sendout will be somewhat lower than what would be forecast without the coefficient, and vice versa.

Table III.C.4: Segmented Regression Results for sendout vs. HDD and Weekend and Lagged Delta HDD								
Split Year	Intercept	Slope1	Slope2	Weekend	Lagged Delta HDD	Standard Error	Adjusted R^2	Breakpoint HDD
2001/02	11,785.17	280.88	1,712.17	-1,367.82	-231.45	2,226	0.9869	9.77
2002/03	11,925.99	303.73	1,869.98	-1,565.62	-241.72	2,931	0.9893	10.09
2003/04	12,622.81	397.73	1,922.02	-1,347.64	-290.60	2,811	0.9899	10.52
2004/05	12,276.80	358.03	1,963.13	-1,424.72	-273.33	2,168	0.9935	10.49
2005/06	12,783.89	243.75	1,840.82	-1,690.16	-225.37	2,397	0.9902	8.36
2006/07	13,708.51	317.82	1,976.10	-1,991.89	-235.66	2,523	0.9908	10.05
2007/08	12,687.66	324.71	1,918.56	-1697.29	-264.47	2,473	0.9912	9.21
2008/09	12,859.90	363.70	1,948.81	-2,014.95	-312.03	2,466	0.9921	10.03

The functional form of the equation is given in Chart III.C.4. Table III.C.4 sets forth the regression coefficients for the National Grid NH system. The adjusted R-square is 0.9921, and all of the t-statistics of the independent variables are greater than 2.0, indicating that these variables are significant to the explanatory power of the equation.

This regression equation captures the observed characteristics of the Company's sendout requirements. The observed characteristics include the following: (1) sendout requirements are directly related to HDD; (2) sendout requirements are affected by HDDs that occur over a multi-day period; and (3) sendout requirements differ by day of the week. Thus, National Grid NH has developed a reliable regression equation to establish the basis upon which future sendout requirements can be forecast. Using its forecast of load additions and an appropriate set of daily HDD values for a design year, the Company can successfully plan its operational requirements to provide a low-cost, adequate and reliable supply of natural gas to its customers.

D. Normalized Forecasts of Customer Requirements By Year

Pursuant to Order No. 24,941, the Company bases its planning standards on a Monte Carlo analysis, having selected average daily temperature as the variable to be modeled and HDD, which is a linear transformation of average daily temperature, as the independent variable for its regression analysis. The Company decided to perform its Monte Carlo analysis on average daily temperature in this filing based on the experience it gained in its 2006 Long-Range Plan filing (DG 06-105). In Docket DG 06-105, the Company performed its Monte Carlo analysis on Effective Degree Days ("EDD")[9] and it learned that there a number of accommodations that have to be made when using data that is not continuous, i.e. EDD is a left-truncated data series in that it is the set of integer numbers greater than or equal to zero, whereas average daily temperature is a continuous data set when characterizing air temperature at Manchester, NH.

The Company has two sources of temperature data to use for its analysis. For data from 1977-2000, the Company used maximum and minimum temperatures (in ^{o}F) observed at the Manchester NH airport (KMHT). This data was available from the National Weather Service and Weather Underground, Inc. Average daily temperatures (from 12 midnight to 12 midnight) were calculated and rounded to one decimal place of precision. For data from 2001 to the present, the Company calculated average daily temperatures for the Gas Day (from 10am - 9am) from hourly national Weather Service METAR data from the Manchester NH airport (KMHT). These hourly observations are

[9] EDD incorporates the effects of both temperature and wind speed.

expressed in ^{o}C. The Company calculated average daily temperature (in ^{o}F) as the mean of the 24 hourly temperature observations in ^{o}C taken through the Gas Day. The average daily temperatures were then converted from ^{o}C to ^{o}F and they are specified with three decimal places of precision. There are no gaps in the data from January 1, 1977 – July 31, 2009.

a. The Theory of the Company's Monte Carlo Methodology

For its 2010 filing, the Company has used a Monte Carlo simulation method to generate synthetic daily EDD values for Manchester, NH for purposes of establishing its normal and design planning standards. The application of this Monte Carlo method provides the Company with a much larger time series of daily temperature values on which to base its standards.

The Monte Carlo methodology generally implies the generation of a dataset of synthetic values, larger than a given dataset of actual observations, based on the observed statistical properties of the actual dataset. The larger size of the synthetic dataset (4,096 simulated years) can assist in the determination of a better approximation of average expected temperatures (normal) as well as the likelihood of extreme weather events, such as those the Company seeks to define in its design standards.

In developing a time series of daily temperature values much larger than the Company's existing actual historical observations from 1977-present, greater consideration had to be given than to generate 365 random values for each year of the synthetic dataset. First, consideration of the seasonality of temperature values had to be given. Second, consideration of the interdependence of one day's temperature value with the prior day's value had to be given, as well. To generate its set of synthetic data values, the Company chose to model its temperature data using a first-order autoregressive process (denoted AR(1)). Such a model has been commonly assumed for meteorological time series.

Letting X_t denote the temperature value on the t^{th} day, the AR(1) process requires that the conditional probability distribution of X, given the past record of observed temperatures, X_{t-1}, X_{t-2}, , depends only on X_{t-1}, the observed temperature value for the previous day. This property can be expressed as:

$$X_t - \mu = \Phi(X_{t-1} - \mu) + \varepsilon_t, \qquad (1)$$

where the daily temperature values are expressed in terms of deviations from their common mean μ, and Φ denotes the first-order autocorrelation coefficient. The error terms (ε_t) in equation (1) are assumed to constitute a "white-noise process"; that is, they are uncorrelated random variables with zero mean and constant variance σ_ε^2. It is further assumed that the ε_t, are normally distributed [denoted $N(0, \sigma_\varepsilon^2)$].

The first-order autocorrelation coefficient Φ measures the degree of dependence between the temperature values on consecutive days, X_{t-1} and X_t. A value of $\Phi = 0$ implies that X_{t-1} and X_t are uncorrelated (i.e., X_t is completely unpredictable from the past record of daily temperatures), whereas a value of $\Phi = 1$ or -1 implies that the X_t are perfectly correlated (i.e., X_t is completely predictable). For daily temperature time series, typically $0 < \Phi < l$, meaning that the X_t are positively, but not perfectly, correlated. An AR(1) process is stationary (i.e., all the joint probability distributions of the X, are time invariant) if $| \Phi | < 1$.

The requirement that the error term ε_t is normally distributed implies that the daily temperature X_t also is normally distributed. Letting σ^2 denote the variance of X_t, it is straightforward to show that σ^2 is related to σ_ε^2, the variance of an error term, by

$$\sigma_\varepsilon^2 = (1 - \Phi^2)\, \sigma^2 \qquad (2)$$

We see by equation (2), that the stronger the dependence between X_{t-1} and X_t, the greater the reduction in the variance of an error term relative to the variance of daily temperature. More importantly, (2) implies that an AR(1) process can be completely characterized in terms of three parameters, μ, Φ and σ^2.

b. The Application of the Company's Monte Carlo Methodology

The Company used the dataset of thirty-two calendar years of daily average air temperature (in ^{o}F; 1977-2008) at Manchester NH airport as the source data for its Monte Carlo analysis. For the purposes of this analysis, the data for leap days were removed. To begin its analysis, the Company determined the annual (365-day) cycle in the dataset Fourier analysis and removed it from the input dataset (i.e. it "deseasonalized" the temperature pattern over the course of the year) to conduct its analysis on the variations in temperature about the long-term mean values. The Company then calculated Φ, the first-order autocorrelation coefficient, over the entire dataset of deseasonalized daily average temperatures. For each calendar day, the

Company then computed the mean and standard deviation values (32 observations per day) to establish the μ and σ^2 parameters required for its AR(1) process.

To create 4,096 years of synthetic daily temperature time series, the Company generated 365 random EDD deviation values (January 1st – December 31st) denoted by X'_1, X'_2,…, X'_{365}, from the AR(1) process. The initial daily temperature deviation value (for the day of January 1st), X'_1 was produced from the $N(\mu, \sigma^2)$ normal distribution by means of a random number generator. Each subsequent daily temperature deviation value, X'_n, was produced using Equations (1) and (2) from the $N(\mu, \sigma^2)$ normal distribution by means of a random number generator and the first-order autocorrelation coefficient Φ. Finally, the entire Monte Carlo data series was re-seasonalized by adding back in the 365-day seasonal component removed at the beginning of the analysis.

c. Definition of the Normal Year

Since it is important to model resource utilization using realistic weather scenarios, the Company could not directly take the mean of the 4,096 Monte Carlo values for each calendar day to define its normal year. National Grid NH needed to design a "Typical Meteorological Year" which would be actual observed weather patterns that would, on average, represent the normally-expected year.

From the Monte Carlo dataset, the Company calculated for each calendar month the mean monthly air temperature as well as the mean of the monthly standard deviations of the air temperature within each calendar month. It then referred back to the 32 years of actual data on record and, for each calendar month, it selected the month in the Manchester, NH weather database that most closely approximated the average temperature and standard deviation for each month. Since the actual values never exactly equaled the target monthly value, the Company then scaled the actual daily values by the ratio of the target mean temperature from its Monte Carlo analysis to the actual mean temperature for each month.

Lastly, the Company's Typical Meteorological Year was converted from temperature to HDD for modeling purposes (Table III.D.1). The normal year is defined as 6,409.8 HDD (rounded to 6,410 HDD) with a standard deviation of 276.88 HDD. Within the normal year, the coldest expected day is 61.51 HDD with a standard deviation of 5.40 HDD.

Table III.D.1: Normal Year HDD	
January	1,214
February	1,040
March	919
April	550
May	227
June	45
July	8
August	17
September	118
October	423
November	766
December	1,083
Total	6,410

d. Normal Year Customer Requirements

In the third step of the Company's forecasting methodology set forth in Section III.A, above, the Company combines the April 2008 – March 2009 reference-year sendout, which is derived from the regression analysis, with the annual incremental sendout forecast discussed in Section III.B, to yield the following forecast of customer requirements under normal weather conditions:

Base Case Demand Scenario Customer Requirements (MMBtu)

	2010/11	2011/12	2012/13	2013/14	2014/15
Heating Season	9,257,057	9,460,883	9,667,358	9,862,266	10,060,888
Non-Heating Season	3,841,316	3,995,891	4,160,845	4,314,283	4,463,019
Total	13,098372	13,456,774	13,828,203	14,176,549	14,523,907
Per-Annum Growth	---	2.7 %	2.8 %	2.5 %	2.5 %

The heating season is defined as the months of November through March; the non-heating season is defined as the months of April through October. The leap day in 2012 is not factored in these tables.

High Case Demand Scenario Customer Requirements (MMBtu)

	2010/11	2011/12	2012/13	2013/14	2014/15
Heating Season	9,430,576	9,730,752	10,038,810	10,339,946	10,650,091
Non-Heating Season	3,917,886	4,120,179	4,336,812	4,545,257	4,752,464
Total	13,348,462	13,850,931	14,375,621	14,885,203	15,402,555
Per-Annum Growth	---	3.8 %	3.8 %	3.5 %	3.5 %

Low Case Demand Scenario Customer Requirements (MMBtu)

	2010/11	2011/12	2012/13	2013/14	2014/15
Heating Season	9,086,718	9,198,596	9,309,939	9,407,214	9,505,192
Non-Heating Season	3,766,145	3,875,063	3,991,458	4,094,139	4,189,877
Total	12,852,863	13,073,659	13,301,397	13,501,353	13,695,069
Per-Annum Growth	---	1.7 %	1.7 %	1.5 %	1.4 %

E. Resource Planning Standards

In the fourth step of the Company's forecasting methodology, the Company determines the appropriate design-day and design-year planning standards to develop a least-cost reliable supply portfolio over the forecast period. Design day and design year are two types of extreme weather events for which the Company must maintain adequate resources. These two types of standards are significant in that the design day standard determines the most cost-effective amount of daily transportation capacity (both interstate and supplemental) and the design year standard determines the most cost-effective amount of storage supply to maintain to ensure reliable seasonal service to the Company's customers.

The design day standard is based on the statistical distribution of the coldest day of each calendar year. The design year standard is based on the statistical distribution of the total HDDs in each calendar year.

Pursuant to Order No. 24,941, the Company bases its planning standards on its Monte Carlo analysis, using the method found to be acceptable by the Commission Staff in Docket DG 06-105. In Docket DG 06-105, Staff stated that a design day/year of mean plus two standard deviations "…establishes a reasonable level of reliability for firm customers."

Therefore, the Company's design day is defined as 61.51 + 2*5.40, or 72.3 HDD (rounded to 72 HDD) and its design year is defined as 6409.8 + 2*276.88 HDD, or 6963 HDD. To create its design year of daily HDD values, the Company scaled upward each of the daily HDD values in its normal year by the ratio of 6,963 / 6,410.

The Company's design year is summarized in Table III.E.1

Table III.E.1: Design Year HDD	
January	1,324
February	1,129
March	998
April	597
May	246
June	49
July	8
August	18
September	128
October	459
November	831
December	1,176
Total	6,963

F. Forecasts of Design Year Customer Requirements By Year

In the fifth and final step of the Company's forecasting methodology set forth in Section III.A above, the Company uses the applicable design day and design year planning standards to determine the design day and design year sendout requirements. To accomplish this, the Company combines the 2008/09 reference-year sendout, which is derived from the regression analysis, with the annual incremental sendout forecast discussed in Section III.B, to yield the following forecast of customer requirements under design weather conditions:

Base Case Demand Scenario Customer Requirements (MMBtu)

	2010/11	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Heating Season	10,116,909	10,330,955	10,547,145	10,751,397	10,960,122
Non-Heating Season	4,032,928	4,190,246	4,357,806	4,513,752	4,665,199
Total	14,149,837	14,521,200	14,904,952	15,265,149	15,625,321
Per-Annum Growth	---	2.6 %	2.6 %	2.4 %	2.4 %

The heating season is defined as the months of November through March; the non-heating season is defined as the months of April through October. The leap day in 2012 is not factored in within these tables.

High Case Demand Scenario Customer Requirements (MMBtu)

	2010/11	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Heating Season	10,303,316	10,620,471	10,945,267	11,263,019	11,590,844
Non-Heating Season	4,112,956	4,319,806	4,540,930	4,753,834	4,965,786
Total	14,416,272	14,940,277	15,486,197	16,016,852	16,556,630
Per-Annum Growth	---	3.6 %	3.7 %	3.4 %	3.4 %

Low Case Demand Scenario Customer Requirements (MMBtu)

	2010/11	**2011/12**	**2012/13**	**2013/14**	**2014/15**
Heating Season	9,933,920	10,049,575	10,164,069	10,264,021	10,365,280
Non-Heating Season	3,954,362	4,064,294	4,181,534	4,284,934	4,381,552
Total	13,888,282	14,113,869	14,345,603	14,548,955	14,746,832
Per-Annum Growth	---	1.6 %	1.6 %	1.4 %	1.4 %

Chart III-A-1

Chart III-A-1

National Grid NH Sendout Requirements Forecast
EnergyNorth Natural Gas, Inc.
2010/11 - 2014/15 Base Case

Normal Weather	2010/11	2011/12	2012/13	2013/14	2014/15	Average Increment Or Percent	Total Increment Or Percent
Sendout (MMBtu)							
Residential	6,242,666	6,333,987	6,422,372	6,506,607	6,592,574	87,477	349,908
Commercial & Industrial	6,855,706	7,122,787	7,405,831	7,669,942	7,931,333	268,907	1,075,627
Traditional Market	13,098,372	13,456,774	13,828,203	14,176,549	14,523,907	356,384	1,425,535
NGV	0	0	0	0	0	0	0
Seasonal	0	0	0	0	0	0	0
Total	13,098,372	13,456,774	13,828,203	14,176,549	14,523,907	356,384	1,425,535
Growth Rate (%)							
Residential		1.5%	1.4%	1.3%	1.3%	1.4%	5.5%
Commercial & Industrial		3.9%	4.0%	3.6%	3.4%	3.7%	14.8%
Traditional Market		2.7%	2.8%	2.5%	2.5%	2.6%	10.5%
NGV		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Seasonal		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total		2.7%	2.8%	2.5%	2.5%	2.6%	10.5%

Design Weather	2010/11	2011/12	2012/13	2013/14	2014/15	Average Increment Or Percent	Total Increment Or Percent
Sendout (MMBtu)							
Residential	6,743,793	6,835,003	6,922,457	7,006,242	7,092,519	87,182	348,726
Commercial & Industrial	7,406,044	7,686,197	7,982,495	8,258,907	8,532,802	281,689	1,126,758
Traditional Market	14,149,837	14,521,200	14,904,952	15,265,149	15,625,321	368,871	1,475,484
NGV	0	0	0	0	0	0	0
Seasonal	0	0	0	0	0	0	0
Total	14,149,837	14,521,200	14,904,952	15,265,149	15,625,321	368,871	1,475,484
Growth Rate (%)							
Residential		1.4%	1.3%	1.2%	1.2%	1.3%	5.1%
Commercial & Industrial		3.8%	3.9%	3.5%	3.3%	3.6%	14.4%
Traditional Market		2.6%	2.6%	2.4%	2.4%	2.5%	10.0%
NGV		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Seasonal		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total		2.6%	2.6%	2.4%	2.4%	2.5%	10.0%

Chart III-B-1

EnergyNorth Natural Gas, Inc.
d/b/a National Grid
Demand Projections
Base Case
2010-2015
(MMBtu)

2010 FORECAST

	2011-2012	2012-2013	2013-2014	2014-2015	Total	Annual Average
NET ANNUAL ADDITIONS						
Residential Heating	94,617	92,726	89,390	91,410	368,143	92,036
Residential Non-Heat	-2,786	-3,802	-4,682	-5,006	-16,275	-4,069
Total Residential	91,831	88,925	84,708	86,404	351,867	87,967
Commercial/Industrial Heating	217,939	232,474	216,964	214,682	882,059	220,515
Commercial/Industrial Non-Hea	48,631	50,030	46,674	46,272	191,607	47,902
Total Commercial/Industrial	266,570	282,504	263,638	260,954	1,073,667	268,417
TRADITIONAL TOTAL	358,401	371,429	348,346	347,358	1,425,534	356,384
Natural Gas Vehicles	0	0	0	0	0	0
Seasonal Firm Contracts	0	0	0	0	0	0
TOTAL NET	**358,401**	**371,429**	**348,346**	**347,358**	**1,425,534**	**356,384**

Chart III-B-2

EnergyNorth Natural Gas, Inc.
d/b/a National Grid
Demand Projections
Low Case and High Case vs. Base Case
2010-2015
(MMBtu)

2010 FORECAST

		2011-2012	2012-2013	2013-2014	2014-2015	Total	Annual Average
NET ANNUAL ADDITIONS							
Low Case VS. Base Case							
	Base Case						
	Residential	91,831	88,925	84,708	86,404	351,867	87,967
	Commercial/Industrial	266,570	282,504	263,638	260,954	1,073,667	268,417
	Traditional Total	358,401	371,429	348,346	347,358	1,425,534	356,384
	Low Case						
	Residential	28,609	24,678	19,587	20,181	93,054	23,264
	Commercial/Industrial	192,187	203,060	180,369	173,534	749,151	187,288
	Traditional Total	220,795	227,738	199,956	193,715	842,205	210,551
	Difference (Low vs. Base)						
	Residential	(63,222)	(64,246)	(65,121)	(66,223)	(258,813)	(64,703)
	Commercial/Industrial	(74,384)	(79,444)	(83,268)	(87,420)	(324,516)	(81,129)
	Traditional Total	(137,606)	(143,691)	(148,389)	(153,643)	(583,329)	(145,832)
	Difference as % of Base Case						
	Residential	-68.85%	-72.25%	-76.88%	-76.64%	-73.55%	-73.55%
	Commercial/Industrial	-27.90%	-28.12%	-31.58%	-33.50%	-30.23%	-30.23%
	Traditional Total	**-38.39%**	**-38.69%**	**-42.60%**	**-44.23%**	**-40.92%**	**-40.92%**
High Case VS. Base Case							
	Base Case						
	Residential	91,831	88,925	84,708	86,404	432,056	87,967
	Commercial/Industrial	266,570	282,504	263,638	260,954	1,222,662	268,417
	Traditional Total	358,401	371,429	348,346	347,358	1,654,718	356,384
	High Case						
	Residential	158,043	157,518	155,578	159,841	774,788	157,745
	Commercial/Industrial	344,426	367,172	354,004	357,512	1,642,841	355,778
	Traditional Total	502,468	524,690	509,581	517,352	2,417,629	513,523
	Difference (High vs. Base)						
	Residential	66,212	68,594	70,870	73,437	342,732	69,778
	Commercial/Industrial	77,855	84,668	90,366	96,557	420,179	87,362
	Traditional Total	144,067	153,261	161,236	169,994	762,911	157,140
	Difference as % of Base Case						
	Residential	72.10%	77.14%	83.66%	84.99%	79.33%	79.32%
	Commercial/Industrial	29.21%	29.97%	34.28%	37.00%	34.37%	32.55%
	Traditional Total	**40.20%**	**41.26%**	**46.29%**	**48.94%**	**46.11%**	**44.09%**

Chart III-B-3

EnergyNorth Natural Gas, Inc.
d/b/a National Grid
Demand Projections
High Case
2010-2015
(MMBtu)

2010 FORECAST

	2011-2012	2012-2013	2013-2014	2014-2015	Total	Annual Average
NET ANNUAL ADDITIONS						
Residential Heating	159,883	160,464	159,518	164,213	644,078	161,019
Residential Non-Heat	(1,840)	(2,945)	(3,940)	(4,372)	(13,098)	(3,275)
Total Residential	158,043	157,518	155,578	159,841	630,980	157,745
Commercial/Industrial Heating	281,743	301,916	291,109	293,915	1,346,713	292,171
Commercial/Industrial Non-He	62,683	65,256	62,894	63,597	296,128	63,608
Total Commercial/Industrial	344,426	367,172	354,004	357,512	1,642,841	355,778
TRADITIONAL TOTAL	502,468	524,690	509,581	517,352	2,417,629	513,523

Chart III-B-4

EnergyNorth Natural Gas, Inc.
d/b/a National Grid
Demand Projections
Low Case
2010-2015
(MMBtu)

2010 FORECAST

	2011-2012	2012-2013	2013-2014	2014-2015	Total	Annual Average
NET ANNUAL ADDITIONS						
Residential Heating	32,294	29,275	24,939	25,741	112,250	28,062
Residential Non-Heat	(3,686)	(4,597)	(5,352)	(5,561)	-19,195	-4,799
Total Residential	28,609	24,678	19,587	20,181	93,054	23,264
Commercial/Industrial Heating	156,962	167,296	148,622	142,927	615,806	153,952
Commercial/Industrial Non-Hea	35,225	35,764	31,747	30,608	133,344	33,336
Total Commercial/Industrial	192,187	203,060	180,369	173,534	749,151	187,288
TRADITIONAL TOTAL	220,795	227,738	199,956	193,715	940,609	210,551

Chart III-B-5

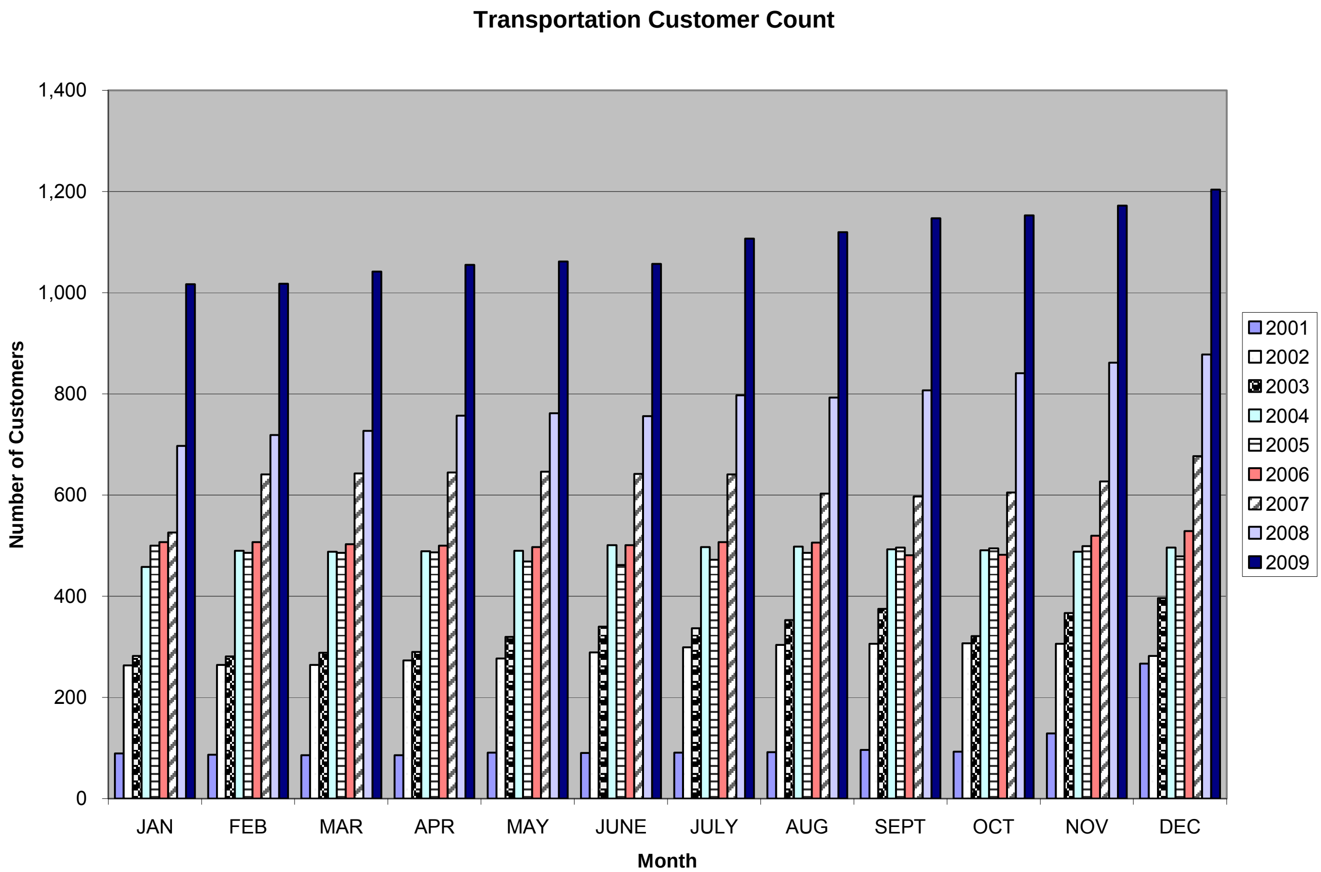
Transportation Customer Count
1,400
1,200
1,000
800
600
400
200
0
Number of Customers
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
Month
2001
2002
2003
2004
2005
2006
2007
2008
2009

Chart III.C.1 – Plots of SCC vs. HDD (Page 1 of 2)

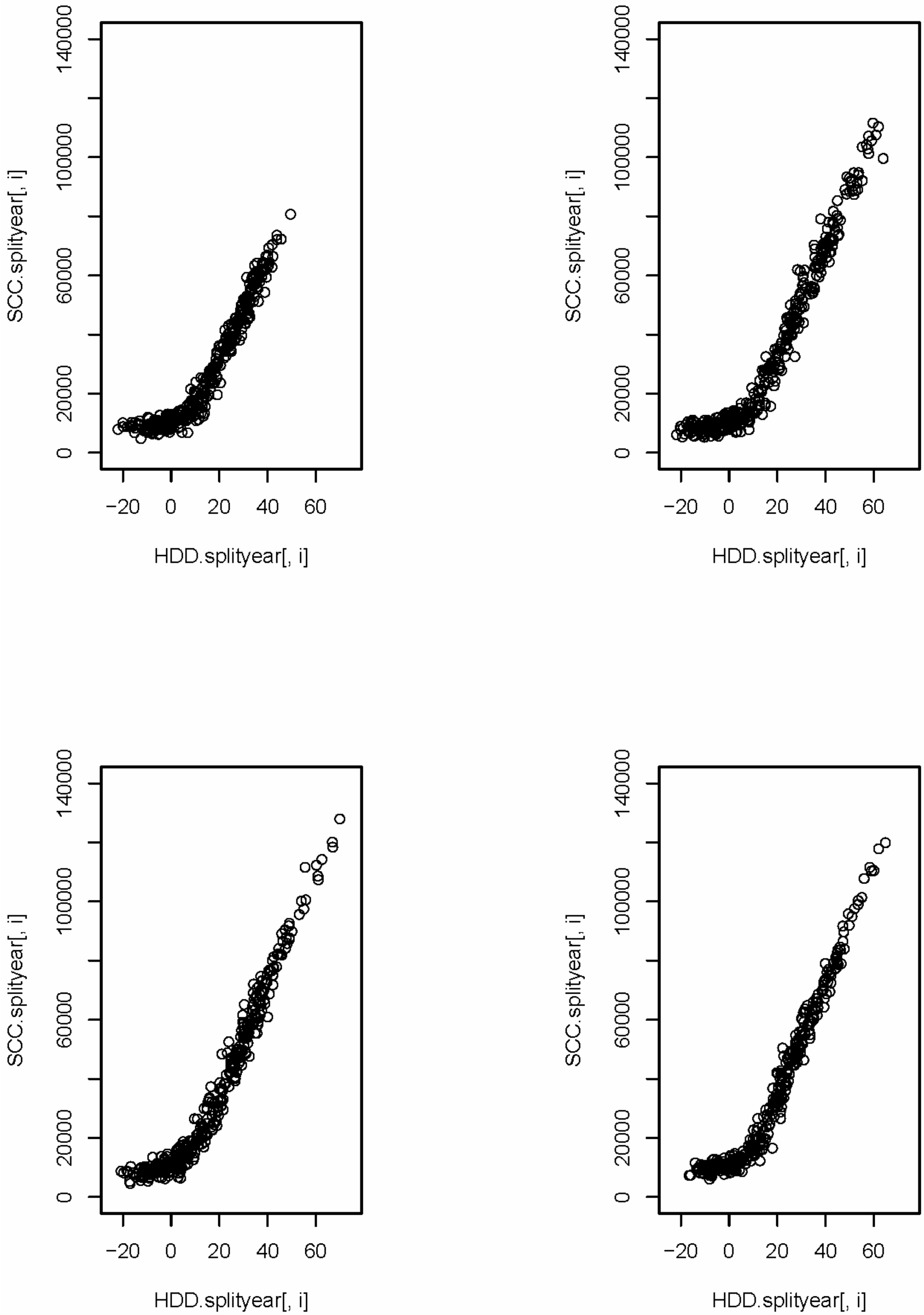

Chart III.C.1 – Plots of SCC vs. HDD (Page 2 of 2)

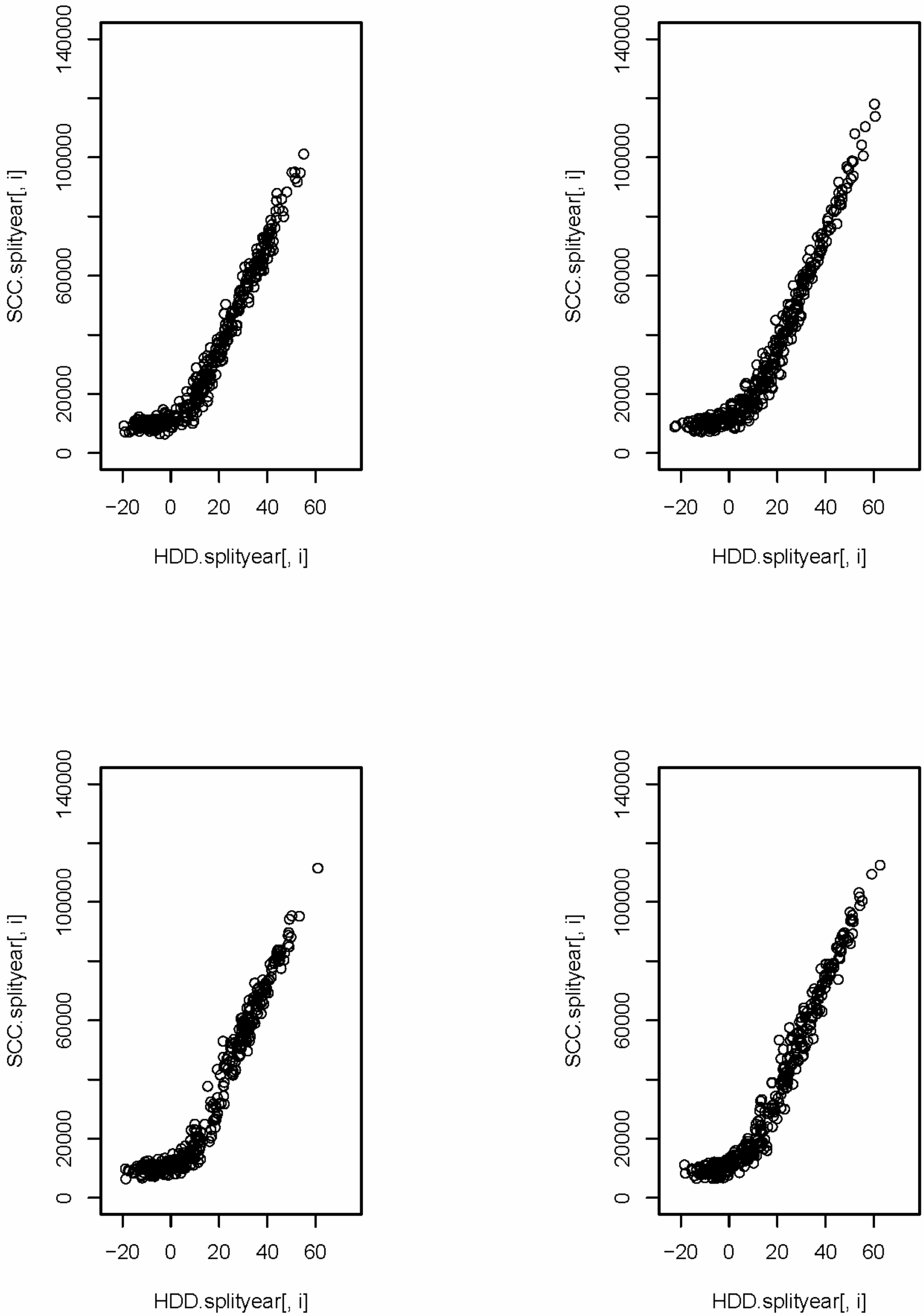

Chart III.C.2 – Weekly Harmonic in SCC vs. HDD Residuals

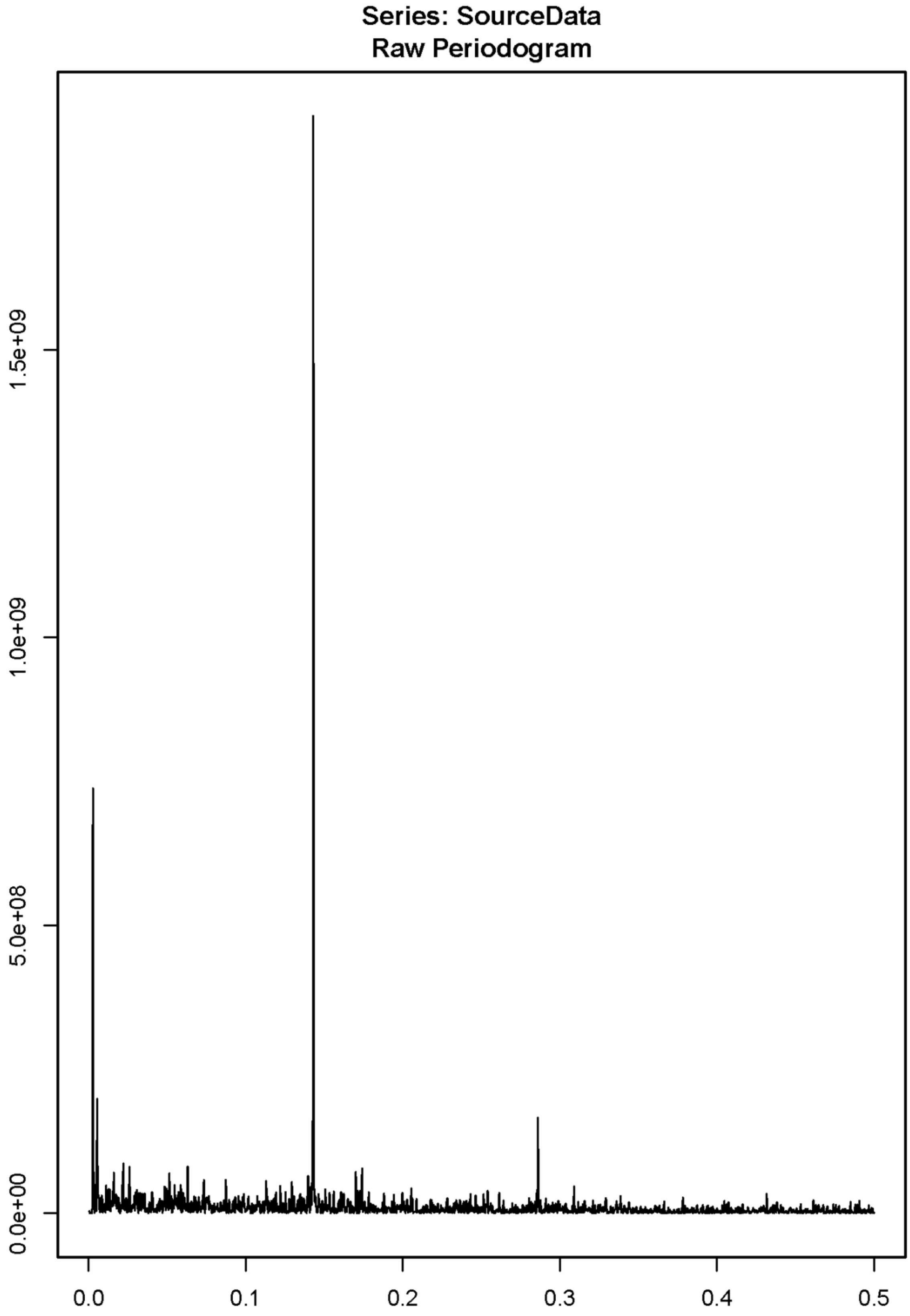

Chart III.C.3 – Correlation in Lagged Temperature in SCC vs. HDD+Weekend Residuals

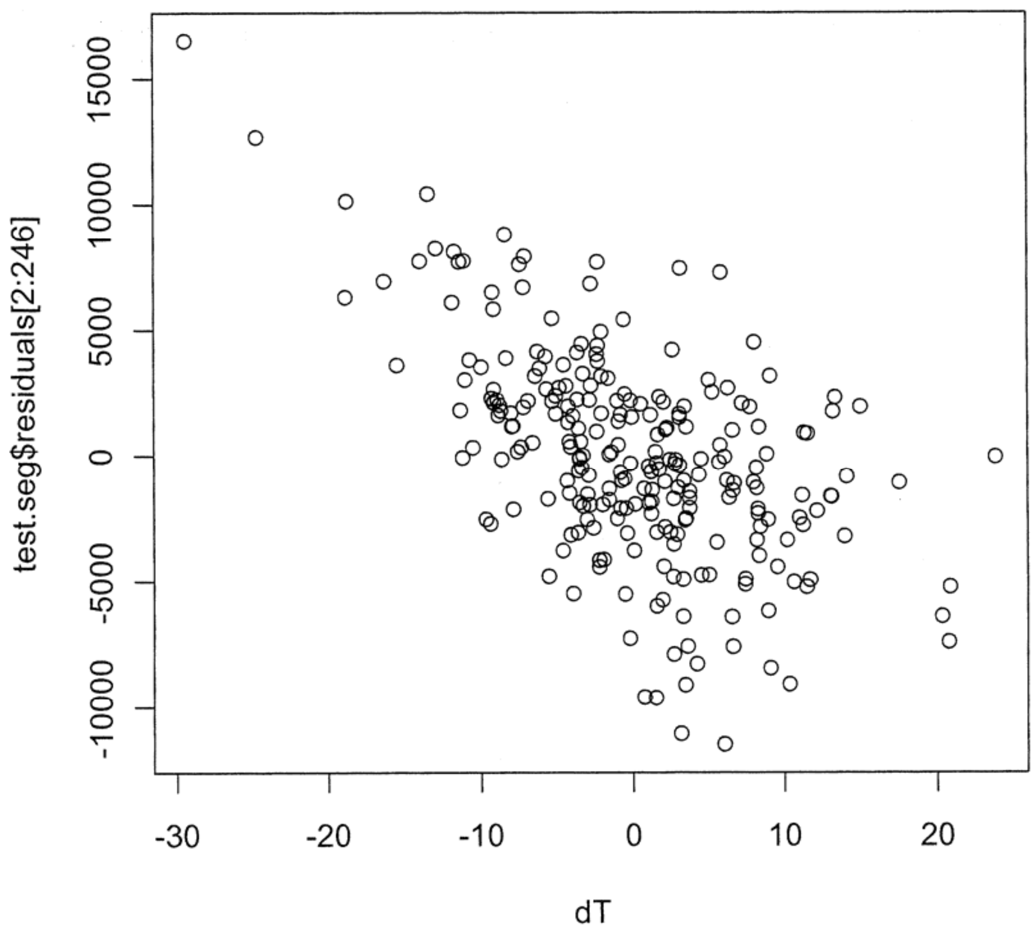

Chart III.C.4 – Functional Form of the Company's Springboard Regression Equation

SCC (MMBtu/day) = Intercept +
Slope1 * min(HDDt, BPT) +
Slope2 * max(HDDt-BPT, 0) +
Weekend * weekend_dummy +
Lagged_Delta_HDD * (HDDt – mean(HDDt-1, HDDt-2)

Where BPT = Breakpoint Temperature (in HDD)

IV. DESIGN OF THE RESOURCE PORTFOLIO

A. Portfolio Design

To generate the long-term resource plan, the Company evaluates the current resource portfolio in relation to the firm sendout forecast developed in Section III above. Specifically, the Company evaluates the possible strategies for meeting demand with current resources and identifies the sensitivities and contingencies that need to be tested. Using the SENDOUT® model (described below), the Company is able to determine the least-cost portfolio that will meet the forecasted demand and test the sensitivity of the portfolio to key inputs and assumptions, as well as its ability to meet all of the Company's planning standards and contingencies. Based on the results of this analysis, the Company then makes preliminary decisions on the adequacy of the resource portfolio and its ability to meet system requirements in the longer term.

National Grid NH has been using the Ventyx SENDOUT® model as its primary analytical tool in the portfolio design process since 2000. The SENDOUT® model is a linear programming optimization software tool used to assist in evaluating and selecting long-term portfolio strategies.

The SENDOUT® model can be used in one of two ways: the optimization mode or the resource mix mode. In the optimization mode, the model can be used to determine the best use of a given portfolio of supply, capacity and storage contracts to meet a specified demand. That is, it can solve for the dispatch of resources that minimizes the cost of serving the specified demand given the existing resource and system-operating constraints. The model dispatches resources based on the lowest variable cost to meet demand, assuming that demand charges are fixed. In the resource mix mode, the SENDOUT® model can be used to determine the optimal portfolio to meet a given demand. To do this, the model uses a linear programming algorithm to analyze the combination of contracts and the size of each contract (i.e., MDQ) to determine the combination that results in the lowest total cost, taking into account both variable and fixed costs.

In this IRP, when performing optimization mode simulations, the 2009/10 long-term, short-term and market-area portfolio was used as a proxy for the gas supply portfolio that will be used in all years of the forecast. Although the actual contracts and contract terms will differ in every year, the Company believes that the current resource mix is representative of the actual supplies that the Company will use over the forecast period. Therefore, gas commodity costs were estimated using NYMEX futures prices for natural gas. All other costs represent actual contract costs including transportation and storage, fixed charges, variable charges, and other related costs. Fixed costs were not escalated over the forecast period because escalating all fixed costs at the same rate would maintain the relative ranking of the resources and would not, therefore, alter the decisions that the Company would make with respect to resource dispatch. Also, there is no indication that annual pipeline and underground-storage rate increases are a reasonable assumption.

B. Analytical Process and Assumptions

In preparing this IRP, the Company analyzed three demand scenarios: a low-demand case, a base case and a high-demand case, as described in Section III. Each of these three demand scenarios is based on the Company's 2008/09 springboard (as described in Section III.C) plus incremental demand, as forecast for the period of the filing (2010/11 through 2014/15). The Company's traditional resource portfolio (as described below in Section IV.C) was then tested for adequacy to address the customer requirements under design weather conditions. The Company has assumed that, throughout the forecast period, there is no change in its current service obligation and that, as a result, it is responsible for planning for the capacity requirements for all firm customers[1].

The Company then ran these different demand scenarios in combination with three levels of penetration of incremental demand-side management measures: low case, base case, and high case. The low case and base case demand side management penetration scenarios were SENDOUT® model runs in optimization mode alone to test the reduction in utilization of the Company's traditional resource portfolio due to different levels of demand side management. In the high case demand side management penetration scenario, the Company utilized the resource mix mode of the SENDOUT® model to optimize its resource portfolio with both supply-side and demand-side resources. The Company's

[1] As noted in section III B above, this obligation excludes those firm transportation customers that are exempt from the Commission's mandatory capacity assignment rule. (i.e. customers who had migrated to transportation service prior to the implementation of the mandatory capacity assignment rule or new customers who go direct to delivery only service)

expiring Niagara, Dawn, and Gulf Coast supply transportation contracts were optimized side-by-side with its demand side management resource options.

In its Order No. 24,941 in Docket DG 06-105 dated February 13, 2009, the Commission required the Company to use as the basis of its demand-side assessment in this IRP filing, the information on the technical and economic potential of demand side resources contained in the report “Additional Opportunities for Energy Efficiency in New Hampshire” by GDS Associates (January 2009). A copy of the report is provided as Appendix C. The Company reviewed the details of this report as it prepared this filing. The Company concluded that the most realistic scenario presented in this report was the “Potentially Available Scenario” and chose to evaluate it as the upper limit constraint on reasonably available demand side management savings. Under this scenario, the report concludes that the potentially obtainable demand side management savings is approximately 10.7 percent of the residential fossil fuel consumption (See, Appendix C at Table 43, Summary of Residential Non-Electric Energy Efficiency Savings Potential, p. 66), 7.0 percent of commercial fossil fuel consumption (See, Appendix C Table 47, Summary of Commercial Non-Electric Energy Efficiency Savings Potential, p. 88), and 4.4 percent of industrial consumption (See, Appendix C Table 57, Summary of Industrial Non-Electric Energy Efficiency Savings Potential, p. 108). Because the Company’s records combine the C&I classes, the Company calculated a weighted average of the two percentages for these classes and derived a combined potential of 6.5 percent[2] for the C&I class. Applying these percentages for the residential and C&I classes to the 2009/2010 sendout volumes presented in Table III-13 above, results in an over-all savings potential of 8.5 percent or 1,084,787 MMBtu. Given that this potential is more than 8.7 times the 2010 goal of 124,318 MMBtu in the Company's currently approved energy efficiency program, the Company determined that the savings potential estimated in this report does not represent a practical target or limit of demand side management savings for supply planning purposes. Therefore, it developed the assumptions described below to determine the demand side management volumes available to its supply portfolio.

The Company started with the costs and MMBtu savings goals presented and approved in its current energy efficiency program, from Order No. 24,995 dated July 31, 2009 in Docket DG 09-049. The annual savings goal under this program is 124,318 MMBtu at a total annual cost of $9,527,217, including $4,986,415 of Company cost, $4,141,889 of participant cost and $398,913 of Company incentive. These costs and savings provided the initial structure needed to enter demand side management into the SENDOUT® model as a supply resource.

As a base case, the Company assumed that these program savings and costs would be repeated for each year of the five-year forecast, and included

[2] (Commercial Savings + Industrial Savings) / (Commercial Consumption + Industrial Consumption) = (3,252,204 MMBtu + 683,836 MMBtu) / (45,329,915 MMBtu + 15,673,818 MMBtu) = 6.5 percent

them in the supply portfolio as such. The result is a total of 621,950 MMBtu of demand side management savings in the portfolio by year five of the forecast representing 4.3 percent of the customer requirements in 2014/15.

As a low case, the Company assumed that it would realize the average level of savings actually achieved over the past five years of program implementation resulting in 395,990 MMBtu of demand side management savings by year five of the forecast. This represents 2.7 percent of the customer requirements in 2014/15.

For the high case, the Company allowed the SENDOUT® model to determine the reasonably available demand side management savings to be included in the portfolio. To model demand side management in this way, the Company started with the program costs and MMBtu savings and made the following simplifying assumptions:

- The average lives of the measures in the program are 15 years,
- Any increase in demand side management volumes, would result from increasing the number of installations of measures that rely strictly on rebates (Residential Weatherization and Commercial Energy Efficiency Program) and not from measures that require equipment replacement, demonstration projects or information dissemination,
- That the cost of these increased volumes would be at the variable costs associated with these program measures,
- As a constraint on the maximum demand side management volumes that could be obtained, the Company limited the number of installations of the Residential Weatherization and Commercial Energy Efficiency Programs to two times the goal by the third year of the forecast and four times the goal by the fifth year of the forecast. This assumption is based on experience the Company has implementing the programs over the past six years.

The result of the high case is an additional 23,007 MMBtu of demand side management annually with a per-annum cost of $1,574,436. The results of this analysis are presented in Chart IV-D-1.

In its Order No. 24,941, the Commission further states that the Company should include in this filing a description of the methodology for calculating the avoided costs (i.e. cost savings) associated with not having to purchase additional gas supplies or constructing new peaking capacity. Because the SENDOUT® model's resource mix mode performs a least-cost selection of the available supplies including demand side management savings, there is no explicit avoided cost calculation involved. The model selects the optimum level of demand side management savings in the portfolio based on their costs relative to the costs of the other supplies in portfolio and subject to the constraints identified above for demand side management and the constraints for the other supplies.

However, as described in the attached *Energy Efficiency Plan, May 2009 through December 2010* (Appendix B) submitted by the Company on May 8 2009 and approved by the Commission in DG 09-049, Order No. 24,995, the Company used the avoided energy costs from the regional "Avoided Energy Supply Costs in New England: 2007 Final Report," in performing the benefit/cost analysis. The avoided costs are presented as the benefits in benefit/cost analyses for each measure of each program in Exhibit B of the Plan. Hence, the Company's analysis includes the evaluation of the combinations of scenarios listed in the four tables below:

No demand side management Scenarios			
	Low Case Demand	Base Case Demand	High Case Demand
Design Year	✓	✓	✓
Normal Year	✓	✓	✓

Low Case demand side management Scenarios			
	Low Case Demand	Base Case Demand	High Case Demand
Design Year		✓	
Normal Year		✓	

Base Case demand side management Scenarios			
	Low Case Demand	Base Case Demand	High Case Demand
Design Year	✓	✓	✓
Normal Year	✓	✓	✓

High Case demand side management Scenarios			
	Low Case Demand	Base Case Demand	High Case Demand
Design Year		✓	
Normal Year		✓	

In addition, the Company analyzed two final scenarios: first, a cold-snap scenario using the Company's current supply and capacity portfolio with no demand side management resources to test portfolio adequacy for its seven-day storage requirement; and, second, a scenario that tested the benefit of optimizing the balance between the Company's traditional Gulf Coast long-haul transportation contract with the potential to convert a portion of it to short-haul transportation of supply from the Marcellus Shale supply basin in the Northeast.

The detailed tables of results from all of these scenarios can be found in Appendix D: Resource and Requirements Tables.

C. Expected Available Resources

This section describes National Grid NH's current resource portfolio and discusses the modifications that the Company anticipates making to the portfolio during the forecast period to meet sendout requirements. As discussed below, to meet design day and design year sendout requirements, the Company's resource portfolio is composed of the following categories of available resources: (1) long-haul and short-haul transportation; (2) underground storage services; (3) gas supply contracts; (4) supplemental resources; (5) market area supply purchases and (6) Demand Side Management ("DSM") resources.[3] Chart IV-C-1 is a schematic of the Company's transportation and underground storage contracts effective November 1, 2009. Chart IV-C-2 is a table listing and description of the Company's resource portfolio. Appendix B is a description of the Company's most recently approved DSM program.

1. <u>Long-haul and Short-haul Transportation</u>

National Grid NH has capacity entitlements on multiple upstream pipelines that provide access to various production areas that afford the Company a level

[3] In the past the Company treated the volume reductions associated with DSM programs as reductions to demand forecast. In this filing DSM is treated as a supply option, and optimized with other supply options in the design of the supply portfolio.

of operational flexibility to ensure the least-cost and reliable delivery of gas supplies.

The Company's pipeline capacity contracts fall into four primary categories. First, the Company has contract entitlements to long-haul capacity from the lower 48 states that are used to transport gas from production areas located in the Gulf of Mexico to the Company's New Hampshire citygates. The long-haul transportation capacity from the Gulf of Mexico is also used to transport gas from the production areas to the Company's underground storage facilities in Pennsylvania and New York. By using long-haul capacity to fill storage, the Company is able to use these resources at a higher load factor. Second, the Company has contract entitlements to short-haul capacity that is used to transport gas from the underground storage fields in Pennsylvania and New York to the Company's citygates. These short-haul capacity entitlements are also used to transport non-storage supplies from the storage market area to the Company's citygates when the capacity is not being used to transport underground storage supplies. Third, the Company has a short-haul contract with entitlements to transport gas from the Dracut, Massachusetts interconnect on Tennessee Gas Pipeline ("Tennessee") to the Company's citygates. Lastly, the Company holds capacity on Union Gas Limited ("Union") and TransCanada Pipelines Limited ("TransCanada"). This capacity path consists of entitlements from Dawn, Ontario to Kirkland/Parkway on Union and from Parkway to Waddington on TransCanada. The gas is then transported to National Grid NH's citygates using transportation capacity on Tennessee and the Iroquois Gas

Transmission System ("Iroquois"). The Company's long-haul and short-haul transportation contracts are described in more detail below:

- Iroquois Gas Transmission System

  National Grid NH has contract entitlements to 4,047 MMBtus/day of firm transportation service on Iroquois on a 365-day basis. Firm Canadian supplies are transported from the Canadian/New York border from Waddington, New York via the Iroquois system to the Tennessee interconnect at Wright, New York. Effective May 1, 2009, National Grid NH entered into an amendment extending the term from December 1, 2011 to November 1, 2017. This amendment aligns the Iroquois contract with the upstream contracts on Union and TransCanada.

- Portland Natural Gas Transmission System

  National Grid NH has contract entitlements to 1,000 MMBtus/day of firm transportation service on the Portland Natural Gas Transmission System ("PNGTS") on a 365-day basis. PNGTS transports gas from Pittsburg, New Hampshire to the Company's city gate in Berlin, New Hampshire.

- Tennessee Gas Pipeline

  In the production area, Tennessee splits into three legs: the 100 leg, the 800 leg, and the 500 leg. In addition, the Tennessee system is divided into six market Zones, from Zone 0 and Zone 1 in Texas and Louisiana to Zone 6 in New England. See Chart IV-C-3 for a map showing the Tennessee Zone locations. National Grid NH has capacity entitlements of 107,833 MMBtus/day on Tennessee to its New Hampshire citygates. The Company's contract entitlements consist of transport volumes from Zone 0 and Zone 1 of up to 21,596 MMBtus/day to the Company's citygates in New Hampshire located in Zone 6 and to the Company's storage fields located in Zone 4 and Zone 5; from the Zone 4 and Zone 5 storage market area the Company's contract entitlement consists of transport volumes of up to 28,115 MMBtus/day to the Company's citygates; from the interconnect at Niagara in Zone 5 the Company's contract entitlements transport volumes of up to 3,122 MMBtus/day to the Company's citygates; from the interconnect at Wright, New York with Iroquois in Zone 5 the Company's contract entitlements transport volumes of up to 4,000 MMBtus/day to the Company's citygates; and finally, the Company has contract entitlements of up to 50,000 MMBtus/day from Dracut, Massachusetts located in Zone 6 to the Company's citygates.

- TransCanada Pipelines Limited

National Grid NH has contract entitlements to 4,047 MMBtu/day of firm transportation service on TransCanada on a 365-day basis. Firm Canadian supplies are transported from the receipt point on Union at Dawn, Ontario, to the interconnection with Iroquois at Waddington.

- Union Gas Limited

Effective November 1, 2007 TransCanada and National Grid NH entered into a permanent assignment, whereby the Company permanently assigned to TransCanada 4,092 MMBtu/day of capacity on Union with an expiration date of October 31, 2017. This assignment provides for a contiguous nomination path. Firm Canadian supplies are still transported from the receipt point at Dawn, Ontario to the interconnection with Iroquois at Waddington, New York.

2. <u>Underground Storage Services</u>

National Grid NH's underground storage contracts provide the Company with the ability to meet winter-season loads, while avoiding the expense of adding 365-day long-haul transportation capacity. These contracts enable National Grid NH to store approximately 2.5 million MMBtus of gas. These underground storage supplies allow National Grid NH to serve a percentage of the winter period requirements with gas injected during the off-peak period and to manage short-term fluctuations in demand during the winter period. It is the Company's practice to have storage inventories approximately 95% full as of November 1st of each year, thus leaving approximately 5% of the storage capacity available for balancing purposes.

The Company contracts with the following storage providers:

- Dominion Transmission, Incorporated

  Under rate schedule GSS which provides 102,700 MMBtus of storage capacity with a withdrawal rate of 934 MMBtus/day and an injection rate of 934 MMBtus/day.

- Honeoye Storage Corporation

  Under rate schedule SS-NY that provides 245,280 MMBtus of storage capacity with a withdrawal rate of 1,957 MMBtus/day and an injection rate of 1,362 MMBtus/day.

- National Fuel Supply Corporation

  Under rate schedule FSS that provides 670,800 MMBtus of storage capacity with a withdrawal rate of 6,098 MMBtus/day and an injection rate of 4,472 MMBtus/day. Along with this storage service, the Company also contracts for 365-day firm transportation under rate schedule FST in order to transport the storage gas into and out of the storage field.

- Tennessee Gas Pipeline

  Under rate schedule FS-MA that provides 1,560,391 MMBtus of Storage capacity with a withdrawal rate of 21,844 MMBtus/day and an injection rate of 10,404 MMBtus/day.

3. Gas Commodity

The Company is responsible for contracting for the necessary gas supply to meet firm sendout requirements. In order to meet customer requirements the Company will contract for a mix of seasonal, monthly and daily supplies from a diverse group of suppliers that are designed to take advantage of the interstate pipeline capacity paths held by the Company.

(a) Domestic Gas Supply

As described above, the Company's resource portfolio is currently structured to have a high level of flexibility to adapt to changing market conditions and regulatory obligations as they relate to Supplier Service. This is especially true with respect to the Company's domestic gas commodity commitments. Generally speaking, National Grid NH enters into agreements that allow it the flexibility to eliminate up to 100 percent of its existing domestic gas commodity purchases in less than a twelve-month period. As of the date of this filing, the Company has supply agreements in place for seasonal supplies sourced from domestic gas supply markets to meet customer requirements for the both 2009/10 peak season and the 2010 off peak season. These volumes are priced as index-based first of the month and/or daily market purchases. Chart IV-C-2 (Page 3 of 4) is a table listing and description of the Company's supply portfolio. These seasonal volumes will later be supplemented, as necessary, with additional index-based first of the month and/or daily market purchases.

(b) Market Area Supply

Market area purchases are short-term arrangements that the Company makes in order to achieve a higher utilization of existing portfolio resources and to prolong the effective utilization of the Company's short-haul capacity. On a daily basis during the peak period, the Company has the opportunity to take advantage of market-area resource opportunities to bring gas supplies to the Company's citygates or to inject them into the Company's underground storage fields. In the past, gas injected into storage during the off-peak season was generally lower priced than gas purchased in the peak season. However, experience indicates that market prices during the winter period can drop below storage inventory costs. Furthermore, prices in the later part of the winter season can be higher or lower than prices in the early part of the winter season, depending on market conditions. Market-area purchases generally refer to purchase in either Tennessee Zone 4 at or near the storage region or Zone 6 at Dracut, MA, or at the Company's citygates. These purchases minimize the cost of the resource portfolio because: (1) the Company is avoiding demand charges for capacity that is not needed on a design-day or design-season basis; and (2) the Company is able to better utilize existing transportation capacity that is available when underground storage supplies are not being transported to the Company's citygates.

(c) Canadian Gas Supply

In addition to domestic gas supplies, the Company currently holds several long-term supply contracts with Canadian suppliers. Effective November 1, 2006, National Grid NH entered into transportation agreements on TransCanada for transportation from Dawn, Ontario to the interconnect with Iroquois at Waddington, New York. The Canadian transportation and gas supply contracts consists of a gas commodity from Dawn, Ontario Canada pursuant a contract with Alberta Northeast, Ltd. ("ANE-II"), which commenced on November 1, 2006. Supply contracts have been executed with BP Canada Energy Company ("BP Canada") for up to 4,047 MMBtu/day plus applicable fuel commencing on November 1, 2009 through March 31, 2010. The supply will be transported on TransCanada from Dawn, Ontario to the interconnect with Iroquois at Waddington, New York. In addition, the Company entered into a Capacity Assignment and Gas Delivery Agreement with BP Canada for a term of

November 1, 2009 through October 31, 2010. BP Canada provides a fixed fee to the Company for the rights to optimize the assets along the TransCanada path to the interconnect with Iroquois at Waddington, NY.

The Company also holds a contract with BP Canada Energy Company for 3,199 MMBtu/day. This contract delivers into Tennessee at Niagara, NY.

Lastly, as a result of the completion of the Concord Lateral, for additional supply at Dracut, Massachusetts a Request for Proposal (“RFP”) was issued on September 29, 2009 for an Asset Management and Gas Supply Agreement effective November 1, 2009 for a term of one year. With the utilization of the SENDOUT® Model the appropriate resource mix was determined to set both the baseload and swing volume requirements by month. As a result of the output of the SENDOUT® Model, it was determined that it would be best to present the need as two packages in the RFP for a term of November 1, 2009 to October 31, 2010.

Package 1 was presented as an Asset Management Arrangement and Gas Supply requirement. In order to match the two (2) Tennessee FT-A Agreements; Package 1 was further subdivided into Agreement #1 and Agreement #2. Agreement #1 has an MDQ of 25,500 MMBtu/day with both a baseload and swing component. Agreement #2 has an MDQ of 17,000 MMBtu/day with a daily swing component for the months of November 2009 through April 2010. The delivery points for both agreements are the National Grid NH citygates. Please see Tables IV-C-1 and IV-C-2 below for a description of the monthly baseload and swing quantities for each agreement. Once, the delivery obligations are met the successful bidder retains the rights to optimize the released assets, while providing a fixed fee to the Company.

. Package 2 was presented as a Gas Supply Package with an MDQ of up to 7,500 MMBtu/day. Package 2 was designed to be used by the Company to meet the full sendout requirements as well as meet the obligations of the Customer Choice Program with regards to migration. The combination of Packages 1 and 2 provides the Company with an MDQ of up to 50,000 MMBtus.

As a result of the RFP for Package 1, the Company entered into an Asset Management and Gas Supply Agreement with Repsol Energy North America Corporation ("Repsol") for supply at the National Grid NH citygates. Provided in the tables below is a breakdown of Gas Supply agreements with Repsol.

Table IV-C-1: Asset Management and Gas Supply Agreement #1

Period	Base-Load Quantity (dt/day)	Maximum Daily Call (dt/day)	Maximum Monthly Quantity (dt)
Nov-09	0	25,500	765,000
Dec-09	25,500	0	790,500
Jan-10	25,500	0	790,500
Feb-10	25,500	0	714,000
Mar-10	0	25,500	790,500
Apr-10	0	25,000	663,000
May-10	0	21,000	351,000
Jun-10	0	0	0
Jul-10	0	0	0
Aug-10	0	0	0
Sep-10	0	0	0
Oct-10	0	16,000	86,000

Table IV-C-2: Asset Management and Gas Supply Agreement #2

Period	Base-Load Quantity (dt/day)	Maximum Daily Call (dt/day)	Maximum Monthly Quantity (dt)
Nov-09	0	17,000	510,000
Dec-09	0	17,000	527,000
Jan-10	0	17,000	527,000
Feb-10	0	17,000	476,000
Mar-10	0	17,000	527,000
Apr-10	0	10,000	90,000
May-10	0	0	0
Jun-10	0	0	0
Jul-10	0	0	0
Aug-10	0	0	0
Sep-10	0	0	0
Oct-10	0	0	0

As a result of the RFP for Package 2, the Company entered into a supply arrangement with Sempra Energy Trading for the months of December 2009 to March 2010 to provide for a daily swing quantity of up to 7,500 MMBtu/day.

These Canadian gas supplies represent an important component in maintaining the diversity, flexibility and reliability of the resource portfolio.

4. Supplemental Resources

In addition to interstate pipeline and storage resources, National Grid NH utilizes supplemental peaking supplies to meet its design day and design season requirements in excess of pipeline resources. Peaking supplies are an important component of the resource mix because these supplies provide the Company with the ability to respond to fluctuations in weather, economics and other factors driving the Company's sendout requirements. The Company utilizes both off-system and on-system supplemental resources.

Off system supplemental resources include the Company's contract with Granite Ridge, L.L.C. ("Granite Ridge," formerly "AES Londonderry") as well as the Company's firm liquid service ("FLS") contract with Distrigas of Massachusetts ("DOMAC").

On-system supplemental resources are the local production plants that store LNG and liquid propane until vaporized. It is the Company's practice to have its supplemental storage facilities full as of November 1st of each year.[4] National Grid NH's on-system supplemental facilities are distributed strategically across the service territory, which enhances service reliability and provides a source of supply for the entire distribution system. Chart IV-C-4 shows the locations of these facilities. Because these resources can be brought on line quickly, these plants can be used to meet hourly fluctuations in demand, maintain deliveries to customers and balance pressures across portions of the distribution system during periods of high demand. Most importantly, these resources are vital in preserving delivery pressures in the event that an off-system resource becomes unavailable. These supplemental volumes are the supplies that must be available to the Company's distribution system to ensure service to customers when the Company has exhausted its available pipeline supplies. Thus, the availability of liquid natural gas and propane gas to refill the Company's local storage tanks throughout the winter season is a reoccurring necessity. The Company's DOMAC contract (FLS-160) is currently the primary sources of LNG refill throughout the winter season. The Company will enter into negotiations during the 2010 off peak season for its DOMAC FLS-160 contract that expires on October 31, 2010. In addition, as it has for the last several years, the Company has contracted for a dedicated trucking arrangement in order to guarantee the availability of both trailers and drivers to truck the LNG from the source point to the Company's facilities during the upcoming winter season. Lastly, the Company has a contract for seasonal transportation for propane amongst the National Grid facilities with Eastern Propane Company. The transportation agreement provides for up to 3 loads per day with a maximum of 10 days per month for a term of December 1, 2009 to March 31, 2010. The Company expects to enter into a similar arrangement in subsequent years throughout the forecast period.

5. Replacement and Incremental Resources

Changes in National Grid NH's resource needs are caused by changes in its firm demand, (i.e., load growth, load loss and changes in load shape). The Company differentiates incremental and replacement resource needs primarily in terms of how a need arises. The need to increase (or decrease) resources arises when the capacity of the Company's resource portfolio is not substantially equivalent to its firm demand requirements. A replacement resource need occurs when the term of an existing resource comes up for expiration and the

[4] The on-system LNG storage capacity is not sufficient to meet the full seasonal requirements

Company's firm demand requirements are substantially the same (i.e., the resource is not avoidable). The Company applies the same decision-making process to meet replacement needs as it applies to incremental needs.

A critical component of identifying a resource need is defining the load shape of the demand that needs to be met. "Shape" refers to the degree of uniformity that a resource need exhibits throughout the course of a year. In characterizing the shape of resource needs, three general terms are applied herein: "baseload," "seasonal," and "peaking". A need that is substantially uniform throughout the year is described as a "baseload" need; a need that is driven by temperature fluctuations, and is therefore concentrated in a finite portion of the year (i.e. 60-180 days), is described as a "seasonal" need; a need that is observed at the very upper limits of the demand profile (i.e., the coldest days of the year) is described as a "peaking" need. The Company notes specific resource needs do not necessarily fall discretely into one of these categories, but rather can exhibit characteristics of any or all of these classifications.

Determining the shape of a need is also important in terms of narrowing the range of possible resource options that may be able to satisfy the need. Baseload needs for example, tend to be best met through pipeline supply options. On the other hand, 365-day pipeline resources tend to be less efficient in meeting seasonal needs because the fixed capacity charges become concentrated across a relatively short demand period, which drives the unit cost up. Conversely, resources that can be inventoried and dispatched in response to

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without refill throughout the winter season.

temperature variations (such as underground storage and LNG) tend be cost-effective in meeting seasonal demands. Finally, peaking demands are likely to be best met by on-system LNG or propane facilities because of the flexibility with which these resources can be dispatched.

When a resource need arises, the Company attempts to identify all of the possible resource options that may be able to meet that need. The Company regularly requests, receives and reviews promotional material regarding new or revised services from various supply-related entities. In addition, the Company endeavors to maintain continuous contact with suppliers, pipelines operators and other service providers. Thus, the Company is able to develop a list of potential, creditworthy service providers to whom Requests for Proposals ("RFPs") will be sent. The RFP process effectively generates tailored service bids at market prices from potential service providers. The responses to an RFP establish the set or "universe," of potential resource options available to meet a particular need at a given point in time. The Company then performs a preliminary review to narrow the set down to an appropriate range for further analysis. This preliminary screening is dictated in part by the nature of the demand (i.e., the size and shape of the need) and by the planning time horizon. The time horizon is also an important element because the availability of specific resource alternatives may not perfectly coincide with the initial timing of an identified need. For example, an incremental seasonal need arising four years into the future may be met best by a storage option that will become available in three years if no other storage alternatives are available until the fifth year.

During the forecast period, National Grid NH is faced with key decisions regarding the expiration and renewal of a number of contracts in its resource portfolio. Existing resources from the Company's 2009/10 portfolio that are set to expire during the five-year forecast period are listed in Table IV-C-3.

Table IV-C-3: National Grid NH Contract Expiration Dates

Contract	MDCQ	Annual Quantity (MMBtu)	Date of Expiration
Granite Ridge Energy, LLC	15,000	450,000	9/30/10
BP Canada Energy Company	3,199	1,167,635	3/31/12
BP Canada Energy Company	4,047	1,477,155	03/31/2010
Chevron Natural Gas	21,596	3,908,876	04/30/2010
Repsol Energy North America Corporation	42,500	7,607,500	10/31/2010
Distrigas of Massachusetts Corporation FLS160		100,000	10/31/10
Sempra Energy Trading	7,500	907,500	03/31/2010
Honeoye Storage Corporation	1,957	245,280	04/01/11Evergreen
National Fuel Company N02358	6,098	2,225,770	3/31/11 Evergreen
National Fuel Company O02357	6,098	670,800	3/31/11 Evergreen
Tennessee Gas 523	21,844	1,560,391	10/31/2015
Tennessee Gas 632	15,265	5,571,725	10/31/2015
Tennessee Gas 2302	3,122	1,139,530	10/31/2015
Tennessee Gas 8587	25,407	9,273,555	10/31/2015
Tennessee Gas 11234	9,039	3,299,235	10/31/2015
Tennessee Gas 33371	4,000	1,460,000	10/31/2011
Tennessee Gas 42076	20,000	7,300,000	10/31/2015

Following the Company's planning process described above, during the forecast period; the Company will employ a three-step analysis to reach its conclusions on contract renewals. First, the Company will evaluate the need to maintain the contracts as part of the resource portfolio. As part of this need analysis, the Company will consider the trends in transportation migration and the growth in transportation relating to new customers that have not previously been served by the Company, and therefore, are not subject to the assignment of capacity. If the Company determines that the resource is needed to meet firm sendout requirements, the Company will consult with competitive suppliers serving customers on National Grid NH's system to solicit their input on the Company's contract renewals. Second, depending on the type of need, the Company will canvas the marketplace to determine the availability of a replacement resource with consideration being given to demand–side resource options as discussed above. Where appropriate, the Company will solicit competitive bids to determine the lowest-cost available resource. Finally, the Company will evaluate non-price factors associated with the available replacement options such as flexibility, diversity, reliability and contract term to determine the least-cost, most reliable option to meet the Company's resource need. This same approach will be implemented when the need arises for a new resource to be added to the portfolio.

6. <u>Northeast Gas Supply and Infrastructure</u>

There have been a number of major supply and infrastructure additions that have gone into service in the Northeast since the Company's last filing in

2006. This trend is expected to continue and possibly accelerate over the forecast period.

The following projects providing additional gas and/or infrastructure to the Northeast have commenced service since 2006:

- Union/TransCanada Expansions from Dawn to Waddington (ANE II):

  This project provided for gas supplies to be purchased at Dawn, Ontario and be transported on Union from Dawn to an interconnection with TransCanada at Parkway and then transported by TransCanada from Parkway to Waddington, New York. The capacity path originating at Dawn provided customers in the Northeast access to a liquid trading hub as well as access to underground storage fields and diverse supply sources including Western Canada, Rockies, Mid-Continent, Gulf Coast, and the Chicago hub. This project went into service in November 2006 with an initial volume of 181,000/dth per day. Similar expansion projects in 2007 and 2008, have increased the total volumes sourced Dawn up to almost 312,000 MMBtu/day.

- Tennessee ConneXion Project:

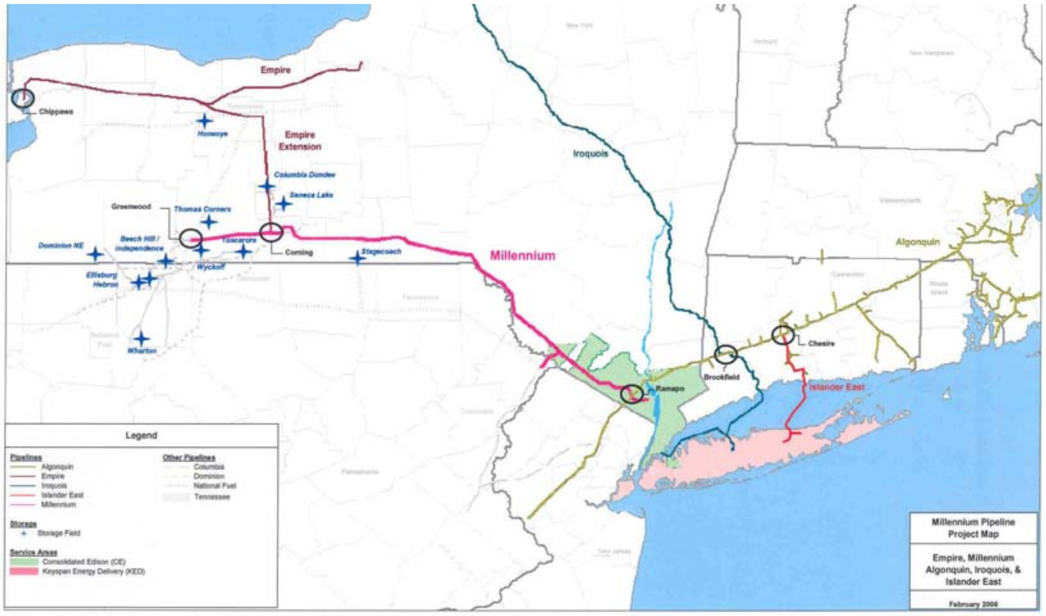
  This project provided an incremental 136,300/dth per day transported on Tennessee Gas Pipeline from the points in the Gulf of Mexico to various delivery points throughout New England, located in Zone six. This project went into service in November 2007.

- Northeast Gateway:

This off-shore LNG facility operated by Excelerate Energy, and located offshore Cape Ann, MA, became fully operational in early 2008, receiving its first shipment of LNG in May. The facility is capable of delivering approximately 400,000 MMBtu/day into Algonquin's offshore HubLine system. Since 2008, this facility has received at least six cargoes of LNG.

- Millennium Pipeline Company LLC:

This new pipeline commenced service in December 2008. The pipeline originates at the Independence interconnect with National Fuel and terminates at Ramapo, New Jersey at the interconnect with Algonquin and can move approximately 500,000 MMBtu/day. The original supply source is predominantly Canada; however Millennium also interconnects with Tennessee, Columbia Gas Transmission, Empire State Pipeline and Stagecoach Storage. In addition, this pipeline well is positioned to access other supply basins in the future.



- Maritimes and Northeast Pipeline Phase IV Project:

This project commenced service in January 2009. The project included five new compressor stations, two compressor station upgrades and two miles of 30-inch looping of pipe. The project provided an incremental 833,000 MMBtu/day of capacity delivered to the Dracut interconnect with Tennessee or the Beverly interconnect with Algonquin. Under a twenty-five year deal, Repsol contracted for 735,000 MMBtu/day of this capacity.

- Canaport LNG:

Owned and operated by Repsol and Irving Oil, this new LNG facility became operational in mid-2009. It is located roughly sixty miles from the Maine border in New Brunswick, Canada. The facility includes 6.6 Bcf of storage (two tanks), with another third tank expected to be in service in Q2 2010 for a total of 9.9 BCF of on-site storage. The facility is capable of delivering up to 1 BCF/day of gas into the Brunswick Pipeline (owned by Emera), which connects with the Maritimes & Northeast Pipeline. Gas is sourced principally from Trinidad, however Repsol has plans to diversify supply sources in the future (a cargo from Qatar arrived in late 2009).

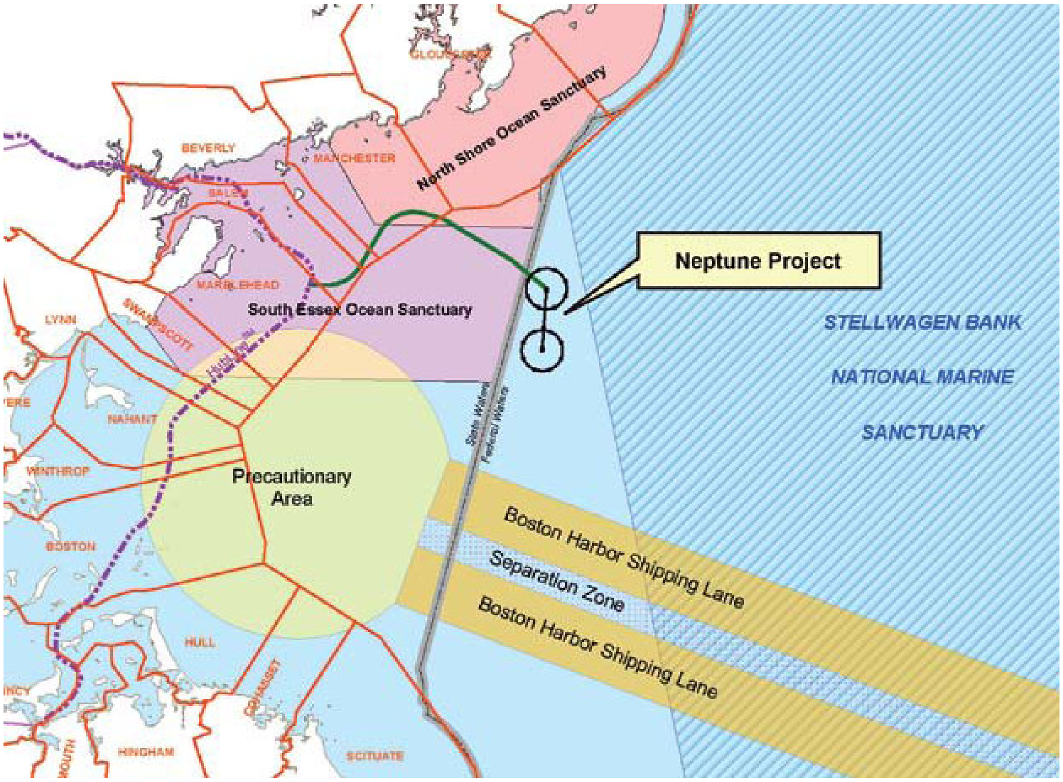
- Tennessee Concord Lateral Project:

This project commenced service in November 2009. The project involved 6,130 hp of mid-point compression expansion on Tennessee's existing Concord Lateral. It is the first pipeline compressor station on Tennessee's system in New Hampshire, located in Pelham. The project provides an incremental 30,000 MMBtu/day of capacity from Dracut, MA to the Company's Laconia, NH citygate.

During the forecast period, the following projects providing additional gas and/or infrastructure to the Northeast are expected to commence service:

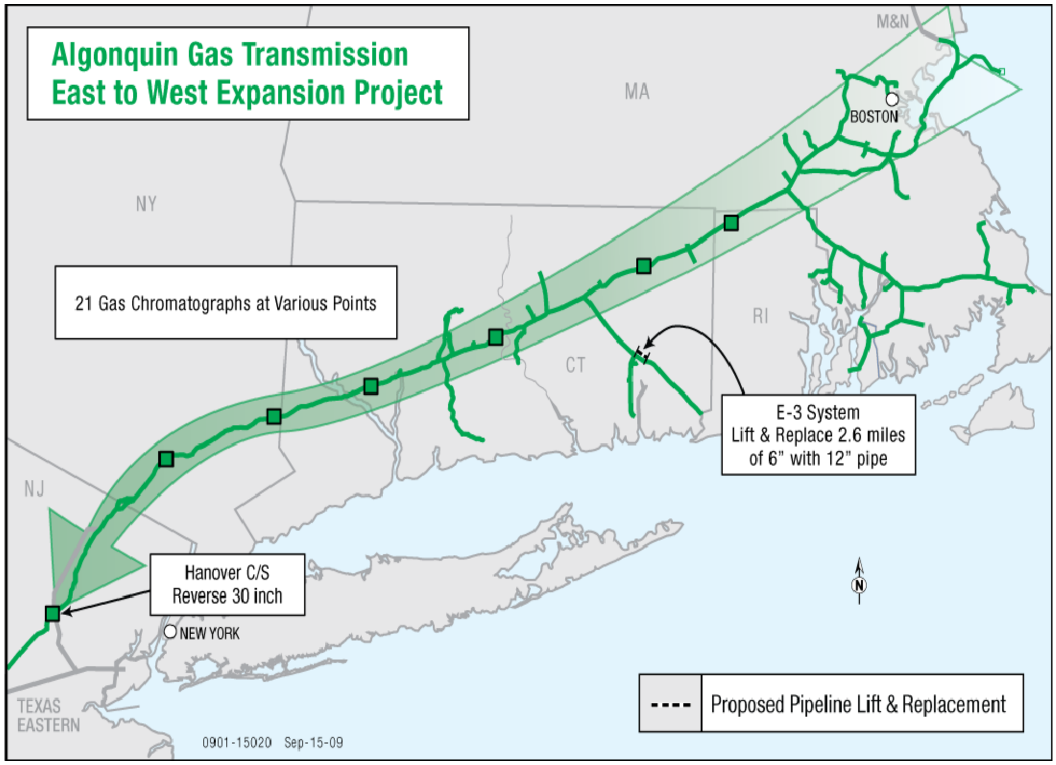
- Neptune LNG:

  Owned by GDF Suez Gas NA LLD, this off-shore LNG facility located off Cape Ann, MA is expected to become operational in Q2 2010. The project consists of a thirteen mile lateral which will tie into Algonquin's HubLine. There will be two unloading buoys which will be connected to specially designed LNG vessels called Shuttle and Regasification Vessels or SRVs. These vessels are equipped with onboard vaporization and turn LNG into vapor and pump the vapor into the pipeline lateral. Each SRV will have an average sendout of 400,000 MMBtu/day.

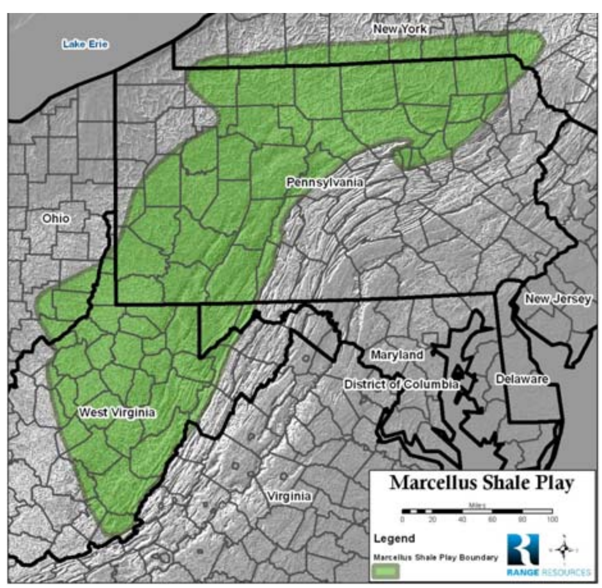


- Algonquin's East-to-West Project:

This project is expected to commence service in November 2010. This project will allow the Algonquin system to move supplies "east to west" rather than traditional "west to east". In particular, the project is designed to move new LNG supplies into the market. The project participant volumes total over 280,000 MMBtu/day.



Perhaps the biggest regional gas development for the next decade and beyond - is the emerging news on the potential of expanded gas production in the Marcellus Shale.



Referred to as a “game changer”, this shale gas formation extends from West Virginia into Ohio, Pennsylvania and New York. Estimates are that this area may hold from 50 to 250 trillion cubic feet (“Tcf”) of natural gas. A June 2009 study from Penn State put the potential at 500 Tcf. Although the amount that is economically recoverable had yet to be determined, Marcellus clearly is a major resource basin with the distinct advantage of market-area location. Gas from Marcellus is already flowing into the region, and the next few years promise further, greater volumes. The potential impact of this shale gas on the supply/demand dynamics in the Northeast is truly significant. If even the most conservative estimates of this supply basin come to fruition, the current landscape will be altered dramatically. As a large player in the Northeast, the Company will be closely monitoring this development in the coming years.

D. Adequacy of the Resource Portfolio

Although the base case scenario is intended to represent the most probable demand case, customer demand could vary within the range of the low-demand and high-demand case. Accordingly, the resource plan must possess a level of flexibility to adjust to changing economic conditions, while ensuring that adequate resources are available to meet customer requirements on the peak day. As described below, the Company’s resource portfolio currently possesses the flexibility to meet design-year and cold snap requirements in the high, base and low case demand scenarios on a reliable basis. This is true under the condition of no incremental penetration of demand side management measures into the marketplace, as well as under the condition of penetration of the low, base or high case demand side management scenarios.

1. Resources and Requirements Tables

In Appendix D: Resource and Requirements Tables, the Company has provided the detailed results of all of its simulation runs. There is one table per split year (Nov – Oct) with two sections: requirements and resources. The monthly resource requirement (net of reduction due to demand side management) includes customer requirements plus storage refill requirements. The monthly resources include all pipeline and supplemental resources used to satisfy the requirements.

In the methodology of the Company's modeling, the 'Other Purchased Resource' option is the default option used by the model when the Company's portfolio is unable to meet customer requirements. In all years and all scenarios, the 'Other Purchased Resource' option is zero. Hence, the Company's resource portfolio is adequate in serving its customers' requirements.

2. Demand Side Management As a Resource Option

In Charts IV-D-1 through IV-D-11, the Company has included summary tables for its high, base, and low demand case simulation runs with the three demand side management scenarios to summarize the differences in the demand scenarios and summarize the reductions in the supplies required with the penetration of the demand side management measures. The summary groups are:

- Summary of demand side management Measures
- Summary of Base Case Design Year Customer Requirements (No, Low Case, Base Case, and High Case demand side management)
- Summary of Design Year Customer Requirements (Base Case demand side management; Low Case, Base Case, and High Case Incremental Growth)
- Summary of Base Case Normal Year Customer Requirements (No, Low Case, Base Case, and High Case demand side management)
- Summary of Normal Year Customer Requirements (Base Case demand side management; Low Case, Base Case, and High Case Incremental Growth)
- Summary of Base Case Design Year (Resource Use With No demand side management, and Reductions In Load and Resource-by-Type with demand side management)

Chart IV-D-1 summarizes the demand side management programs modeled by the Company. As discussed in Section IV.B above, over 2004-2009, the Company has averaged 79,198 MMBtu of demand reduction using a variety of demand side management programs at an annual average total (Company plus participant) cost of $3,258,139 (Program 1). The programs were divided into baseload and heat sensitive components for the residential and C&I customer groups, and the costs were entered in as one-time utility fixed charges with an assumed lifetime of 15 years for levelized costing purposes. For its Low

Case demand side management scenarios, the Company assumed that it would continue with that annual level of expenditure and demand reduction.

For 2010, the Company has targeted 124,318 MMBtu of reduction at a total cost of $9,527,217 (Program 2). The programs were divided into baseload and heat sensitive components for the residential and C&I customer groups, and the costs were entered in as one-time utility fixed charges with an assumed lifetime of 15 years for levelized costing purposes. For its Base Case demand side management scenarios, the Company assumed that beginning in the 2009/10 split year it would continue with that higher annual level of expenditure and demand reduction.

For its High Case demand side management scenarios, beginning in the split year 2010/11, the Company developed six demand side management resource options, three for the residential group and three for the C&I group. Each group has available as Tier 1 the level of cost and demand reduction from the Company's 2004-2009 average. As Tier 2, each group had available the incremental costs and demand reductions based on the difference between the 2004-2009 program averages and the 2010 program averages. Lastly, as Tier 3, the Company developed incremental programs for each group based on the programs it can readily increase in scale over the forecast period, with annual costs and demand reductions based on the rate of growth it expects to be plausible.

3. Descriptive Results of Scenarios

Chart IV-D-5 indicates that, relative to the 2008/09 springboard year, annual implementation of the Low Case demand side management programs can result in a reduction in customer requirements of 553,629 MMBtu/year by 2014/15. Relative to the 2008/09 springboard year, annual implementation of the Base Case demand side management programs can result in a reduction in customer requirements of 824,425 MMBtu/year by 2014/15. Under the resource mix simulation of the High Case demand side management programs, the model is allowed to choose the optimum mix and timing of the six programs available under Tiers 1, 2, and 3. Simulation results indicate that the Tier 1 C&I programs are favorable beginning in 2010/11. The Tier 1 Residential programs are favorable beginning in 2011/12. And, then, the Tier 2 Residential, Tier 3 Residential and Tier 3 C&I programs all become favorable in 2012/13. In isolation, the Tier 2 C&I programs are not favorable. Relative to the 2008/09 springboard year, annual implementation of the High Case demand side management programs can result in a reduction in customer requirements of 812,319 MMBtu/year by 2014/15.

4. Cold Snap Analysis

In addition to the design day, design year and normal year planning standards, the Company also evaluates the capability of the resource portfolio to meet sendout requirements during a protracted period of very cold weather, which is referred to as a “cold snap.”

To generate its cold-snap scenario, the Company selected the actual seven-day period of coldest weather experienced by the Company leading to the highest supplementals requirement. This seven-day period for Manchester, NH, was January 9, 2004 through January 15, 2004.

The Company then substituted the coldest seven-day period in its normal weather scenario with the cold-snap scenario by creating an HDD pattern of (a) normal HDD through February 2nd; (b) the cold-snap HDD on February 3rd through February 9th, followed by; (c) normal HDD. Using base case demand, the Company analyzed the effectiveness of the portfolio in meeting the requirements of the cold-snap scenario. The results of the simulation using the SENDOUT® model (Appendix D-66 through Appendix D-70) show that the Company's portfolio can meet the cold-snap requirement adequately.

5. <u>Evaluation of Alternative Resources</u>

In addition to testing the Company's resource portfolio under varying weather conditions, growth assumptions, and demand side management penetration levels, the Company evaluated the potential to reduce the overall portfolio cost when a number of its resource contracts reach expiration as discussed in Section IV.C – Expected Available Resources. In its High Case demand side management scenario, the three demand side management tiers were evaluated in a resource mix along with the Company's:

- Tennessee short-haul capacity from Niagara to the citygate;
- Iroquois/Tennessee capacity from Waddington to the citygate; and the,
- Tennessee long-haul capacity from the Gulf Coast to the citygate.

All three traditional resources were selected at their existing levels with no evidence to indicate any could be reduced in size. Results of this scenario can be found in Appendix D-61 through Appendix D-65.

The Company then ran one additional scenario to evaluate the potential to convert a portion of its Tennessee long-haul capacity (specifically, 10,000 MMBtu/day) with supply located in the Gulf Coast to Tennessee short-haul capacity with supply located at the Marcellus Shale formation in the Northeast. The remainder of the Tennessee long-haul capacity would then be retained for supply diversity and storage refill reasons. At current Tennessee tariff rates and without additional costs to attach to the Marcellus supply basin, the conversion of the capacity would result in approximately $1,000,000/year reduction in pipeline demand charges. Under current basis differentials, the higher cost of supply located at Marcellus would reduce this to a net savings of approximately $500,000 to $700,000 per year.

Before committing to such a change in its resource portfolio, however, the Company will have to further consider a number of factors including, but not limited to whether or not development of the Marcellus Shale supply will alter the currently-existing basis differentials, which could further reduce the advantage of converting its pipeline contract. Additionally, the Company will have to consider the implication from the model that the Marcellus shale supply is currently attractive only as a peak period supply and that, with the reduced access to off-peak supply from the Gulf Coast, the Company will have to depend on additional, off-peak period purchases of supply at its Dracut MA receipt point to achieve this potential cost savings.

E. <u>Contingency Planning</u>

As a final complement to the overall planning process, the Company must consider the possibility of supply/capacity interruptions and the contingency plan to implement in such an event. In the Company's last IRP, the Company included a contingency plan that would address the following supply/capacity interruptions:

- <u>Disruption at DOMAC</u>
- <u>Supply Disruption at Dracut, MA</u>
- Supply and Capacity Disruptions in the Gulf of Mexico

The Company would implement the same contingency plans as provided in its last IRP in the event any one of these interruptions occurred.

- Disruption at DOMAC:

  Throughout the forecast period, National Grid NH relies on liquid peaking supplies from DOMAC, now known as GDF Suez Gas North America LLC, to meet both the design year and design day needs of customers. Therefore, the loss of these resources would cause a supply deficit during the forecast period. National Grid has had experience in dealing with the disruption of its DOMAC supplies. In light of a ban imposed by the U.S. Coast Guard on LNG vessels in entering Boston Harbor following the events of September 11, 2001, National Grid was forced to implement a contingency plan to address this supply disruption.

Similar to its last IRP filing, National Grid NH is including a contingency plan in this filing to meet a supply deficit similar to that created by the loss of DOMAC LNG supplies in 2001. For this analysis, National Grid NH considers three scenarios: (1) no LNG shipments for the month of October, (2) no LNG shipments or sporadic shipments for the winter period; and (3) no shipments for the long term. For the first scenario the Company determined that there would not be a material effect on National Grid NH, since the Company's tanks are full in early fall. In addressing the other scenarios, the Company would consider its short-term, minimum liquid needs for a design winter.

With respect to the immediate and short-term liquid needs, the Company would immediately implement its contingency plan. This plan would call for liquid deliveries from various LNG facilities including, but not limited to; the NSTAR Gas facility in Hopkinton, Massachusetts, the Philadelphia Gas Works facility in Philadelphia, Pennsylvania, the Transco facility in Carlstadt, New Jersey, and/or the Gaz Metropolitain facility in Montreal, Canada. In addition to LNG deliveries, the Company would also call for incremental propane deliveries from its regional propane supplier as well as other suppliers in the northeast corridor.

In the event of a long-term supply disruption, the Company would need to replace its existing DOMAC LNG contracts with another source of supply and related transportation. Should this become a reality, the Company would act immediately and initiate discussions with suppliers and Tennessee Gas Pipeline.

- Supply Disruption at Dracut:

Throughout the forecast period, National Grid NH relies on gas supplies sourced from the Dracut, MA interconnect on Tennessee Gas Pipeline to the Company's citygates to meet both the design-year and design-day needs of customers. Therefore, the loss of these resources would cause a supply deficit during the forecast period. The timing of the disruption as well as the extent of the disruption would determine the actions taken by the Company to fill the void.

A disruption to this pipeline delivered supply could be replaced with a mix of various gas supplies available to the Company. These supplies include but are not limited to:

- Citygate delivered spot-market purchases;
- Incremental long-haul supplies delivered from the Gulf using the Company's long-haul capacity;
- Underground storage volumes delivered from the storage fields using the Company's short-haul storage capacity;
- TGP Zone 4 market area supplies transported on the Company's short-haul capacity from zone 4 to zone 6;
- TGP Zone 6 market area supplies from off-shore LNG facilities;
- On-system propane resources

- Supply and Capacity Disruptions in the Gulf of Mexico:

Throughout the forecast period, National Grid NH relies on gas supplies being sourced from the Gulf of Mexico on Tennessee Gas Pipeline to the Company's citygates to meet both the design-year and design-day needs of customers. Therefore, the loss of these resources would cause a supply deficit during the forecast period. In the aftermath of Hurricanes Katrina and Rita in 2005, the Company took several steps in order to ensure supply reliability for its New Hampshire customers. Should a similar event again occur the Company would follow the same process it implemented following Hurricanes Katrina and Rita ("2005 Hurricanes"). First, the Company would determined its overall supply capabilities on a peak day and peak season basis, from "at risk" locations, *i.e.,* Tennessee's 500-leg and Texas Eastern's ELA and WLA regions during the 2005 Hurricanes. Next, the Company would fill both its underground and LNG storage facilities going into the winter and implement a conservative storage withdrawal strategy in order to guarantee maximum storage withdrawals as far into the winter as possible. Finally, the Company would firm-up winter supplies traditionally sourced in the Gulf Coast at points upstream of the constrained points.

Lastly, albeit it not an event of force majeure, the Company must begin to plan for the likelihood that the Haverhill propane facility located in Haverhill, MA will no longer be available for use by New Hampshire customer to store propane inventories. If needed to meet customer requirements or to maintain compliance with the seven-day storage inventory rule, the Company would need to procure replacement supplies to replace these volumes.

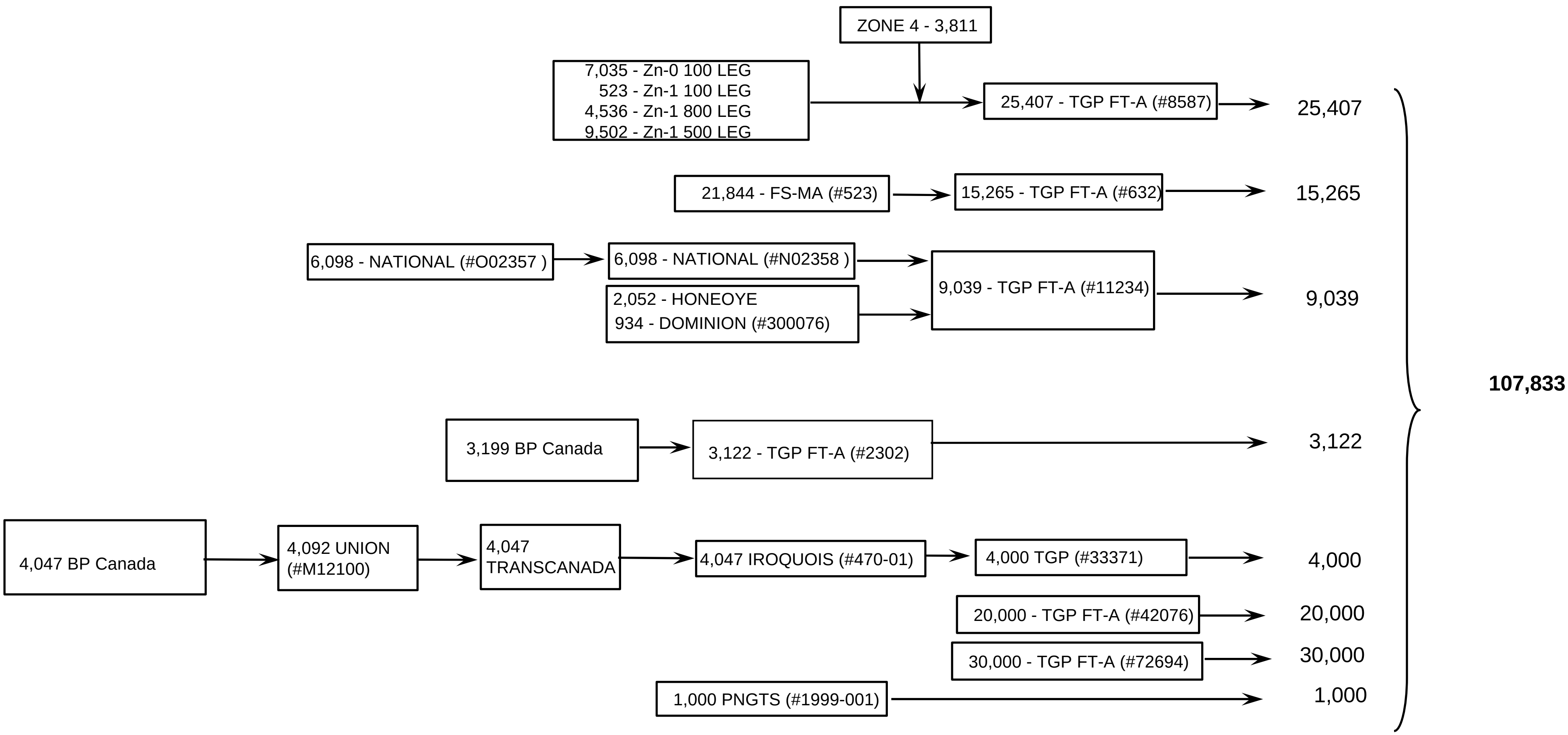
It is also important to note that the Company is an active member of the Northeast Gas Association's ("NGA") Gas Supply Task Force. The Task Force meets periodically throughout the winter season, and more often if the situation warrants. As a member of this Task Force, the Company can request to convene a meeting in order address either a regional or a Company-specific issue and seek the assistance of fellow members if needed.

- Emergency Curtailment Plan:

In the event that despite all reasonable efforts, a force majeure event prevents the Company from securing adequate supply to maintain deliverability to customers, the Company would implement its emergency curtailment plan. A copy of that plan was filed with the Commission in July 2008.

ENERGYNORTH NATURAL GAS INCORPORATED
DESIGN DAY
PIPELINE AND STORAGE TRANSPORTATION
(MMBtu)

Chart IV-C-1



EnergyNorth Natural Gas Incorporated
Resource Listing

Long-haul and Short-haul Transportation Contracts

Shipper	Pipeline Company	Contract No.	Rate Schedule	City Gate MDQ	Annual Quantity	Expiration Date	Notes
EnergyNorth Natural Gas Incorporated	Iroquois	47001	RTS-1	4,047	1,477,155	11/01/2017	Part-284 transportation service (365-day). This contract is used to transport volumes from Waddington, NY to the Iroquois interconnect with TGP at Wright, NY. April 15, 2009, the Company amended this agreement to extend the term to November 1, 2017. The extension of the term aligns the agreement with its upstream contracts.
EnergyNorth Natural Gas Incorporated	National Fuel	N02358	FST	6,098	2,225,770	03/31/2011	Part-284 transportation service (365-day) associated with the FSS service O02357, used for storage injection and or withdrawal across National Fuel pipeline system and into and out of the FSS storage. The Company is currently exercising it right to the Evergreen provision. Therefore the contract is extended year to year, unless one-year written notice is provided by either party. Amendment dated March 21, 2002 gave National Fuel the option of notifying the Company by February 28, 2002 to discontinue the discounted rate. The Company was notified by National Fuel effective April 1, 2007 the discounted rate would no longer apply. Current tariff rates now apply.
EnergyNorth Natural Gas Incorporated	Portland Natural Gas	1999-001	FT	1,000	365,000	10/31/2019	Part-284 transportation service (365-day). This contract is used to transport volumes from Pittsburg, New Hampshire to EnergyNorth citygate located in Berlin, New Hampshire.
EnergyNorth Natural Gas Incorporated	Tennessee	632	FT-A	15,265	5,571,725	10/31/2015	Part-284 transportation service (365-day). This contract is used to transport volumes from FS-MA storage (zone 4) to EnergyNorth city gates. Effective November 1, 2010, The Company has extended the term for 5 years, pursuant to Article III, Section 10.4 of Tennessee Gas Pipelines General Terms and Conditions.
EnergyNorth Natural Gas Incorporated	Tennessee	2302	FT-A	3,122	1,139,530	10/31/2015	Part-284 transportation service (365-day). This contract is used to transport Canadian supply (BP Canada) from Niagara, New York (zone 5) to EnergyNorth city gates. Effective November 1, 2010, The Company has extended the term for 5 years, pursuant to Article III, Section 10.4 of Tennessee Gas Pipelines General Terms and Conditions.
EnergyNorth Natural Gas Incorporated	Tennessee	8587	FT-A	25,407	9,273,555	10/31/2015	Part 284 transportation service (365-day). This contract is used to transport volumes from the access area (zones 0 and 1) and storage (zone 4) to EnergyNorth city gates (zone 6) with primary receipt points of 21,596 MMBtu/day from zones 0 and 1 and 3,811 MMBtu from zone 4. Effective November 1, 2010, The Company has extended the term for 5 years, pursuant to Article III, Section 10.4 of Tennessee Gas Pipelines General Terms and Conditions.
EnergyNorth Natural Gas Incorporated	Tennessee	11234	FT-A	9,039	3,299,235	10/31/2015	Part 284 transportation service (365-day). This contract is used to transport volumes from three storage fields (Honeoye, National Fuel and Dominion) to EnergyNorth's city gates (zone 6). Effective November 1, 2010, The Company has extended the term for 5 years, pursuant to Article III, Section 10.4 of Tennessee Gas Pipelines General Terms and Conditions.
EnergyNorth Natural Gas Incorporated	Tennessee	33371	NET-NE	4,000	1,460,000	11/30/2011	Part 284 transportation service (365-day) used to transport gas from Iroquois at Wright, NY to EnergyNorth city gates.
EnergyNorth Natural Gas Incorporated	Tennessee	42076	FT-A	20,000	7,300,000	10/31/2015	Part 284 transportation service (365-day). This contract is used to transport volumes from Dracut, MA (zone 6) to the EnergyNorth city gates (zone 6). Effective November 1, 2010, The Company has extended the term for 5 years, pursuant to Article III, Section 10.4 of Tennessee Gas Pipelines General Terms and Conditions.
EnergyNorth Natural Gas Incorporated	Tennessee	72694	FT-A	30,000	10,950,000	10/31/2029	Part 284 transportation service (365-day). This contract is used to transport volumes from Dracut, MA (zone 6) to the EnergyNorth city gates (zone 6).
EnergyNorth Natural Gas Incorporated	TransCanada		FT	4,047	1,477,155	10/31/2017	Canadian Transportation service (365-day). This contract is used to transport volumes from Parkway-Union to TransCanada interconnect with Iroquois. Effective November 1, 2006, the Company assigned Union contract to TransCanada. The receipt point has been amended to Union Dawn from Parkway-Union.
EnergyNorth Natural Gas Incorporated	Union Gas	M12100	M12	4,092	1,493,580	10/31/2017	Canadian transportation service (365-day). This contract is used to transport volumes from Dawn to Union interconnect with TransCanada. See TransCanada contract above. The Company assigned this contract to TransCanada effective November 1, 2006.

Underground Storage Services

Shipper	Pipeline Company	Contract No.	Rate Schedule	City Gate MDWQ	Annual Quantity MSQ	Expiration Date	Notes
EnergyNorth Natural Gas Incorporated	Dominion	300076	GSS Storage	934	102,700	03/31/2016	Part-284 storage service that provides 102,700 MMBtu of storage capacity at a withdrawal rate of 934 MMBtu/day and an injection rate of 934 MMBtu/day. Injection ratchets if inventory is under 50% the calculation is 1/180 x 102,700 for injection rights. If the inventory is above 50% the calculation is 1/214 x 102,700. April to July Dominion allows for 115% of the daily injection rights The contract term has been extended from March 31, 2011 to March 31, 2016.
EnergyNorth Natural Gas Incorporated	Honeoye		SS-NY Storage	1,957	245,280	04/01/2011	Part-157 (7C) storage service that provides 145,280 MMBtu of storage capacity at a withdrawal rate of 1,957 MMBtu/day and an injection rate of 1,957 MMBtu/day. The Company is currently exercising the evergreen provision provided in the contract and extending the contract on a year to year basis. If operational integrity should be in jeopardy, Honeoye reserves the right to institute a storage ratchet calculation as follows MSQ/210 days.
EnergyNorth Natural Gas Incorporated	National Fuel	O02357	FSS Storage	6,098	670,800	03/31/2011	Part-284 storage service (150-day) that provides 670,800 MMBtu of storage capacity, with a withdrawal rate of 6,098 MMBtu/day and an injection rate of 4,472 MMBtu/day. The 110-day service has injection ratchets 0 to 70% the calculation is 1/170 x MSQ and 70% to 100% the calculation is 1/200 x MSQ. The contract is associated with National Fuel transportation contract (No. N02358). The Company is currently exercising the evergreen provision provided in the contract and is extending the contract on a year to year basis.
EnergyNorth Natural Gas Incorporated	Tennessee	523	FS-MA Storage	21,844	1,560,391	10/31/2015	Part-284 storage service that provides 1,560,391 MMBtu of storage capacity with a withdrawal rate of 21,844 MMBtu/day and an injection rate of 10,404 MMBtu/day or 1/150 of Shipper's MSQ. The contract term has been extended from October 31, 2003 to October 31, 2010. Effective October 31, 2009, the Company extended the term for 5 years, pursuant to Article III, Section 10.4 of Tennessee Gas Pipelines General Terms and Conditions.

EnergyNorth Natural Gas Incorporated
Resource Listing

Supply Contracts

Shipper	Supplier	Contract No.	MDCQ	Annual Quantity	Expiration Date	Notes
EnergyNorth Natural Gas Incorporated	BP Canada Energy Company		3,199	1,167,635	03/31/2012	Supply Agreement between EnergyNorth and BP Canada Energy Company that provides gas commodity from western Canada at the Canadian-US border near Niagra, New York on Tennessee for transportation to EnergyNorth citygates.
EnergyNorth Natural Gas Incorporated	BP Canada Energy Company		4,047	1,477,155	03/31/2010	Supply Agreement between EnergyNorth and BP Canada Energy Company that provides gas commodity at the TransCanada Pipeline interconnection at Dawn, Ontario.
EnergyNorth Natural Gas Incorporated	Chevron Natural Gas		21,596	3,908,876	04/30/2010	Supply Agreement between EnergyNorth and Chevron Natural Gas that provides gas commodity from the Gulf of Mexico on the Tennessee Long Haul for transportation to EnergyNorth citygates. The contract has an MDQ of up to 21,596 MMBtu, not to exceed a total of 3,908,876 MMBtu.
EnergyNorth Natural Gas Incorporated	Repsol Energy North America Corporation		42,500	7,607,500	10/31/2010	Supply Agreement between EnergyNorth and Repsol Energy North America Corporation. The contract provides for both gas commodity and asset managment arrangement. The contract has an MDQ of up to 42,500 MMBtu, not to exceed a total of 7,607,500 MMBtu.
EnergyNorth Natural Gas Incorporated	Sempra Energy Trading		7,500	907,500	03/31/2010	Supply Agreement between EnergyNorth and Sempra Energy Trading. The contract provides gas commodity at Dracut, MA. The contract has an MDQ of up to 7,500 MMBtu, not to exceed a total of 907,500 MMBtu.

Supplemental Resources

Shipper	Supplier	Contract No.	MDCQ	Annual Quantity	Expiration Date	Notes
EnergyNorth Natural Gas Incorporated	Granite Ridge Energy, L.L.C.		15,000	450,000	09/30/2010	Peaking Supply Agreement between Granite Ridge Energy L.L.C. and EnergyNorth that provides up to 15,000 MMBtu/day for a total of 450,000 MMBtus during the months of December, January and February.
EnergyNorth Natural Gas Incorporated	Distrigas	FLS160	Monthly Take Quantities	1,000,000	10/31/2010	Distrigas of Massachusetts FLS (Firm Liquid Service) is a winter liquid refill contract with an annual quantity of 1,000,000 MMBtu of which 100,000 MMBtus is allocated to EnergyNorth.

Location	Facility Type	Maximum Vaporization (MMBtu/day)	Storage Capacity (MMBtu/day)
Concord, NH	LNG	4,800	4,200
Tilton, NH	LNG	9,600	4,200
Manchester, NH	LNG	8,400	4,200
Nashua, NH	Propane	11,000	23,672
Amherst, NH	Propane	0	28,450
Manchester, NH	Propane	21,600	47,317
Tilton, NH	Propane	2,000	4,730

Chart IV-C-3

Tennessee Gas Pipeline Zones

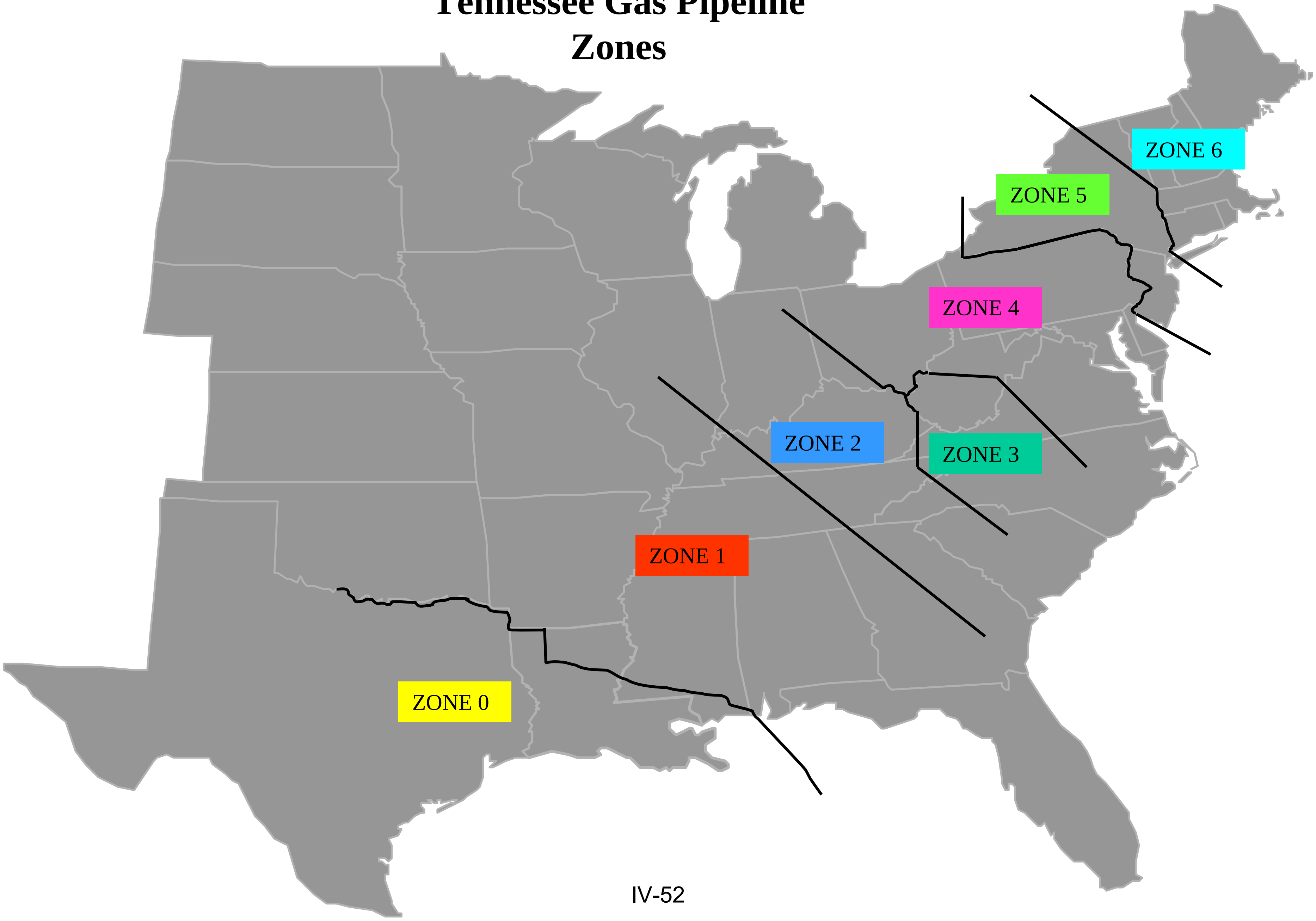
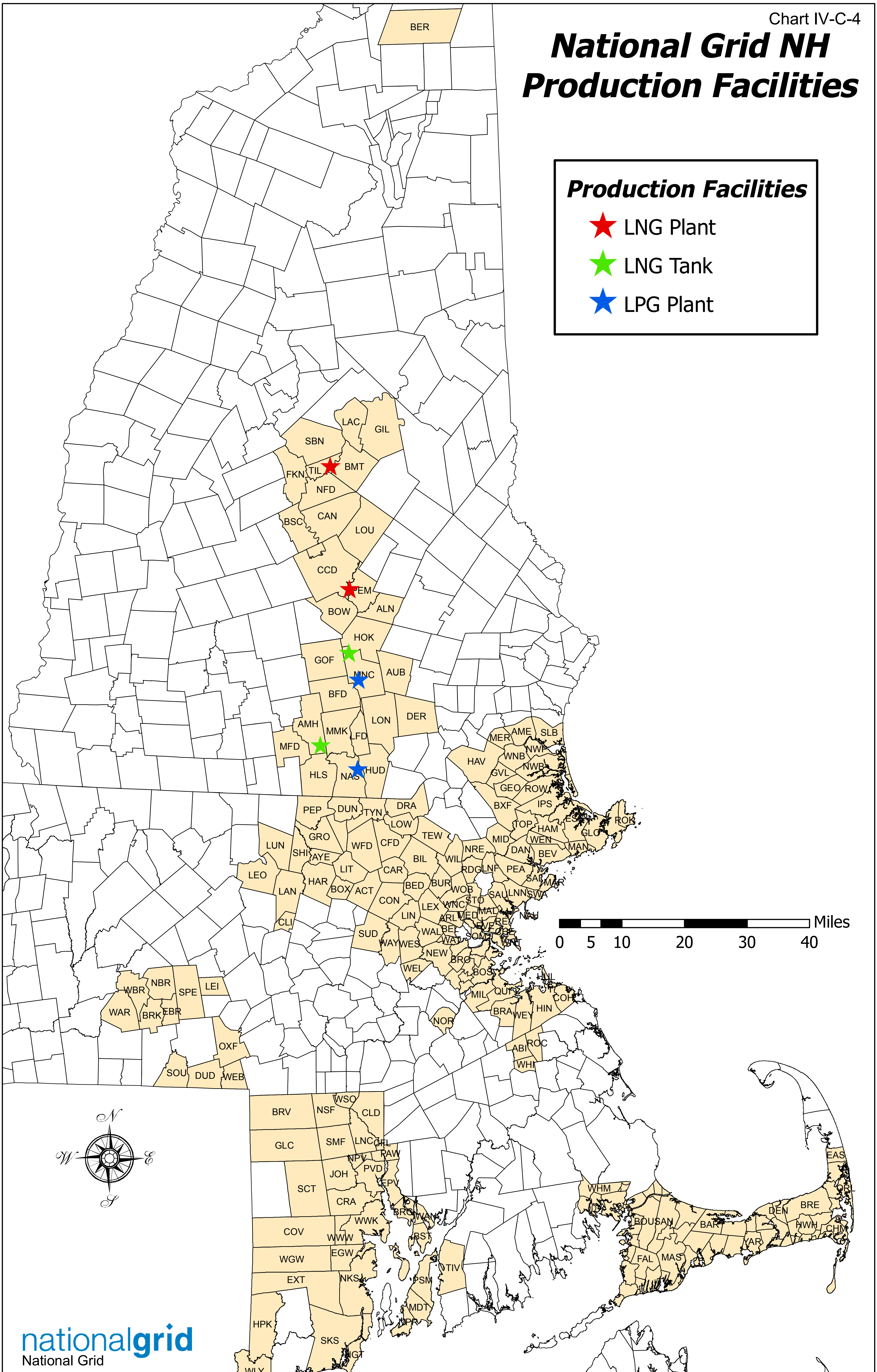


Chart IV-C-4

National Grid NH Production Facilities



national**grid**
National Grid

Summary of the DSM Scenarios

Summary of DSM Measures
National Grid New Hampshire

		Program 1 (2009)	Program 2 (2010)	Tier 1 (2011 and beyond)	Tier 2 (2011 and beyond)	Tier 3 (2011 and beyond)
Assumptions						
	Annual Normal HDD	6,410	6,410	6,410	6,410	6,410
Residential DSM Programs						
	Utility Fixed Costs	$1,807,764	$4,029,152	$1,807,764	$2,221,388	$602,252
	Annual Baseload Savings	1,161	2,993	1,161	1,832	0
	Annual Temperature-Sensitive Savings	26,677	44,571	26,677	17,894	6,998
	Participant Count	12	12	12	0	12
	Per-Participant Baseload Coefficient	0.265	0.683	0.265	0.418	0.000
	Per-Participant Heating Coefficient	0.347	0.579	0.347	0.233	0.091
Commercial & Industrial DSM Programs						
	Utility Fixed Costs	$1,450,375	$5,498,066	$1,450,375	$4,047,691	$972,184
	Annual Baseload Savings	24,654	48,075	24,654	23,421	16,009
	Annual Temperature-Sensitive Savings	26,706	28,679	26,706	1,973	0
	Participant Count	12	12	12	0	12
	Per-Participant Baseload Coefficient	5.629	10.976	5.629	5.347	3.655
	Per-Participant Heating Coefficient	0.347	0.373	0.347	0.026	0.000
Target Annual Reduction		79,198	124,318	79,198	45,120	23,007
Target Annual Peak Day Reduction		670	963	670	292	122
Cumulative Annual Reduction		79,198	203,516			
Target Annual Peak Day Reduction		670	1,633			
RES	Total Cost	$1,807,764	$4,029,152	$1,807,764	$2,221,388	$602,252
	Annualized Cost Over 15 Years	$120,518	$268,610	$120,518	$148,093	$40,150
	Peak Day Capacity	303	509	303	206	79
	Peak Day Cost Per MMBtu	$397.97	$527.89	$397.97	$718.86	$510.76
C&I	Total Cost	$1,450,375	$5,498,066	$1,450,375	$4,047,691	$972,184
	Annualized Cost Over 15 Years	$96,692	$366,538	$96,692	$269,846	$64,812
	Peak Day Capacity	368	454	368	86	44
	Peak Day Cost Per MMBtu	$263.09	$807.62	$263.09	$3,125.65	$1,477.72
TOT/AVG	Total Cost	$3,258,139	$9,527,217	$3,258,139	$6,269,079	$1,574,436
	Annualized Cost Over 15 Years	$217,209	$635,148	$217,209	$417,939	$104,962
	Peak Day Capacity	670	963	670	292	122
	Peak Day Cost Per MMBtu	$324.02	$659.76	$324.02	$1,429.62	$857.06

Summary of the Base Case Design Year Customer Requirements

Without the Impact of DSM
And
Under Three DSM Scenarios

Comparison of Base Case Design Year Customer Requirements By DSM Scenario

Base Case Demand - Design Year - No DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,477,244	2,159,674	2,432,101	2,080,163	1,820,662	1,046,434	518,986	381,410	370,032	369,547	430,634	823,461	13,910,348	138,401	-	-
2010/11	1,501,745	2,190,898	2,466,082	2,109,611	1,848,570	1,066,574	532,896	391,350	379,510	379,211	442,044	841,331	14,149,822	140,043	239,474	1,642
2011/12	1,538,332	2,236,141	2,514,796	2,239,699	1,889,648	1,097,679	556,341	409,603	397,369	397,306	462,149	869,770	14,608,833	142,301	698,485	3,900
2012/13	1,575,638	2,281,759	2,563,715	2,194,737	1,931,298	1,129,768	581,235	429,497	416,982	417,139	483,800	899,414	14,904,982	144,531	994,634	6,130
2013/14	1,610,788	2,324,883	2,610,004	2,235,114	1,970,606	1,159,904	604,427	447,888	435,072	435,444	503,885	927,170	15,265,185	146,653	1,354,837	8,252
2014/15	1,646,385	2,369,016	2,657,573	2,276,528	2,010,618	1,190,077	627,012	465,352	452,124	452,728	523,183	954,692	15,625,288	148,866	1,714,940	10,465

Base Case Demand - Design Year - Low Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,459,159	2,135,701	2,405,663	2,057,398	1,799,654	1,032,247	510,504	376,350	365,514	364,862	424,258	811,431	13,742,741	137,060	-	-
2010/11	1,474,618	2,154,939	2,426,426	2,075,463	1,817,058	1,045,293	520,172	383,760	372,732	372,184	432,481	823,286	13,898,412	138,032	155,671	972
2011/12	1,502,162	2,188,196	2,461,921	2,192,353	1,847,632	1,069,304	539,376	399,483	388,332	387,936	449,398	845,710	14,271,803	139,620	529,062	2,560
2012/13	1,530,426	2,221,828	2,497,621	2,137,823	1,878,778	1,094,300	560,029	416,847	405,686	405,427	467,861	869,338	14,485,964	141,179	743,223	4,119
2013/14	1,556,534	2,252,965	2,530,691	2,166,818	1,907,583	1,117,342	578,980	432,709	421,517	421,389	484,758	891,079	14,762,365	142,631	1,019,624	5,571
2014/15	1,583,088	2,285,112	2,565,041	2,196,849	1,937,091	1,140,421	597,323	447,643	436,310	436,331	500,868	912,586	15,038,663	144,174	1,295,922	7,114

Base Case Demand - Design Year - Base Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,454,501	2,129,902	2,399,404	2,051,952	1,794,408	1,028,316	507,594	374,123	363,344	362,662	421,785	807,860	13,695,851	136,767	-	-
2010/11	1,465,302	2,143,340	2,413,906	2,064,571	1,806,566	1,037,431	514,354	379,305	368,394	367,783	427,534	816,143	13,804,629	137,446	108,778	679
2011/12	1,488,188	2,170,797	2,443,142	2,175,379	1,831,893	1,057,512	530,649	392,800	381,824	381,335	441,978	834,996	14,130,493	138,741	434,642	1,974
2012/13	1,511,793	2,198,629	2,472,583	2,116,040	1,857,793	1,078,576	548,392	407,937	397,008	396,625	457,968	855,054	14,298,398	140,008	602,547	3,241
2013/14	1,533,243	2,223,967	2,499,393	2,139,588	1,881,351	1,097,688	564,434	421,570	410,670	410,387	472,392	873,224	14,527,907	141,166	832,056	4,399
2014/15	1,555,139	2,250,314	2,527,484	2,164,173	1,905,612	1,116,836	579,868	434,277	423,293	423,128	486,029	891,159	14,757,312	142,416	1,061,461	5,649

Base Case Demand - Design Year - High Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,454,501	2,129,902	2,399,404	2,051,952	1,794,408	1,028,316	507,594	374,123	363,344	362,662	421,785	807,860	13,695,851	136,767	-	-
2010/11	1,473,515	2,154,135	2,425,778	2,074,807	1,816,066	1,043,943	518,386	381,832	370,695	370,157	430,636	821,724	13,881,674	138,042	185,823	1,275
2011/12	1,497,504	2,182,396	2,455,661	2,186,695	1,842,386	1,065,374	536,467	397,256	386,163	385,736	446,925	842,138	14,224,701	139,327	528,850	2,560
2012/13	1,511,676	2,197,766	2,471,373	2,115,103	1,857,346	1,079,007	549,705	409,649	398,878	398,471	459,496	855,868	14,304,338	139,900	608,487	3,133
2013/14	1,533,087	2,222,816	2,497,780	2,138,340	1,880,755	1,098,261	566,184	423,854	413,162	412,848	474,429	874,309	14,535,825	141,023	839,974	4,256
2014/15	1,554,944	2,248,875	2,525,467	2,162,613	1,904,867	1,117,553	582,056	437,131	426,409	426,205	488,575	892,516	14,767,211	142,237	1,071,360	5,470

Base Case Demand - Design Year - Low Case DSM LESS No DSM														
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day
2009/10	-18,085	-23,973	-26,438	-22,765	-21,008	-14,187	-8,482	-5,060	-4,518	-4,685	-6,376	-12,030	-167,607	-1,341
2010/11	-27,127	-35,959	-39,656	-34,148	-31,512	-21,281	-12,724	-7,590	-6,778	-7,027	-9,563	-18,045	-251,410	-2,011
2011/12	-36,170	-47,945	-52,875	-47,346	-42,016	-28,375	-16,965	-10,120	-9,037	-9,370	-12,751	-24,060	-337,030	-2,681
2012/13	-45,212	-59,931	-66,094	-56,914	-52,520	-35,468	-21,206	-12,650	-11,296	-11,712	-15,939	-30,076	-419,018	-3,352
2013/14	-54,254	-71,918	-79,313	-68,296	-63,023	-42,562	-25,447	-15,179	-13,555	-14,055	-19,127	-36,091	-502,820	-4,022
2014/15	-63,297	-83,904	-92,532	-79,679	-73,527	-49,656	-29,689	-17,709	-15,814	-16,397	-22,315	-42,106	-586,625	-4,692

Base Case Demand - Design Year - Base Case DSM LESS No DSM														
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day
2009/10	-22,743	-29,772	-32,697	-28,211	-26,254	-18,118	-11,392	-7,287	-6,688	-6,885	-8,849	-15,601	-214,497	-1,634
2010/11	-36,443	-47,558	-52,176	-45,040	-42,004	-29,143	-18,542	-12,045	-11,116	-11,428	-14,510	-25,188	-345,193	-2,597
2011/12	-50,144	-65,344	-71,654	-64,320	-57,755	-40,167	-25,692	-16,803	-15,545	-15,971	-20,171	-34,774	-478,340	-3,560
2012/13	-63,845	-83,130	-91,132	-78,697	-73,505	-51,192	-32,843	-21,560	-19,974	-20,514	-25,832	-44,360	-606,584	-4,523
2013/14	-77,545	-100,916	-110,611	-95,526	-89,255	-62,216	-39,993	-26,318	-24,402	-25,057	-31,493	-53,946	-737,278	-5,487
2014/15	-91,246	-118,702	-130,089	-112,355	-105,006	-73,241	-47,144	-31,075	-28,831	-29,600	-37,154	-63,533	-867,976	-6,450

Base Case Demand - Design Year - High Case DSM LESS No DSM														
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day
2009/10	-22,743	-29,772	-32,697	-28,211	-26,254	-18,118	-11,392	-7,287	-6,688	-6,885	-8,849	-15,601	-214,497	-1,634
2010/11	-28,230	-36,763	-40,304	-34,804	-32,504	-22,631	-14,510	-9,518	-8,815	-9,054	-11,408	-19,607	-268,148	-2,001
2011/12	-40,828	-53,745	-59,135	-53,004	-47,262	-32,305	-19,874	-12,347	-11,206	-11,570	-15,224	-27,632	-384,132	-2,974
2012/13	-63,962	-83,993	-92,342	-79,634	-73,952	-50,761	-31,530	-19,848	-18,104	-18,668	-24,304	-43,546	-600,644	-4,631
2013/14	-77,701	-102,067	-112,224	-96,774	-89,851	-61,643	-38,243	-24,034	-21,910	-22,596	-29,456	-52,861	-729,360	-5,630
2014/15	-91,441	-120,141	-132,106	-113,915	-105,751	-72,524	-44,956	-28,221	-25,715	-26,523	-34,608	-62,176	-858,077	-6,629

Summary of the Base Case Normal Year Customer Requirements

Without the Impact of DSM
And
Under Three DSM Scenarios

Comparison of Base Case Normal Year Customer Requirements By DSM Scenario

Base Case Demand - Normal Year - No DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,352,264	1,978,976	2,212,838	1,906,607	1,667,437	961,188	493,275	377,985	370,032	369,192	418,093	761,294	12,869,181	112,247	-	-
2010/11	1,375,552	2,008,471	2,244,772	1,934,393	1,693,874	980,458	506,833	387,852	379,510	378,838	429,319	778,498	13,098,370	113,684	229,189	1,437
2011/12	1,410,616	2,051,533	2,290,903	2,056,608	1,733,095	1,010,459	529,831	406,010	397,369	396,909	449,189	806,093	13,538,615	115,684	669,434	3,437
2012/13	1,446,474	2,095,082	2,337,368	2,015,450	1,772,987	1,041,502	554,306	425,817	416,982	416,720	470,616	834,932	13,828,236	117,669	959,055	5,422
2013/14	1,480,227	2,136,209	2,381,307	2,053,920	1,810,597	1,070,632	577,089	444,121	435,072	435,004	490,484	861,916	14,176,578	119,555	1,307,397	7,308
2014/15	1,514,321	2,178,193	2,426,325	2,093,276	1,848,779	1,099,712	599,236	461,490	452,124	452,265	509,551	888,606	14,523,878	121,513	1,654,697	9,266

Base Case Demand - Normal Year - Low Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,335,229	1,956,586	2,188,232	1,885,424	1,647,695	947,800	484,959	373,125	365,514	364,524	412,067	749,847	12,711,002	111,090	-	-
2010/11	1,349,999	1,974,886	2,207,864	1,902,618	1,664,261	960,376	494,359	380,562	372,732	371,836	420,280	761,327	12,861,100	111,948	150,098	858
2011/12	1,376,545	2,006,752	2,241,692	2,012,527	1,693,611	983,683	513,199	396,290	388,332	387,572	437,137	783,198	13,220,538	113,369	509,536	2,279
2012/13	1,403,885	2,039,106	2,275,854	1,962,492	1,723,632	1,008,032	533,516	413,667	405,686	405,049	455,551	806,314	13,432,784	114,775	721,782	3,685
2013/14	1,429,120	2,069,038	2,307,490	1,990,371	1,751,371	1,030,469	552,141	429,541	421,517	420,999	472,406	827,574	13,702,037	116,083	991,035	4,993
2014/15	1,454,697	2,099,827	2,340,206	2,019,135	1,779,682	1,052,855	570,130	444,480	436,310	435,926	488,460	848,541	13,970,249	117,462	1,259,247	6,372

Base Case Demand - Normal Year - Base Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,330,766	1,951,081	2,182,315	1,880,273	1,642,685	944,019	482,081	370,935	363,344	362,326	409,659	746,384	12,665,868	110,831	-	-
2010/11	1,341,074	1,963,877	2,196,028	1,892,317	1,654,241	952,813	488,603	376,181	368,394	367,441	415,464	754,402	12,770,835	111,430	104,967	599
2011/12	1,363,158	1,990,240	2,223,939	1,996,466	1,678,581	972,338	504,565	389,719	381,824	380,980	429,913	772,811	13,084,534	112,593	418,666	1,762
2012/13	1,386,036	2,017,089	2,252,183	1,941,890	1,703,591	992,906	522,004	404,906	397,008	396,260	445,920	792,464	13,252,257	113,740	586,389	2,909
2013/14	1,406,809	2,041,516	2,277,902	1,964,617	1,726,320	1,011,560	537,751	418,589	410,670	410,012	460,367	810,262	13,476,375	114,789	810,507	3,958
2014/15	1,427,923	2,066,801	2,304,699	1,988,231	1,749,621	1,030,164	552,862	431,338	423,293	422,742	474,013	827,766	13,699,453	115,909	1,033,585	5,078

Base Case Demand - Normal Year - High Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,330,766	1,951,081	2,182,315	1,880,273	1,642,685	944,019	482,081	370,935	363,344	362,326	409,659	746,384	12,665,868	110,831	-	-
2010/11	1,341,084	1,963,663	2,195,711	1,892,079	1,654,151	952,994	489,048	376,762	369,017	368,057	415,990	754,701	12,773,257	111,403	107,389	572
2011/12	1,363,178	1,989,812	2,223,304	1,995,964	1,678,401	972,700	505,456	390,879	383,070	382,213	430,965	773,409	13,089,351	112,538	423,483	1,707
2012/13	1,386,066	2,016,448	2,251,231	1,941,175	1,703,322	993,448	523,340	406,646	398,878	398,108	447,497	793,360	13,259,519	113,658	593,651	2,827
2013/14	1,406,849	2,040,661	2,276,632	1,963,665	1,725,961	1,012,284	539,532	420,910	413,162	412,477	462,469	811,457	13,486,059	114,680	820,191	3,849
2014/15	1,427,973	2,065,732	2,303,112	1,987,041	1,749,172	1,031,069	555,089	434,239	426,409	425,822	476,641	829,260	13,711,559	115,773	1,045,691	4,942

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day
	Base Case Demand - Normal Year - Low Case DSM LESS No DSM													
2009/10	-17,035	-22,390	-24,606	-21,183	-19,742	-13,388	-8,316	-4,860	-4,518	-4,668	-6,026	-11,447	-158,179	-1,157
2010/11	-25,553	-33,585	-36,908	-31,775	-29,613	-20,082	-12,474	-7,290	-6,778	-7,002	-9,039	-17,171	-237,270	-1,736
2011/12	-34,071	-44,781	-49,211	-44,081	-39,484	-26,776	-16,632	-9,720	-9,037	-9,337	-12,052	-22,895	-318,077	-2,315
2012/13	-42,589	-55,976	-61,514	-52,958	-49,355	-33,470	-20,790	-12,150	-11,296	-11,671	-15,065	-28,618	-395,452	-2,894
2013/14	-51,107	-67,171	-73,817	-63,549	-59,226	-40,163	-24,948	-14,580	-13,555	-14,005	-18,078	-34,342	-474,541	-3,472
2014/15	-59,624	-78,366	-86,119	-74,141	-69,097	-46,857	-29,106	-17,010	-15,814	-16,339	-21,091	-40,065	-553,629	-4,051

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day
	Base Case Demand - Normal Year - Base Case DSM LESS No DSM													
2009/10	-21,498	-27,895	-30,523	-26,334	-24,752	-17,169	-11,194	-7,050	-6,688	-6,866	-8,434	-14,910	-203,313	-1,416
2010/11	-34,478	-44,594	-48,744	-42,076	-39,633	-27,645	-18,230	-11,671	-11,116	-11,397	-13,855	-24,096	-327,535	-2,254
2011/12	-47,458	-61,293	-66,964	-60,142	-54,514	-38,121	-25,266	-16,291	-15,545	-15,929	-19,276	-33,282	-454,081	-3,091
2012/13	-60,438	-77,993	-85,185	-73,560	-69,396	-48,596	-32,302	-20,911	-19,974	-20,460	-24,696	-42,468	-575,979	-3,929
2013/14	-73,418	-94,693	-103,405	-89,303	-84,277	-59,072	-39,338	-25,532	-24,402	-24,992	-30,117	-51,654	-700,203	-4,766
2014/15	-86,398	-111,392	-121,626	-105,045	-99,158	-69,548	-46,374	-30,152	-28,831	-29,523	-35,538	-60,840	-824,425	-5,604

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day
	Base Case Demand - Normal Year - High Case DSM LESS No DSM													
2009/10	-21,498	-27,895	-30,523	-26,334	-24,752	-17,169	-11,194	-7,050	-6,688	-6,866	-8,434	-14,910	-203,313	-1,416
2010/11	-34,468	-44,808	-49,061	-42,314	-39,723	-27,464	-17,785	-11,090	-10,493	-10,781	-13,329	-23,797	-325,113	-2,281
2011/12	-47,438	-61,721	-67,599	-60,644	-54,694	-37,759	-24,375	-15,131	-14,299	-14,696	-18,224	-32,684	-449,264	-3,146
2012/13	-60,408	-78,634	-86,137	-74,275	-69,665	-48,054	-30,966	-19,171	-18,104	-18,612	-23,119	-41,572	-568,717	-4,011
2013/14	-73,378	-95,548	-104,675	-90,255	-84,636	-58,348	-37,557	-23,211	-21,910	-22,527	-28,015	-50,459	-690,519	-4,875
2014/15	-86,348	-112,461	-123,213	-106,235	-99,607	-68,643	-44,147	-27,251	-25,715	-26,443	-32,910	-59,346	-812,319	-5,740

Summary of the Design Year Customer Requirements

Three Demand Scenarios

Using

Base Case DSM Scenario

Comparison of Design Year Customer Requirements Scenarios - Base Case DSM

	High Case Demand - Design Year - Base Case DSM														Annual	Peak Day
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Change From 2009/10	Change From 2009/10
2009/10	1,468,510	2,149,067	2,420,764	2,070,253	1,810,943	1,038,864	513,016	376,582	365,258	364,723	425,408	816,427	13,819,815	137,889	-	-
2010/11	1,494,849	2,183,248	2,458,188	2,102,593	1,841,221	1,060,060	526,770	385,735	373,778	373,463	436,300	834,860	14,071,065	139,740	251,250	1,851
2011/12	1,534,290	2,232,734	2,511,750	2,236,717	1,885,806	1,093,069	550,679	403,673	391,142	391,101	456,409	864,624	14,551,994	142,274	732,179	4,385
2012/13	1,575,389	2,283,759	2,566,762	2,197,015	1,932,033	1,127,857	576,629	423,688	410,674	410,904	478,555	896,323	14,879,588	144,838	1,059,773	6,949
2013/14	1,615,165	2,333,321	2,620,271	2,243,562	1,976,844	1,161,393	601,391	442,606	429,087	429,583	499,581	926,758	15,279,562	147,345	1,459,747	9,456
2014/15	1,656,321	2,385,086	2,676,346	2,292,264	2,023,434	1,195,735	626,073	460,991	446,839	447,627	520,266	957,649	15,688,631	150,007	1,868,816	12,118

	Base Case Demand - Design Year - Base Case DSM														Annual	Peak Day
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Change From 2009/10	Change From 2009/10
2009/10	1,454,501	2,129,902	2,399,404	2,051,952	1,794,408	1,028,316	507,594	374,123	363,344	362,662	421,785	807,860	13,695,851	136,767	-	-
2010/11	1,465,302	2,143,340	2,413,906	2,064,571	1,806,566	1,037,431	514,354	379,305	368,394	367,783	427,534	816,143	13,804,629	137,446	108,778	679
2011/12	1,488,188	2,170,797	2,443,142	2,175,379	1,831,893	1,057,512	530,649	392,800	381,824	381,335	441,978	834,996	14,130,493	138,741	434,642	1,974
2012/13	1,511,793	2,198,629	2,472,583	2,116,040	1,857,793	1,078,576	548,392	407,937	397,008	396,625	457,968	855,054	14,298,398	140,008	602,547	3,241
2013/14	1,533,243	2,223,967	2,499,393	2,139,588	1,881,351	1,097,688	564,434	421,570	410,670	410,387	472,392	873,224	14,527,907	141,166	832,056	4,399
2014/15	1,555,139	2,250,314	2,527,484	2,164,173	1,905,612	1,116,836	579,868	434,277	423,293	423,128	486,029	891,159	14,757,312	142,416	1,061,461	5,649

	Low Case Demand - Design Year - Base Case DSM														Annual	Peak Day
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Change From 2009/10	Change From 2009/10
2009/10	1,440,614	2,110,899	2,378,233	2,033,809	1,778,016	1,017,856	502,225	371,696	361,459	360,630	418,200	799,368	13,573,005	135,655	-	-
2010/11	1,436,297	2,104,161	2,370,440	2,027,248	1,772,557	1,015,218	502,161	372,992	363,109	362,208	418,929	797,774	13,543,094	135,194	-29,911	-461
2011/12	1,443,379	2,110,599	2,376,465	2,115,767	1,779,491	1,022,950	511,178	382,247	372,792	371,863	427,962	806,202	13,720,895	135,307	147,890	-348
2012/13	1,450,595	2,116,722	2,381,961	2,038,123	1,786,359	1,031,153	521,214	392,756	383,829	382,858	438,140	815,339	13,739,049	135,362	166,044	-293
2013/14	1,455,197	2,119,796	2,384,254	2,040,548	1,790,373	1,036,990	529,215	401,497	393,089	392,065	446,463	822,208	13,811,695	135,280	238,690	-375
2014/15	1,459,707	2,123,215	2,387,093	2,043,375	1,794,492	1,042,416	536,264	409,056	401,060	399,998	453,716	828,434	13,878,826	135,257	305,821	-398

Summary of the Normal Year Customer Requirements

Three Demand Scenarios
Using
Base Case DSM Scenario

Comparison of Normal Year Customer Requirements Scenarios - Base Case DSM

High Case Demand - Normal Year - Base Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,343,817	1,968,873	2,202,043	1,897,254	1,658,049	953,874	487,221	373,336	365,258	364,373	413,134	754,416	12,781,648	111,790	-	-
2010/11	1,368,698	2,001,036	2,237,056	1,927,707	1,686,552	974,052	500,458	382,493	373,778	373,091	423,933	772,052	13,020,906	113,399	239,258	1,609
2011/12	1,406,331	2,047,986	2,287,586	2,053,659	1,728,935	1,005,776	523,741	400,412	391,142	390,701	443,892	800,815	13,480,976	115,630	699,328	3,840
2012/13	1,445,658	2,096,526	2,339,635	2,017,420	1,772,995	1,039,315	549,077	420,412	410,674	410,478	465,896	831,532	13,799,618	117,897	1,017,970	6,107
2013/14	1,483,674	2,143,633	2,390,216	2,061,662	1,815,671	1,071,606	573,229	439,315	429,087	429,130	486,781	860,998	14,185,002	120,112	1,403,354	8,322
2014/15	1,522,914	2,192,711	2,443,085	2,107,842	1,859,918	1,104,589	597,258	457,674	446,839	447,145	507,299	890,826	14,578,100	122,453	1,796,452	10,663

Base Case Demand - Normal Year - Base Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,330,766	1,951,081	2,182,315	1,880,273	1,642,685	944,019	482,081	370,935	363,344	362,326	409,659	746,384	12,665,868	110,831	-	-
2010/11	1,341,074	1,963,877	2,196,028	1,892,317	1,654,241	952,813	488,603	376,181	368,394	367,441	415,464	754,402	12,770,835	111,430	104,967	599
2011/12	1,363,158	1,990,240	2,223,939	1,996,466	1,678,581	972,338	504,565	389,719	381,824	380,980	429,913	772,811	13,084,534	112,593	418,666	1,762
2012/13	1,386,036	2,017,089	2,252,183	1,941,890	1,703,591	992,906	522,004	404,906	397,008	396,260	445,920	792,464	13,252,257	113,740	586,389	2,909
2013/14	1,406,809	2,041,516	2,277,902	1,964,617	1,726,320	1,011,560	537,751	418,589	410,670	410,012	460,367	810,262	13,476,375	114,789	810,507	3,958
2014/15	1,427,923	2,066,801	2,304,699	1,988,231	1,749,621	1,030,164	552,862	431,338	423,293	422,742	474,013	827,766	13,699,453	115,909	1,033,585	5,078

Low Case Demand - Normal Year - Base Case DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,317,829	1,933,442	2,162,752	1,863,429	1,627,446	934,252	476,993	368,567	361,459	360,309	406,220	738,421	12,551,119	109,880	-	-
2010/11	1,313,952	1,927,397	2,155,744	1,857,575	1,622,522	931,961	476,962	369,984	363,109	361,895	407,148	737,073	12,525,322	109,497	-25,797	-383
2011/12	1,321,194	1,934,115	2,162,079	1,940,879	1,629,636	939,835	485,927	379,343	372,792	371,552	416,335	745,591	12,699,278	109,641	148,159	-239
2012/13	1,328,663	1,940,648	2,168,040	1,869,210	1,636,807	948,246	495,941	389,960	383,829	382,552	426,680	754,868	12,725,444	109,741	174,325	-139
2013/14	1,333,586	1,944,240	2,170,911	1,872,175	1,641,205	954,347	503,939	398,814	393,089	391,764	435,183	761,919	12,801,172	109,718	250,053	-162
2014/15	1,338,330	1,948,050	2,174,185	1,875,420	1,645,597	959,966	510,961	406,479	401,060	399,701	442,600	768,269	12,870,618	109,738	319,499	-142

Summary of the Base Case Design Year

Resource Utilization Without the Impact of DSM
And
The Reductions in Load and Resource-by-type With DSM

Base Case Design Year Resource Utilization - No DSM Case

Base Case Customer Requirements - Design Year - No DSM

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,477,244	2,159,674	2,432,101	2,080,163	1,820,662	1,046,434	518,986	381,410	370,032	369,547	430,634	823,461	13,910,348	138,401	-	-
2010/11	1,501,745	2,190,898	2,466,082	2,109,611	1,848,570	1,066,574	532,896	391,350	379,510	379,211	442,044	841,331	14,149,822	140,043	239,474	1,642
2011/12	1,538,332	2,236,141	2,514,796	2,239,699	1,889,648	1,097,679	556,341	409,603	397,369	397,306	462,149	869,770	14,608,833	142,301	698,485	3,900
2012/13	1,575,638	2,281,759	2,563,715	2,194,737	1,931,298	1,129,768	581,235	429,497	416,982	417,139	483,800	899,414	14,904,982	144,531	994,634	6,130
2013/14	1,610,788	2,324,883	2,610,004	2,235,114	1,970,606	1,159,904	604,427	447,888	435,072	435,444	503,885	927,170	15,265,185	146,653	1,354,837	8,252
2014/15	1,646,385	2,369,016	2,657,573	2,276,528	2,010,618	1,190,077	627,012	465,352	452,124	452,728	523,183	954,692	15,625,288	148,866	1,714,940	10,465

Pipeline Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	1,451,764	1,692,303	1,750,072	1,550,074	1,767,688	1,043,585	516,041	378,560	367,087	366,602	427,784	820,516	12,132,076	79,072	-	-
2010/11	1,472,737	1,707,605	1,605,707	1,502,292	1,789,579	1,063,556	529,951	388,500	376,565	376,266	439,194	838,386	12,090,338	66,400	-41,738	-12,672
2011/12	1,504,308	1,637,177	1,465,272	1,509,581	1,737,113	1,093,012	553,396	406,753	394,424	394,361	459,299	866,825	12,021,521	68,658	-110,555	-10,414
2012/13	1,536,594	1,667,038	1,526,475	1,494,811	1,840,019	1,123,449	578,290	426,647	414,037	414,194	480,950	896,469	12,398,973	70,888	266,897	-8,184
2013/14	1,566,986	1,729,616	1,570,756	1,525,076	1,868,854	1,152,021	601,482	445,038	432,127	432,499	501,035	924,225	12,749,715	75,750	617,639	-3,322
2014/15	1,597,683	1,758,535	1,618,548	1,560,581	1,898,039	1,180,585	624,067	462,502	449,179	449,783	520,333	951,747	13,071,582	79,072	939,506	0

Underground Storage Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	22,634	464,432	589,518	506,963	50,034	0	0	0	0	0	0	0	1,633,581	28,115	-	-
2010/11	26,162	480,353	678,015	582,077	56,051	169	0	0	0	0	0	0	1,822,827	28,115	189,246	0
2011/12	31,178	596,023	858,981	713,060	149,595	1,818	0	0	0	0	0	0	2,350,655	28,115	717,074	0
2012/13	36,198	611,780	846,068	683,495	88,339	3,469	0	0	0	0	0	0	2,269,349	28,115	635,768	0
2013/14	40,955	592,327	851,978	689,705	98,812	5,033	0	0	0	0	0	0	2,278,810	28,115	645,229	0
2014/15	45,856	607,541	857,468	689,901	107,942	6,643	0	0	0	0	0	0	2,315,351	28,115	681,770	0

Supplemental Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	2,845	2,940	92,511	23,127	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	144,693	31,214	-	-
2010/11	2,845	2,940	182,361	25,242	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	236,658	45,528	91,965	14,314
2011/12	2,845	2,940	190,544	17,059	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	236,658	45,528	91,965	14,314
2012/13	2,845	2,940	191,173	16,430	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	236,658	45,528	91,965	14,314
2013/14	2,845	2,940	187,270	20,333	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	236,658	42,788	91,965	11,574
2014/15	2,845	2,940	181,557	26,046	4,636	2,850	2,945	2,850	2,945	2,945	2,850	2,945	238,354	41,679	93,661	10,465

Chart IV-D-9

Base Case Design Year Change In Resource Utilization - Low Case DSM

	Change In Customer Requirements														Annual	Peak Day
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Change From 2009/10	Change From 2009/10
2009/10	-18,085	-23,973	-26,438	-22,765	-21,008	-14,187	-8,482	-5,060	-4,518	-4,685	-6,376	-12,030	-167,607	-1,341	-	-
2010/11	-27,127	-35,959	-39,656	-34,148	-31,512	-21,281	-12,724	-7,590	-6,778	-7,027	-9,563	-18,045	-251,410	-2,011	-83,803	-670
2011/12	-36,170	-47,945	-52,875	-47,346	-42,016	-28,375	-16,965	-10,120	-9,037	-9,370	-12,751	-24,060	-337,030	-2,681	-169,423	-1,340
2012/13	-45,212	-59,931	-66,094	-56,914	-52,520	-35,468	-21,206	-12,650	-11,296	-11,712	-15,939	-30,076	-419,018	-3,352	-251,411	-2,011
2013/14	-54,254	-71,918	-79,313	-68,296	-63,023	-42,562	-25,447	-15,179	-13,555	-14,055	-19,127	-36,091	-502,820	-4,022	-335,213	-2,681
2014/15	-63,297	-83,904	-92,532	-79,679	-73,527	-49,656	-29,689	-17,709	-15,814	-16,397	-22,315	-42,106	-586,625	-4,692	-419,018	-3,351

	Change In Pipeline Supplies														Annual	Peak Day
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Change From 2009/10	Change From 2009/10
2009/10	-15,312	-12,609	-9,339	-11,660	-16,269	-14,188	-8,483	-5,060	-4,518	-4,685	-6,376	-12,031	-120,530	0	-	-
2010/11	-22,968	-17,815	-11,585	-48,431	-24,397	-21,112	-12,724	-7,590	-6,778	-7,027	-9,563	-18,045	-208,035	-2,011	-87,505	-2,011
2011/12	-30,624	-31,470	-38,569	-59,697	-36,408	-26,560	-16,966	-10,120	-9,036	-9,370	-12,751	-24,061	-305,632	-2,681	-185,102	-2,681
2012/13	-38,280	-39,467	-54,545	-61,532	-36,280	-33,199	-21,206	-12,650	-11,296	-11,712	-15,939	-30,076	-366,182	-3,352	-245,652	-3,352
2013/14	-45,935	-46,610	-75,819	-64,615	-44,136	-39,838	-25,448	-15,179	-13,555	-14,055	-19,127	-36,090	-440,407	-6,762	-319,877	-6,762
2014/15	-53,591	-55,257	-92,342	-70,586	-51,955	-46,479	-29,688	-17,709	-15,814	-16,397	-22,315	-42,105	-514,238	-8,541	-393,708	-8,541

	Change In Underground Storage Supplies														Annual	Peak Day
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Change From 2009/10	Change From 2009/10
2009/10	-2,772	-11,365	-13,148	-13,716	-4,738	0	0	0	0	0	0	0	-45,739	0	-	-
2010/11	-4,159	-18,143	-13,914	124	-7,115	-169	0	0	0	0	0	0	-43,376	0	2,363	0
2011/12	-5,545	-16,474	-5,298	3,341	-5,607	-1,815	0	0	0	0	0	0	-31,398	0	14,341	0
2012/13	-6,932	-20,463	-7,640	709	-16,239	-2,269	0	0	0	0	0	0	-52,834	0	-7,095	0
2013/14	-8,318	-25,307	-9,167	1,992	-18,888	-2,723	0	0	0	0	0	0	-62,411	0	-16,672	0
2014/15	-9,705	-28,648	-10,192	911	-19,877	-3,177	0	0	0	0	0	0	-70,688	0	-24,949	0

	Change In Supplemental Supplies														Annual	Peak Day
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Change From 2009/10	Change From 2009/10
2009/10	0	0	-3,951	2,610	0	0	0	0	0	0	0	0	-1,341	-1,341	-	-
2010/11	0	0	-14,159	14,159	0	0	0	0	0	0	0	0	0	0	1,341	1,341
2011/12	0	0	-9,009	9,009	0	0	0	0	0	0	0	0	0	0	1,341	1,341
2012/13	0	0	-3,912	3,912	0	0	0	0	0	0	0	0	0	0	1,341	1,341
2013/14	0	0	5,673	-5,673	0	0	0	0	0	0	0	0	0	2,740	1,341	4,081
2014/15	0	0	10,003	-10,003	-1,696	0	0	0	0	0	0	0	-1,696	3,849	-355	5,190

Base Case Design Year Change In Resource Utilization - Base Case DSM

Change In Customer Requirements

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	-22,743	-29,772	-32,697	-28,211	-26,254	-18,118	-11,392	-7,287	-6,688	-6,885	-8,849	-15,601	-214,497	-1,634	-	-
2010/11	-36,443	-47,558	-52,176	-45,040	-42,004	-29,143	-18,542	-12,045	-11,116	-11,428	-14,510	-25,188	-345,193	-2,597	-130,696	-963
2011/12	-50,144	-65,344	-71,654	-64,320	-57,755	-40,167	-25,692	-16,803	-15,545	-15,971	-20,171	-34,774	-478,340	-3,560	-263,843	-1,926
2012/13	-63,845	-83,130	-91,132	-78,697	-73,505	-51,192	-32,843	-21,560	-19,974	-20,514	-25,832	-44,360	-606,584	-4,523	-392,087	-2,889
2013/14	-77,545	-100,916	-110,611	-95,526	-89,255	-62,216	-39,993	-26,318	-24,402	-25,057	-31,493	-53,946	-737,278	-5,487	-522,781	-3,853
2014/15	-91,246	-118,702	-130,089	-112,355	-105,006	-73,241	-47,144	-31,075	-28,831	-29,600	-37,154	-63,533	-867,976	-6,450	-653,479	-4,816

Change In Pipeline Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	-19,324	-15,809	-11,730	-14,287	-20,418	-18,119	-11,392	-7,287	-6,688	-6,885	-8,849	-15,602	-156,390	0	-	-
2010/11	-30,992	-23,872	-14,969	-59,444	-32,693	-28,975	-18,542	-12,045	-11,116	-11,428	-14,510	-25,188	-283,774	-2,597	-127,384	-2,597
2011/12	-42,661	-40,792	-47,907	-75,674	-51,640	-38,350	-25,693	-16,803	-15,545	-15,971	-20,171	-34,774	-425,981	-3,560	-269,591	-3,560
2012/13	-54,329	-54,674	-72,141	-89,404	-50,477	-48,075	-32,843	-21,560	-19,974	-20,514	-25,832	-44,361	-534,184	-4,524	-377,794	-4,524
2013/14	-65,996	-63,680	-97,737	-98,636	-62,896	-58,432	-39,993	-26,318	-24,402	-25,057	-31,493	-53,947	-648,587	-8,227	-492,197	-8,227
2014/15	-77,666	-77,145	-125,959	-103,254	-74,466	-68,793	-47,144	-31,075	-28,831	-29,600	-37,154	-63,533	-764,620	-10,299	-608,230	-10,299

Change In Underground Storage Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	-3,418	-13,965	-16,197	-17,203	-5,836	0	0	0	0	0	0	0	-56,619	0	-	-
2010/11	-5,450	-23,687	-18,402	-4,401	-9,311	-169	0	0	0	0	0	0	-61,420	0	-4,801	0
2011/12	-7,483	-24,551	-7,650	-4,744	-6,115	-1,818	0	0	0	0	0	0	-52,361	0	4,258	0
2012/13	-9,515	-28,454	-10,776	2,491	-23,028	-3,118	0	0	0	0	0	0	-72,400	0	-15,781	0
2013/14	-11,547	-37,236	-13,088	3,324	-26,360	-3,784	0	0	0	0	0	0	-88,691	0	-32,072	0
2014/15	-13,579	-41,556	-14,897	1,667	-28,843	-4,450	0	0	0	0	0	0	-101,658	0	-45,039	0

Change In Supplemental Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	0	0	-4,770	3,277	0	0	0	0	0	0	0	0	-1,493	-1,634	-	-
2010/11	0	0	-18,806	18,806	0	0	0	0	0	0	0	0	0	0	1,493	1,634
2011/12	0	0	-16,097	16,097	0	0	0	0	0	0	0	0	0	0	1,493	1,634
2012/13	0	0	-8,218	8,218	0	0	0	0	0	0	0	0	0	0	1,493	1,634
2013/14	0	0	214	-214	0	0	0	0	0	0	0	0	0	2,740	1,493	4,374
2014/15	0	0	10,768	-10,768	-1,696	0	0	0	0	0	0	0	-1,696	3,849	-203	5,483

Base Case Design Year Change In Resource Utilization - High Case DSM

Change In Customer Requirements

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	-22,743	-29,772	-32,697	-28,211	-26,254	-18,118	-11,392	-7,287	-6,688	-6,885	-8,849	-15,601	-214,497	-1,634	-	-
2010/11	-28,230	-36,763	-40,304	-34,804	-32,504	-22,631	-14,510	-9,518	-8,815	-9,054	-11,408	-19,607	-268,148	-2,001	-53,651	-367
2011/12	-40,828	-53,745	-59,135	-53,004	-47,262	-32,305	-19,874	-12,347	-11,206	-11,570	-15,224	-27,632	-384,132	-2,974	-169,635	-1,340
2012/13	-63,962	-83,993	-92,342	-79,634	-73,952	-50,761	-31,530	-19,848	-18,104	-18,668	-24,304	-43,546	-600,644	-4,631	-386,147	-2,997
2013/14	-77,701	-102,067	-112,224	-96,774	-89,851	-61,643	-38,243	-24,034	-21,910	-22,596	-29,456	-52,861	-729,360	-5,630	-514,863	-3,996
2014/15	-91,441	-120,141	-132,106	-113,915	-105,751	-72,524	-44,956	-28,221	-25,715	-26,523	-34,608	-62,176	-858,077	-6,629	-643,580	-4,995

Change In Pipeline Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	-19,324	-15,809	-11,730	-14,287	-20,418	-18,119	-11,392	-7,287	-6,688	-6,885	-8,849	-15,602	-156,390	0	-	-
2010/11	-24,021	-18,220	-11,816	-48,887	-25,314	-22,462	-14,510	-9,518	-8,815	-9,054	-11,408	-19,606	-223,631	-2,001	-67,241	-2,001
2011/12	-34,525	-34,319	-39,901	-64,181	-42,042	-30,489	-19,874	-12,347	-11,207	-11,570	-15,224	-27,631	-343,310	-2,974	-186,920	-2,974
2012/13	-54,188	-54,711	-70,933	-88,822	-50,255	-47,552	-31,530	-19,848	-18,104	-18,668	-24,304	-43,547	-522,462	-4,631	-366,072	-4,631
2013/14	-65,846	-63,910	-96,889	-98,917	-62,741	-57,752	-38,243	-24,034	-21,910	-22,596	-29,456	-52,861	-635,155	-8,370	-478,765	-8,370
2014/15	-77,505	-77,553	-125,420	-106,015	-74,396	-67,953	-44,956	-28,221	-25,715	-26,523	-34,608	-62,176	-751,041	-10,478	-594,651	-10,478

Change In Underground Storage Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	-3,418	-13,965	-16,197	-17,203	-5,836	0	0	0	0	0	0	0	-56,619	0	-	-
2010/11	-4,208	-18,544	-14,225	-181	-7,190	-169	0	0	0	0	0	0	-44,517	0	12,102	0
2011/12	-6,302	-19,425	-7,797	-262	-5,220	-1,818	0	0	0	0	0	0	-40,824	0	15,795	0
2012/13	-9,773	-29,281	-12,821	601	-23,697	-3,209	0	0	0	0	0	0	-78,180	0	-21,561	0
2013/14	-11,854	-38,157	-15,022	1,830	-27,110	-3,890	0	0	0	0	0	0	-94,203	0	-37,584	0
2014/15	-13,935	-42,587	-16,839	2,255	-29,658	-4,572	0	0	0	0	0	0	-105,336	0	-48,717	0

Change In Supplemental Supplies

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Peak Day	Annual Change From 2009/10	Peak Day Change From 2009/10
2009/10	0	0	-4,770	3,277	0	0	0	0	0	0	0	0	-1,493	-1,634	-	-
2010/11	0	0	-14,264	14,264	0	0	0	0	0	0	0	0	0	0	1,493	1,634
2011/12	0	0	-11,437	11,437	0	0	0	0	0	0	0	0	0	0	1,493	1,634
2012/13	0	0	-8,589	8,589	0	0	0	0	0	0	0	0	0	0	1,493	1,634
2013/14	0	0	-313	313	0	0	0	0	0	0	0	0	0	2,740	1,493	4,374
2014/15	0	0	10,155	-10,155	-1,696	0	0	0	0	0	0	0	-1,696	3,849	-203	5,483

V. SUMMARY OF COMPLIANCE Order No. 24,941

On February 13, 2009, the Commission issued Order No. 424, 941 accepting the Company's IRP filed in Docket DG-06-105. The order identified certain items to be included in the Company's next IRP. This section documents the Company's compliance with the order.

1. The Planning Period should be five years. The length of the planning horizon should not limit the time period over which long-lived resource options are evaluated. (<u>Order,</u> at 18);

The planning period for this filing is the five year period November 1, 2010 through October 31, 2015. The Company did not use this planning horizon to limit the evaluation of the expected available resources or future resource options presented in Section IV-C.

2. The demand forecast should continue to be based on the econometric forecasting model developed by the Company pursuant to the settlement agreement approved in Order No. 24, 531 (<u>Order,</u> at 18);

The Econometric forecasting model used in this IRP is consistent with the model developed as a result of the settlement and is documented in Section III-B of this IRP.

3. For purposes of establishing design planning standards, the Company should continue to utilize a Monte Carlo weather forecasting analysis (<u>Order</u>, at 18);

The Monte Carlo weather forecasting analysis used by the Company to develop its design planning standards is described in detail in Section III-E.

4. The Company should assess the capability of its resource portfolio to satisfy its design day, design year and cold snap standards and evaluate how its portfolio would perform under alternative high and low demand scenarios. (Order, at 19)

The adequacy of the portfolio under various scenarios is documented at Section IV-D.

5. The Company should address whether circumstances have changed since its last IRP such that a capacity reserve to plan for the potential needs of grandfathered firm transportation customers is warranted. (Order, at 19);

The Company has evaluated the impact of transportation migration on the forecast, as documented in Section III-B-5, and concluded that circumstances have not changed. Therefore, a capacity reserve is not warranted.

6. The Company's IRP should include a systematic evaluation of reasonably available demand-side management programs on an equivalent basis with its evaluation of supply side resources. The

evaluation will include a description of the methodology for calculating avoided costs associated with not having to purchase additional gas supplies or constructing new peaking capacity, reflect any differences in the reliability of demand –side measures compared to supply-side resources and discuss the process for integrating demand–side and supply-side resources so that customer needs will be met at the lowest reasonable cost while maintaining reliability and taking into account other non-cost planning criteria. Cost-effectiveness shall be determined using the total resource cost test. The Company is required to use to use the information contained in the report titled "Additional Opportunities for Energy Efficiency in New Hampshire" that was prepared by GDS Associates for the Commission as the basis for its demand-side assessment. (Order, at 20-23);

The Company's evaluation of reasonably available demand–side management resources is discussed in detail in Sections IV-B and IV-D.

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Heating Customers Forecasting

Regression Model:	AH4a35							
Dependent Variable:	CUSRH							
Independent Variable:	Intercept	CUSRH_1	HH	d1	d6	d7	d12	

Model	obNum	DFE	rsq	DW	SSE	MSE
AH4a35	232	0	0.997642448	2.197836573	27317863.1	117749.41

Model	SBC	AIC	Nor	NorPct
AH4a35	3410.733433	3352.138897	0.57915095	0.748581292

model		Intercept	CUSRH_1	HH	d1	d6	d7	d12	AR2	AR5
AH4a35	DF	1	1	1	1	1	1	1	1	1
AH4a35	Estimate	-202.5320924	0.992439805	1.644175917	191.396645	-297.02206	-541.25453	245.71711	0.227625009	0.194168736
AH4a35	StdErr	1.557168026	0.001906386	0.2382226	23.8863774	10.2262249	30.9007881	22.785879	0.039756904	0.034130979
AH4a35	tValue	-130.0643791	520.5869252	6.9018469	8.01279501	-29.045133	-17.515881	10.783745	5.725420868	5.688929551
AH4a35	Probt	0	0	5.13307E-12	1.1213E-15	1.773E-185	1.0839E-68	4.108E-27	1.03178E-08	1.27838E-08

model		AR6	AR7	AR10	EARCH0	EARCH9	EARCH10	EARCH12	THETA
AH4a35	DF	1	1	1	1	1	1	1	1
AH4a35	Estimate	0.431204257	0.264811948	0.192605669	11.5373531	0.4024665	0.56466737	0.5391731	-0.374608408
AH4a35	StdErr	0.039843207	0.041825593	0.041213309	0.1318919	0.11905708	0.14664766	0.1525778	0.120375023
AH4a35	tValue	10.82252889	6.331337616	4.673385238	87.4758271	3.38045009	3.85050393	3.5337593	-3.112011107
AH4a35	Probt	2.69244E-27	2.43045E-10	2.96275E-06	0	0.00072367	0.00011788	0.0004097	0.001858175

Residential Heating Customers Forecasting
Forecasts

Date	Actual	Forecast
May-02	59,853	60,198
Jun-02	59,742	59,765
Jul-02	59,919	59,459
Aug-02	60,095	60,149
Sep-02	59,581	60,186
Oct-02	59,283	59,848
Nov-02	60,178	59,792
Dec-02	61,105	60,592
Jan-03	61,080	61,004
Feb-03	61,116	61,096
Mar-03	61,180	61,743
Apr-03	61,576	61,551
May-03	62,379	61,307
Jun-03	62,720	61,783
Jul-03	62,052	62,308
Aug-03	63,192	62,304
Sep-03	63,929	63,238
Oct-03	63,924	63,492
Nov-03	63,132	63,517
Dec-03	63,144	63,205
Jan-04	64,300	63,463
Feb-04	63,607	63,965
Mar-04	63,663	62,906
Apr-04	64,031	63,943
May-04	64,731	64,715
Jun-04	64,961	64,537
Jul-04	64,405	64,179
Aug-04	65,110	64,599
Sep-04	65,317	65,630
Oct-04	65,215	65,171
Nov-04	64,372	64,758
Dec-04	64,489	64,645
Jan-05	65,437	64,872
Feb-05	64,770	65,331
Mar-05	64,421	64,487
Apr-05	64,846	64,904
May-05	65,969	65,624
Jun-05	66,198	65,848
Jul-05	65,695	65,474
Aug-05	66,062	66,026
Sep-05	67,050	66,736
Oct-05	66,627	66,956
Nov-05	66,062	65,833
Dec-05	66,160	66,275
Jan-06	66,532	66,596
Feb-06	66,329	66,401
Mar-06	65,577	65,909
Apr-06	66,250	65,833
May-06	66,656	67,077
Jun-06	67,099	66,596
Jul-06	67,018	66,554

Residential Heating Customers Forecasting
Forecasts

Date	Actual	Forecast
Aug-06	67,393	67,393
Sep-06	67,691	67,920
Oct-06	67,478	67,741
Nov-06	66,946	67,155
Dec-06	66,951	67,040
Jan-07	67,295	67,216
Feb-07	67,131	67,151
Mar-07	67,583	67,102
Apr-07	67,649	67,858
May-07	68,670	68,053
Jun-07	68,558	68,756
Jul-07	67,694	68,013
Aug-07	67,967	67,893
Sep-07	67,714	68,233
Oct-07	67,409	67,609
Nov-07	67,350	67,199
Dec-07	67,856	67,661
Jan-08	68,484	68,259
Feb-08	68,955	68,673
Mar-08	68,548	68,995
Apr-08	68,874	68,857
May-08	69,403	69,324
Jun-08	68,868	69,035
Jul-08	68,846	68,144
Aug-08	68,483	68,953
Sep-08	69,231	68,599
Oct-08	69,220	69,358
Nov-08	68,405	68,927
Dec-08	68,356	68,656
Jan-09	69,099	68,953
Feb-09	69,241	69,208
Mar-09	68,748	69,019
Apr-09	69,144	68,957
May-09	69,853	69,796
Jun-09		70,000
Jul-09		68,860
Aug-09		69,140
Sep-09		69,568
Oct-09		69,499
Nov-09		68,775
Dec-09		69,025
Jan-10		69,742
Feb-10		69,678
Mar-10		69,358
Apr-10		69,423
May-10		70,118
Jun-10		70,055
Jul-10		69,101
Aug-10		69,316
Sep-10		69,748
Oct-10		69,743
Nov-10		69,249
Dec-10		69,547
Jan-11		70,211
Feb-11		70,280
Mar-11		69,978
Apr-11		70,070
May-11		70,611
Jun-11		70,585
Jul-11		69,772
Aug-11		69,955
Sep-11		70,383
Oct-11		70,475
Nov-11		70,180
Dec-11		70,502
Jan-12		71,138
Feb-12		71,303
Mar-12		71,102
Apr-12		71,191
May-12		71,634
Jun-12		71,665
Jul-12		70,969
Aug-12		71,135
Sep-12		71,533
Oct-12		71,700
Nov-12		71,553
Dec-12		71,891
Jan-13		72,484
Feb-13		72,719
Mar-13		72,614

Residential Heating Customers Forecasting

Forecasts

Date	Actual	Forecast
Apr-13		72,697
May-13		73,065
Jun-13		73,135
Jul-13		72,530
Aug-13		72,684
Sep-13		73,039
Oct-13		73,249
Nov-13		73,205
Dec-13		73,548
Jan-14		74,093
Feb-14		74,367
Mar-14		74,336
Apr-14		74,416
May-14		74,723
Jun-14		74,814
Jul-14		74,279
Aug-14		74,430
Sep-14		74,740
Oct-14		74,971
Nov-14		75,002
Dec-14		75,352
Jan-15		75,854
Feb-15		76,147
Mar-15		76,176
Apr-15		76,259
May-15		76,519
Jun-15		76,618
Jul-15		76,138
Aug-15		76,292
Sep-15		76,566
Oct-15		76,807

Split-year

Nov-Oct		
Nov. 2004- Oct. 2005	65,495	65,472
Nov. 2005- Oct. 2006	66,687	66,677
Nov. 2006- Oct. 2007	67,631	67,673
Nov. 2007- Oct. 2008	68,676	68,588
Nov. 2008- Oct. 2009		69,215
Nov. 2009- Oct. 2010		69,507
Nov. 2010- Oct. 2011		70,093
Nov. 2011- Oct. 2012		71,171
Nov. 2012- Oct. 2013		72,638
Nov. 2013- Oct. 2014		74,327
Nov. 2014- Oct. 2015		76,144

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Heating Use Per Forecasting

Regression Model:	BH4b17						
Dependent Variable:	USERH						
Independent Variable:	Intercept	BDDA	prcG	PIR	d1	d2	
	d3	d4	d5	d6	d10	d11	d12

Model	obNum	DFE	rsq	DW	SSE	MSE
BH4b17	233	0	0.984817167	1.840813897	107.472492	0.46125533

Model	SBC	AIC	Nor	NorPct
BH4b17	471.2263039	384.95034	2.82369541	0.243692595

model		Intercept	BDDA	prcG	PIR	d1	d2	d3	d4
BH4b17	DF	1	1	1	1	1	1	1	1
BH4b17	Estimate	3.7356021	0.001787854	-0.02863659	-3.701E-05	12.0914271	12.40373186	9.985105838	6.939123242
BH4b17	StdErr	0.0032004	3.15314E-05	0.003944429	1.4837E-06	0.00317303	0.00316227	0.003168938	0.003167879
BH4b17	tValue	1167.2383	56.70077739	-7.260009875	-24.943315	3810.68672	3922.413416	3150.931347	2190.463219
BH4b17	Probt	0	0	3.87062E-13	2.524E-137	0	0	0	0

model		d5	d6	d10	d11	d12	AR12	AR14	AR23
BH4b17	DF	1	1	1	1	1	1	1	1
BH4b17	Estimate	2.8288674	0.981055095	1.124324306	4.12129555	8.30531702	-0.321056133	-0.106603125	-0.102156611
BH4b17	StdErr	0.0031663	0.00315208	0.003176025	0.00316511	0.00317066	0.00319477	0.003341019	0.003774274
BH4b17	tValue	893.43262	311.2405352	354.0035586	1302.10252	2619.42529	-100.4942886	-31.90736928	-27.06655595
BH4b17	Probt	0	0	0	0	0	0	2.1102E-223	2.4388E-161

model		EARCH0	EARCH1	EARCH2	EARCH5	EARCH8	EARCH11	EGARCH6	EGARCH12	THETA
BH4b17	DF	1	1	1	1	1	1	1	1	1
BH4b17	Estimate	-1.154267	0.57988883	0.915037514	-0.4939461	-0.7225623	0.557359103	-0.09962046	0.270516039	0.066267004
BH4b17	StdErr	0.003166	0.003163067	0.003164698	0.00316601	0.0031693	0.003164838	0.003212756	0.003311212	0.003186328
BH4b17	tValue	-364.5831	183.3311901	289.1389637	-156.0154	-227.98816	176.1098131	-31.00778467	81.69699629	20.79729605
BH4b17	Probt	0	0	0	0	0	0	4.2335E-211	0	4.57906E-96

Residential Heating Use Per Forecasting
Forecasts

Date	Actual	Forecast
May-02	6.53	5.6436
Jun-02	4.07	3.4838
Jul-02	2.91	2.0642
Aug-02	1.73	1.9339
Sep-02	2.10	1.9986
Oct-02	2.89	3.5370
Nov-02	7.82	7.4130
Dec-02	13.42	11.8077
Jan-03	15.75	16.7311
Feb-03	17.04	16.9939
Mar-03	15.40	14.0159
Apr-03	10.27	10.1770
May-03	6.27	5.9326
Jun-03	3.45	3.3196
Jul-03	2.14	2.2168
Aug-03	1.96	1.8090
Sep-03	1.93	1.9529
Oct-03	3.88	3.2466
Nov-03	7.18	7.1545
Dec-03	12.72	12.2449
Jan-04	15.97	16.2349
Feb-04	17.67	16.8518
Mar-04	13.58	13.8994
Apr-04	10.72	10.1266
May-04	5.13	5.7379
Jun-04	3.16	3.2197
Jul-04	2.15	1.8729
Aug-04	1.96	1.8025
Sep-04	1.94	1.8148
Oct-04	3.27	3.5054
Nov-04	6.98	7.1177
Dec-04	10.86	11.9806
Jan-05	15.75	16.0691
Feb-05	16.54	17.0034
Mar-05	14.56	13.6172
Apr-05	9.98	10.4465
May-05	5.37	5.3189
Jun-05	3.37	3.2696
Jul-05	2.20	1.8585
Aug-05	1.77	1.7121
Sep-05	1.89	1.7612

Residential Heating Use Per Forecasting
Forecasts

Date	Actual	Forecast
Oct-05	2.65	3.2010
Nov-05	6.63	6.9248
Dec-05	12.08	11.3594
Jan-06	15.96	15.7447
Feb-06	13.62	15.9676
Mar-06	14.45	13.8078
Apr-06	9.41	9.8210
May-06	5.08	5.2791
Jun-06	3.26	3.0435
Jul-06	2.06	1.8157
Aug-06	1.70	1.6734
Sep-06	1.96	1.8336
Oct-06	3.13	3.1109
Nov-06	6.63	6.6121
Dec-06	10.92	11.2534
Jan-07	13.68	15.6297
Feb-07	16.22	15.5731
Mar-07	14.02	13.9183
Apr-07	9.09	9.5647
May-07	5.17	5.2772
Jun-07	2.83	2.8753
Jul-07	1.92	1.6940
Aug-07	1.69	1.6045
Sep-07	1.83	1.7306
Oct-07	2.45	3.0312
Nov-07	5.87	6.7803
Dec-07	11.93	11.6876
Jan-08	13.90	15.0272
Feb-08	14.44	16.1574
Mar-08	12.33	13.3820
Apr-08	9.48	9.5854
May-08	5.18	5.1378
Jun-08	2.70	2.7229
Jul-08	1.87	1.6644
Aug-08	1.66	1.6168
Sep-08	1.85	1.6998
Oct-08	2.76	3.0047
Nov-08	5.86	6.5205
Dec-08	10.88	11.4037
Jan-09	14.90	15.2021
Feb-09	14.89	15.7166
Mar-09	12.63	12.6515
Apr-09	8.87	9.4613
May-09	4.61	4.9393
Jun-09		2.8172
Jul-09		1.7122
Aug-09		1.5728
Sep-09		1.7111
Oct-09		3.0492
Nov-09		6.5753
Dec-09		11.1609
Jan-10		15.2862
Feb-10		15.5670
Mar-10		13.1041
Apr-10		9.5248
May-10		4.9854
Jun-10		2.7967
Jul-10		1.5904
Aug-10		1.5353
Sep-10		1.6163
Oct-10		3.0470
Nov-10		6.6343
Dec-10		11.3021
Jan-11		15.4903
Feb-11		15.8240
Mar-11		13.1595
Apr-11		9.6408
May-11		5.0329
Jun-11		2.7608
Jul-11		1.5195
Aug-11		1.4785
Sep-11		1.5885
Oct-11		3.1245
Nov-11		6.6754
Dec-11		11.3996
Jan-12		15.6169
Feb-12		15.9365

Residential Heating Use Per Forecasting
Forecasts

Date	Actual	Forecast
Mar-12		13.2288
Apr-12		9.7091
May-12		5.0306
Jun-12		2.7300
Jul-12		1.4786
Aug-12		1.4230
Sep-12		1.5445
Oct-12		3.1153
Nov-12		6.6664
Dec-12		11.4235
Jan-13		15.6501
Feb-13		15.9517
Mar-13		13.2433
Apr-13		9.7152
May-13		5.0014
Jun-13		2.6879
Jul-13		1.4258
Aug-13		1.3645
Sep-13		1.4983
Oct-13		3.0761
Nov-13		6.6349
Dec-13		11.4116
Jan-14		15.6394
Feb-14		15.9343
Mar-14		13.2271
Apr-14		9.6868
May-14		4.9584
Jun-14		2.6383
Jul-14		1.3671
Aug-14		1.3037
Sep-14		1.4440
Oct-14		3.0235
Nov-14		6.5898
Dec-14		11.3756
Jan-15		15.6020
Feb-15		15.8975
Mar-15		13.1909
Apr-15		9.6429
May-15		4.9090
Jun-15		2.5847
Jul-15		1.3085
Aug-15		1.2451
Sep-15		1.3873
Oct-15		2.9681

Split-year
Nov-Oct

Nov. 2004- Oct. 2005	91.92	93.36
Nov. 2005- Oct. 2006	89.33	90.38
Nov. 2006- Oct. 2007	86.45	88.76
Nov. 2007- Oct. 2008	84.00	88.47
Nov. 2008- Oct. 2009		86.76
Nov. 2009- Oct. 2010		86.79
Nov. 2010- Oct. 2011		87.56
Nov. 2011- Oct. 2012		87.89
Nov. 2012- Oct. 2013		87.70
Nov. 2013- Oct. 2014		87.27
Nov. 2014- Oct. 2015		86.70

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Heating Volume Forecasting

Regression Model:	CH4b27							
Dependent Variable:	VOLRH							
Independent Variable:	Intercept	BDDA	GSP	HSTT	d1	d2		
	d3	d4	d5	d6	d10	d11		d12

Model	obNum	DFE	rsq	DW	SSE	MSE
CH4b27	233	0	0.982587811	2.093096565	4.1263E+11	1770957584

Model	SBC	AIC	Nor	NorPct
CH4b27	5608.902426	5536.430619	19.08609636	7.1698E-05

model		Intercept	BDDA	GSP	HSTT	d1	d2	d3	d4	d5
CH4b27	DF	1	1	1	1	1	1	1	1	1
CH4b27	Estimate	14104.80667	117.0313015	1.550871279	3986.90481	662327.667	659495.1829	533551.2201	357001.79	152678.7
CH4b27	StdErr	0.113108596	3.839923702	0.02269704	0.11340163	0.11308743	0.113107968	0.113100973	0.1130739	0.1130757
CH4b27	tValue	124701.4566	30.47750698	68.32923093	35157.385	5856775.44	5830669.507	4717476.85	3157242.8	1350234.2
CH4b27	Probt	0	5.1773E-204	0	0	0	0	0	0	0

model		d6	d10	d11	d12	AR1	AR12	AR23	EARCH0
CH4b27	DF	1	1	1	1	1	1	1	1
CH4b27	Estimate	47063.44577	47861.55415	223808.3274	437673.976	-0.2702468	-0.304779297	-0.142749367	20.91281
CH4b27	StdErr	0.113089157	0.113609423	0.113115598	0.1131555	0.02379677	0.019823529	0.014236744	0.1740641
CH4b27	tValue	416162.3167	421281.5515	1978580.602	3867898.36	-11.356449	-15.37462326	-10.02682669	120.14429
CH4b27	Probt	0	0	0	0	6.8888E-30	2.42248E-53	1.16191E-23	0

Residential Heating Volume Forecasting
Forecasts

Date	Actual	Forecast
May-02	390,828	332,950
Jun-02	243,301	220,732
Jul-02	174,631	141,236
Aug-02	103,779	136,298
Sep-02	124,996	125,790
Oct-02	171,334	208,339
Nov-02	470,883	429,546
Dec-02	820,094	695,062
Jan-03	962,280	1,013,641
Feb-03	1,041,455	988,024
Mar-03	942,314	829,967
Apr-03	632,280	619,292
May-03	391,277	372,177
Jun-03	216,386	225,598
Jul-03	132,734	149,663
Aug-03	124,068	120,795
Sep-03	123,690	129,566
Oct-03	247,762	197,192
Nov-03	453,539	444,944
Dec-03	802,930	738,310
Jan-04	1,027,048	1,005,236
Feb-04	1,124,236	1,003,592
Mar-04	864,527	876,304
Apr-04	686,242	621,801
May-04	332,290	384,763
Jun-04	205,247	209,980
Jul-04	138,174	133,664
Aug-04	127,581	128,239
Sep-04	126,722	126,290
Oct-04	213,017	226,638
Nov-04	449,382	457,583
Dec-04	700,239	730,932
Jan-05	1,030,634	987,450
Feb-05	1,071,196	1,035,983
Mar-05	937,823	856,444
Apr-05	647,088	658,294
May-05	354,166	357,759
Jun-05	223,243	213,697
Jul-05	144,727	140,240
Aug-05	116,777	130,850
Sep-05	126,895	131,921
Oct-05	176,523	208,092
Nov-05	437,705	436,862
Dec-05	799,100	699,924
Jan-06	1,061,605	1,008,109
Feb-06	903,416	1,007,721
Mar-06	947,382	842,383
Apr-06	623,246	636,393

Residential Heating Volume Forecasting
Forecasts

Date	Actual	Forecast
May-06	336,746	348,678
Jun-06	218,939	204,057
Jul-06	137,992	137,846
Aug-06	114,409	122,658
Sep-06	132,746	127,664
Oct-06	211,267	200,214
Nov-06	443,574	419,006
Dec-06	730,869	708,915
Jan-07	920,793	992,578
Feb-07	1,088,643	946,134
Mar-07	947,321	892,214
Apr-07	615,140	638,127
May-07	354,917	344,129
Jun-07	194,206	204,603
Jul-07	130,106	130,106
Aug-07	115,203	119,271
Sep-07	124,051	121,910
Oct-07	165,242	195,717
Nov-07	395,640	432,449
Dec-07	809,271	722,454
Jan-08	952,104	966,133
Feb-08	995,983	1,000,909
Mar-08	845,485	862,005
Apr-08	652,882	602,286
May-08	359,481	355,803
Jun-08	186,125	199,438
Jul-08	128,637	121,746
Aug-08	113,713	121,083
Sep-08	127,931	126,220
Oct-08	192,638	199,055
Nov-08	400,619	419,696
Dec-08	744,018	703,168
Jan-09	1,029,692	980,327
Feb-09	1,030,987	994,603
Mar-09	868,116	820,265
Apr-09	613,281	611,712
May-09	321,758	335,274
Jun-09		183,205
Jul-09		117,172
Aug-09		109,936
Sep-09		116,584
Oct-09		190,264
Nov-09		421,303
Dec-09		693,361
Jan-10		968,538
Feb-10		970,677
Mar-10		828,502
Apr-10		601,158
May-10		333,445
Jun-10		189,396
Jul-10		121,580
Aug-10		117,738
Sep-10		124,751
Oct-10		198,786
Nov-10		430,122
Dec-10		698,180
Jan-11		965,126
Feb-11		965,289
Mar-11		816,622
Apr-11		595,336
May-11		339,390
Jun-11		197,972
Jul-11		131,570
Aug-11		127,679
Sep-11		135,757
Oct-11		213,499
Nov-11		435,290
Dec-11		698,945
Jan-12		961,680
Feb-12		961,428
Mar-12		814,077
Apr-12		597,661
May-12		346,675
Jun-12		206,821
Jul-12		141,414
Aug-12		137,496
Sep-12		145,642

Residential Heating Volume Forecasting
Forecasts

Date	Actual	Forecast
Oct-12		224,302
Nov-12		442,622
Dec-12		702,593
Jan-13		962,555
Feb-13		960,274
Mar-13		813,427
Apr-13		600,103
May-13		351,656
Jun-13		213,053
Jul-13		148,238
Aug-13		144,625
Sep-13		153,406
Oct-13		231,137
Nov-13		447,496
Dec-13		705,188
Jan-14		963,602
Feb-14		960,459
Mar-14		814,172
Apr-14		602,585
May-14		355,523
Jun-14		217,744
Jul-14		153,249
Aug-14		149,773
Sep-14		158,915
Oct-14		236,028
Nov-14		451,196
Dec-14		707,589
Jan-15		964,998
Feb-15		961,503
Mar-15		815,890
Apr-15		605,568
May-15		359,669
Jun-15		222,752
Jul-15		158,837
Aug-15		155,815
Sep-15		165,162
Oct-15		241,898

Split-year
Nov-Oct

Nov. 2004- Oct. 2005	5,978,694	5,909,245
Nov. 2005- Oct. 2006	5,926,553	5,772,510
Nov. 2006- Oct. 2007	5,830,065	5,712,710
Nov. 2007- Oct. 2008	5,759,891	5,709,581
Nov. 2008- Oct. 2009		5,582,205
Nov. 2009- Oct. 2010		5,569,235
Nov. 2010- Oct. 2011		5,616,543
Nov. 2011- Oct. 2012		5,671,432
Nov. 2012- Oct. 2013		5,723,688
Nov. 2013- Oct. 2014		5,764,734
Nov. 2014- Oct. 2015		5,810,876

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Heating
alpha value calculation

$$P_{c,T+j} = \alpha \cdot P_{1,T+j} + (1-\alpha) \cdot P_{2,T+j} \qquad \alpha = \frac{VAR[e_{2,t}] - COV[e_{1,t}, e_{2,t}]}{VAR[e_{1,t}] + VAR[e_{2,t}] - 2COV[e_{1,t}, e_{2,t}]}$$

	V[E1]	V[E2}	C[E1,E2]	**alpha**
Reg	1.52E+09	1675245254	1.29E+09	0.63041

Regression Forecast Error

Date	Sales E1	Volume E2
Jan-90	0	39135.89
Feb-90	-26715.30301	3389.55
Mar-90	3805.214601	-44881.23
Apr-90	41202.01965	50197.42
May-90	3224.884825	7539.023
Jun-90	12748.25401	49506.15
Jul-90	-6111.841901	20073.5
Aug-90	-20602.0058	13135.65
Sep-90	6171.156246	40425.05
Oct-90	-17729.02851	5661.042
Nov-90	59415.83258	49111.51
Dec-90	-1028.90324	-42438.95
Jan-91	-37939.65443	-100651.5
Feb-91	4936.72683	-17665.19
Mar-91	16860.11195	25361.45
Apr-91	-2947.409329	11945.82
May-91	47188.7947	62519.94
Jun-91	-22273.30317	-6364.533
Jul-91	-13373.48719	7217.354
Aug-91	-18452.40891	7169.643
Sep-91	-9527.456914	11334.01
Oct-91	11536.783	28812.76
Nov-91	13485.79295	7281.778
Dec-91	-59175.06221	-80912.26
Jan-92	48863.60335	35614.53
Feb-92	86030.35356	77837.25
Mar-92	-58239.2585	-86069.7
Apr-92	24685.44361	49526.82
May-92	9595.191068	11935.81
Jun-92	-18040.39214	-10184.83
Jul-92	-412.1732745	23129.57
Aug-92	-9701.173997	308.8685
Sep-92	-7342.556586	5011.849
Oct-92	2182.560961	14164.24
Nov-92	-9082.079598	-22019.27
Dec-92	-32121.30691	-27511.74
Jan-93	26234.16994	22827.76
Feb-93	-55663.50055	-77200.52
Mar-93	15014.6704	22244.25
Apr-93	35531.33908	51466.13

Regression Forecast Error

Date	Sales E1	Volume E2
May-93	-4374.411845	-14147.49
Jun-93	-8965.758406	10029.31
Jul-93	-12343.09976	7201.676
Aug-93	-20733.06782	-8091.389
Sep-93	-10408.6252	6892.635
Oct-93	1051.992448	19481.64
Nov-93	-6218.372442	-12707.72
Dec-93	-37504.07023	-23098.9
Jan-94	55018.71927	48177.75
Feb-94	-34837.66883	-56406.78
Mar-94	-62920.77897	-39456.85
Apr-94	-4186.693791	25791.89
May-94	11116.99796	13427.66
Jun-94	-14742.29177	2091.893
Jul-94	-14763.14976	-873.3575
Aug-94	-20053.37125	-8175.952
Sep-94	-1518.195711	14465.14
Oct-94	78728.74288	96501.22
Nov-94	128417.6989	108614.6
Dec-94	174477.7724	154394.6
Jan-95	67486.60035	19422.21
Feb-95	-1595.258206	-14138.79
Mar-95	6754.470087	22233.32
Apr-95	-3231.181997	8848.934
May-95	-34913.77438	-33238.64
Jun-95	-706.8058476	27989.79
Jul-95	6976.610514	19902.52
Aug-95	-10915.64111	-1639.603
Sep-95	-5491.539551	7136.026
Oct-95	-41448.3345	-21251.41
Nov-95	-28320.38969	-16932.51
Dec-95	-40816.24849	-15673.57
Jan-96	10728.02433	15780.46
Feb-96	17101.71547	41228.79
Mar-96	-27200.64787	-21100.32
Apr-96	-35338.38281	-18535.79
May-96	21371.57039	33490.14
Jun-96	-9774.951856	-111.1968
Jul-96	8607.424684	14562.07
Aug-96	2099.697259	7632.408
Sep-96	-6301.594889	-4434.165
Oct-96	-2345.275168	2622.481
Nov-96	22009.93068	7943.278
Dec-96	-8475.752764	-12315.41
Jan-97	-39268.45998	-42701.47
Feb-97	82889.15606	111366.3
Mar-97	-52989.41196	-67195.24
Apr-97	-10061.75142	24622.7
May-97	3283.085934	10055.9
Jun-97	-3751.36076	0.101236
Jul-97	2317.799228	10393.75
Aug-97	-3992.476678	-222.3353
Sep-97	-10937.4609	-6063.007
Oct-97	323.6596166	17001.47
Nov-97	-5803.169812	-8189.605
Dec-97	24937.38385	41623.26

Regression Forecast Error

Date	Sales E1	Volume E2
Jan-98	95644.20631	92958.08
Feb-98	-33985.06441	-32382.51
Mar-98	20558.54606	27743.27
Apr-98	-3245.008205	28169.96
May-98	10910.92852	4837.79
Jun-98	5872.624701	7965.896
Jul-98	8032.409915	9092.802
Aug-98	-1030.367692	-1953.234
Sep-98	-6798.346062	-5159.245
Oct-98	-5304.05129	10068.27
Nov-98	23409.67546	22185.23
Dec-98	-114143.7036	-93668.45
Jan-99	56039.09403	91116.52
Feb-99	-97660.04302	-91296.62
Mar-99	37094.02749	90714.5
Apr-99	-32247.68595	-19538.05
May-99	-14706.12012	-7023.985
Jun-99	-34940.09693	-23722.95
Jul-99	-7784.773735	3107.59
Aug-99	-15920.67131	-13154.11
Sep-99	368.4344535	5956.285
Oct-99	-1470.541152	14377.13
Nov-99	-2146.105579	2067.768
Dec-99	-53878.87331	-28294.36
Jan-00	-5163.880628	37816.38
Feb-00	114805.1789	124273.1
Mar-00	-1152.60253	5368.153
Apr-00	-36928.96887	-35105.62
May-00	30327.70982	42864.58
Jun-00	35573.93532	26130.9
Jul-00	33665.77195	16655.39
Aug-00	11007.33614	-7701.785
Sep-00	9026.596372	-1650.015
Oct-00	18636.07719	15340.33
Nov-00	33699.54331	20412.87
Dec-00	38117.2711	37857.12
Jan-01	38105.44214	38991.43
Feb-01	-42684.89645	-39926.05
Mar-01	6712.276077	23864.61
Apr-01	10043.02131	26629.95
May-01	13042.40594	2560.087
Jun-01	23001.71994	10747.24
Jul-01	7339.131324	-7364.366
Aug-01	7269.061242	-1824.44
Sep-01	-3980.238603	-8750.915
Oct-01	-23410.27351	-11640.49
Nov-01	16016.09362	23675.84
Dec-01	-57324.3178	-33163.14
Jan-02	25654.51136	66407.48
Feb-02	41833.40355	65400.83
Mar-02	-10144.51887	-2409.925
Apr-02	-56977.22166	-32616.96
May-02	51096.2356	57877.13
Jun-02	35092.42177	22568.76
Jul-02	51894.84361	33395.08
Aug-02	-12541.12679	-32519.47

APPENDIX A
RHalpha

Regression Forecast Error

Date	Sales E1	Volume E2
Sep-02	4705.815922	-794.6229
Oct-02	-40349.96822	-37004.76
Nov-02	27644.23459	41336.23
Dec-02	104638.745	125031.4
Jan-03	-58374.53209	-51360.92
Feb-03	3192.449299	53430.76
Mar-03	76926.74186	112346.8
Apr-03	5878.705985	12988.4
May-03	27568.00455	19100.16
Jun-03	11291.14605	-9212.177
Jul-03	-5386.798548	-16929.14
Aug-03	11361.55061	3272.687
Sep-03	194.7599245	-5876.748
Oct-03	41626.51121	50570.23
Nov-03	-894.2372469	8594.939
Dec-03	28996.47253	64619.45
Jan-04	-3263.268144	21812
Feb-04	46314.43027	120644.5
Mar-04	-9826.034009	-11776.62
Apr-04	38711.06681	64441.24
May-04	-39039.48529	-52472.98
Jun-04	-2542.727014	-4732.606
Jul-04	17972.9136	4509.839
Aug-04	11142.74424	-658.4586
Sep-04	7617.962139	432.1923
Oct-04	-15437.31441	-13620.96
Nov-04	-11549.76621	-8201.529
Dec-04	-74238.50933	-30693.06
Jan-05	-11800.08281	43184.01
Feb-05	-39658.06572	35212.86
Mar-05	59691.75052	81379.11
Apr-05	-30931.27456	-11205.36
May-05	5116.145981	-3593.066
Jun-05	7944.032741	9545.944
Jul-05	23045.88835	4487.356
Aug-05	3731.400419	-14072.37
Sep-05	9363.149266	-5026.046
Oct-05	-37804.86287	-31568.63
Nov-05	-18180.21837	842.6518
Dec-05	46253.40788	99176.44
Jan-06	13076.04329	53495.5
Feb-06	-156858.1905	-104305
Mar-06	37321.3312	104999
Apr-06	-23302.86542	-13146.93
May-06	-15362.68856	-9931.151
Jun-06	16252.49593	14882.25
Jul-06	17146.7369	145.5625
Aug-06	1632.871608	-8248.949
Sep-06	8208.974507	5081.597
Oct-06	528.9618373	11052.5
Nov-06	-464.821703	24567.76
Dec-06	-23559.8122	21953.89
Jan-07	-129778.8104	-71785.08
Feb-07	42900.12732	142509
Mar-07	13370.33572	55106.72
Apr-07	-33897.54552	-22986.92

APPENDIX A
RHalpha

Regression Forecast Error

Date	Sales E1	Volume E2
May-07	-4213.142703	10787.99
Jun-07	-3485.4977	-10397.1
Jul-07	14895.5707	0.010515
Aug-07	6267.565254	-4067.762
Sep-07	5964.138637	2140.737
Oct-07	-39698.85407	-30474.79
Nov-07	-59988.88556	-36809.04
Dec-07	18475.13225	86816.81
Jan-08	-73632.82207	-14028.39
Feb-08	-113597.8094	-4925.608
Mar-08	-77810.64792	-16519.77
Apr-08	-7141.053458	50596.21
May-08	3305.856323	3677.528
Jun-08	-1849.925493	-13312.62
Jul-08	15215.66747	6891.155
Aug-08	2226.632574	-7370.541
Sep-08	11324.29983	1710.972
Oct-08	-15764.4382	-6417.135
Nov-08	-48820.66486	-19077.75
Dec-08	-38913.54185	40849.88
Jan-09	-18537.3787	49365.19
Feb-09	-56728.58847	36384.19
Mar-09	-5076.846138	47851
Apr-09	-39145.33084	1569.395
May-09	-22982.25273	-13516.05

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Heating Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined
May-02	390,828	339,731	332,950	337,225
Jun-02	243,301	208,209	220,732	212,837
Jul-02	174,631	122,736	141,236	129,573
Aug-02	103,779	116,320	136,298	123,704
Sep-02	124,996	120,290	125,790	122,323
Oct-02	171,334	211,684	208,339	210,447
Nov-02	470,883	443,238	429,546	438,178
Dec-02	820,094	715,455	695,062	707,918
Jan-03	962,280	1,020,655	1,013,641	1,018,062
Feb-03	1,041,455	1,038,262	988,024	1,019,695
Mar-03	942,314	865,387	829,967	852,296
Apr-03	632,280	626,401	619,292	623,774
May-03	391,277	363,709	372,177	366,839
Jun-03	216,386	205,094	225,598	212,672
Jul-03	132,734	138,121	149,663	142,387
Aug-03	124,068	112,706	120,795	115,696
Sep-03	123,690	123,495	129,566	125,739
Oct-03	247,762	206,136	197,192	202,830
Nov-03	453,539	454,433	444,944	450,926
Dec-03	802,930	773,933	738,310	760,767
Jan-04	1,027,048	1,030,311	1,005,236	1,021,043
Feb-04	1,124,236	1,077,922	1,003,592	1,050,450
Mar-04	864,527	874,353	876,304	875,074
Apr-04	686,242	647,531	621,801	638,021
May-04	332,290	371,329	384,763	376,294
Jun-04	205,247	207,790	209,980	208,599
Jul-04	138,174	120,201	133,664	125,177
Aug-04	127,581	116,438	128,239	120,800
Sep-04	126,722	119,104	126,290	121,760
Oct-04	213,017	228,455	226,638	227,783
Nov-04	449,382	460,932	457,583	459,694
Dec-04	700,239	774,477	730,932	758,383
Jan-05	1,030,634	1,042,435	987,450	1,022,113
Feb-05	1,071,196	1,110,854	1,035,983	1,083,182
Mar-05	937,823	878,132	856,444	870,116
Apr-05	647,088	678,020	658,294	670,729
May-05	354,166	349,050	357,759	352,269
Jun-05	223,243	215,299	213,697	214,707
Jul-05	144,727	121,681	140,240	128,540
Aug-05	116,777	113,046	130,850	119,626
Sep-05	126,895	117,532	131,921	122,850
Oct-05	176,523	214,328	208,092	212,023
Nov-05	437,705	455,885	436,862	448,854
Dec-05	799,100	752,847	699,924	733,287
Jan-06	1,061,605	1,048,529	1,008,109	1,033,590
Feb-06	903,416	1,060,275	1,007,721	1,040,851
Mar-06	947,382	910,061	842,383	885,048
Apr-06	623,246	646,549	636,393	642,796
May-06	338,746	354,109	348,678	352,102
Jun-06	218,939	202,686	204,057	203,193
Jul-06	137,992	120,845	137,846	127,129
Aug-06	114,409	112,776	122,658	116,428
Sep-06	132,746	124,537	127,664	125,692
Oct-06	211,267	210,738	200,214	206,848
Nov-06	443,574	444,039	419,006	434,787
Dec-06	730,869	754,429	708,915	737,607
Jan-07	920,793	1,050,572	992,578	1,029,138
Feb-07	1,088,643	1,045,743	946,134	1,008,928
Mar-07	947,321	933,950	892,214	918,525
Apr-07	615,140	649,037	638,127	645,005

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Heating Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined
May-07	354,917	359,130	344,129	353,586
Jun-07	194,206	197,691	204,603	200,245
Jul-07	130,106	115,211	130,106	120,716
Aug-07	115,203	108,936	119,271	112,755
Sep-07	124,051	118,087	121,910	119,500
Oct-07	165,242	204,941	195,717	201,532
Nov-07	395,640	455,628	432,449	447,061
Dec-07	809,271	790,796	722,454	765,538
Jan-08	952,104	1,025,737	966,133	1,003,708
Feb-08	995,983	1,109,581	1,000,909	1,069,417
Mar-08	845,485	923,296	862,005	900,643
Apr-08	652,882	660,023	602,286	638,684
May-08	359,481	356,175	355,803	356,038
Jun-08	186,125	187,975	199,438	192,211
Jul-08	128,637	113,422	121,746	116,498
Aug-08	113,713	111,486	121,083	115,033
Sep-08	127,931	116,606	126,220	120,159
Oct-08	192,638	208,402	199,055	204,948
Nov-08	400,619	449,439	419,696	438,447
Dec-08	744,018	782,932	703,168	753,452
Jan-09	1,029,692	1,048,229	980,327	1,023,133
Feb-09	1,030,987	1,087,716	994,603	1,053,302
Mar-09	868,116	873,193	820,265	853,632
Apr-09	613,281	652,427	611,712	637,379
May-09	321,758	344,740	335,274	341,241
Jun-09		197,205	183,205	192,030
Jul-09		117,899	117,172	117,630
Aug-09		108,741	109,936	109,183
Sep-09		119,036	116,584	118,129
Oct-09		211,918	190,264	203,915
Nov-09		452,215	421,303	440,790
Dec-09		770,389	693,361	741,920
Jan-10		1,066,090	968,538	1,030,036
Feb-10		1,084,684	970,677	1,042,548
Mar-10		908,880	828,502	879,174
Apr-10		661,240	601,158	639,034
May-10		349,567	333,445	343,608
Jun-10		195,926	189,396	193,513
Jul-10		109,896	121,580	114,215
Aug-10		106,420	117,738	110,603
Sep-10		112,735	124,751	117,176
Oct-10		212,503	198,786	207,433
Nov-10		459,424	430,122	448,594
Dec-10		786,025	698,180	753,558
Jan-11		1,087,596	965,126	1,042,333
Feb-11		1,112,117	965,289	1,057,851
Mar-11		920,871	816,622	882,341
Apr-11		675,527	595,336	645,889
May-11		355,376	339,390	349,468
Jun-11		194,871	197,972	196,017
Jul-11		106,021	131,570	115,464
Aug-11		103,431	127,679	112,393
Sep-11		111,806	135,757	120,658
Oct-11		220,201	213,499	217,724
Nov-11		468,474	435,290	456,209
Dec-11		803,692	698,945	764,979
Jan-12		1,110,960	961,680	1,055,788
Feb-12		1,136,313	961,428	1,071,677
Mar-12		940,603	814,077	893,840
Apr-12		691,202	597,661	656,630

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Heating Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined
May-12		360,361	346,675	355,303
Jun-12		195,648	206,821	199,778
Jul-12		104,936	141,414	118,418
Aug-12		101,227	137,496	114,632
Sep-12		110,485	145,642	123,479
Oct-12		223,370	224,302	223,714
Nov-12		477,001	442,622	464,295
Dec-12		821,249	702,593	777,395
Jan-13		1,134,387	962,555	1,070,879
Feb-13		1,160,000	960,274	1,086,183
Mar-13		961,649	813,427	906,868
Apr-13		706,263	600,103	667,028
May-13		365,429	351,656	360,338
Jun-13		196,580	213,053	202,669
Jul-13		103,411	148,238	119,978
Aug-13		99,175	144,625	115,973
Sep-13		109,437	153,406	125,687
Oct-13		225,318	231,137	227,469
Nov-13		485,708	447,496	471,585
Dec-13		839,303	705,188	789,735
Jan-14		1,158,766	963,602	1,086,635
Feb-14		1,184,981	960,459	1,102,000
Mar-14		983,252	814,172	920,762
Apr-14		720,858	602,585	677,145
May-14		370,508	355,523	364,970
Jun-14		197,384	217,744	204,909
Jul-14		101,551	153,249	120,658
Aug-14		97,032	149,773	116,524
Sep-14		107,924	158,915	126,770
Oct-14		226,679	236,028	230,134
Nov-14		494,249	451,196	478,337
Dec-14		857,173	707,589	801,888
Jan-15		1,183,482	964,998	1,102,733
Feb-15		1,210,553	961,503	1,118,507
Mar-15		1,004,830	815,890	935,000
Apr-15		735,361	605,568	687,391
May-15		375,631	359,669	369,732
Jun-15		198,034	222,752	207,169
Jul-15		99,630	158,837	121,512
Aug-15		94,989	155,815	117,470
Sep-15		106,222	165,162	128,006
Oct-15		227,970	241,898	233,117
		-		

Split-year Nov-Oct	Actual	Customers*Use Per	Volume Forecast	Combined
Nov. 2004- Oct. 2005	5,978,694	6,075,784	5,909,245	6,014,233
Nov. 2005- Oct. 2006	5,926,553	5,999,836	5,772,510	5,915,819
Nov. 2006- Oct. 2007	5,830,065	5,981,765	5,712,710	5,882,325
Nov. 2007- Oct. 2008	5,759,891	6,059,129	5,709,581	5,929,940
Nov. 2008- Oct. 2009		5,993,475	5,582,205	5,841,473
Nov. 2009- Oct. 2010		6,030,544	5,569,235	5,860,048
Nov. 2010- Oct. 2011		6,133,265	5,616,543	5,942,290
Nov. 2011- Oct. 2012		6,247,271	5,671,432	6,034,447
Nov. 2012- Oct. 2013		6,359,899	5,723,688	6,124,762
Nov. 2013- Oct. 2014		6,473,945	5,764,734	6,211,828
Nov. 2014- Oct. 2015		6,588,124	5,810,876	6,300,861

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Non-Heat Customers Forecasting

Regression Model:	AN4b13							
Dependent Variable:	CUSRN							
Independent Variable:	Intercept	Date	d2	d3	d4	d9	d10	

Model	obNum	DFE	rsq	DW	SSE	MSE
AN4b13	0	68	0.994642238	1.988278827	77858.7853	1144.98214

Model	R_MSE	SBC	AIC	Nor	NorPct
AN4b13	33.83758467	777.9086464	759.2627797	0	0

model		Intercept	Date	d2	d3	d4
AN4b13	DF	1	1	1	1	1
AN4b13	Estimate	16167.58493	-0.649627409	-39.11444362	-75.472986	-62.944524
AN4b13	StdErr	330.4074675	0.019552491	13.03553299	14.4584368	12.5190614
AN4b13	tValue	48.93226249	-33.22478939	-3.000601789	-5.2199962	-5.0278948
AN4b13	Probt	9.75678E-55	9.11761E-44	0.003764335	1.8436E-06	3.8439E-06

model		d9	d10	AR1
AN4b13	DF	1	1	1
AN4b13	Estimate	53.4151631	55.90950415	-0.729067404
AN4b13	StdErr	12.8333604	12.81829705	0.085597301
AN4b13	tValue	4.162211724	4.361695154	-8.517411159
AN4b13	Probt	9.06755E-05	4.48572E-05	2.52056E-12

Forecasts

Date	Actual	Forecast
Jan-03		
Feb-03	5,850	5,905
Mar-03	5,796	5,810
Apr-03	5,790	5,803
May-03	5,869	5,848
Jun-03	5,867	5,854
Jul-03	5,797	5,848
Aug-03	5,883	5,791
Sep-03	5,982	5,901
Oct-03	5,943	5,932
Nov-03	5,809	5,840
Dec-03	5,782	5,778
Jan-04	5,833	5,752
Feb-04	5,734	5,745
Mar-04	5,659	5,661
Apr-04	5,651	5,639
May-04	5,674	5,682
Jun-04	5,678	5,647
Jul-04	5,599	5,645
Aug-04	5,642	5,582
Sep-04	5,630	5,661
Oct-04	5,602	5,611
Nov-04	5,503	5,527
Dec-04	5,475	5,491
Jan-05	5,516	5,464
Feb-05	5,406	5,449
Mar-05	5,339	5,358
Apr-05	5,350	5,341
May-05	5,413	5,398
Jun-05	5,393	5,393
Jul-05	5,327	5,373
Aug-05	5,336	5,319
Sep-05	5,404	5,374
Oct-05	5,363	5,382
Nov-05	5,264	5,288
Dec-05	5,249	5,252
Jan-06	5,224	5,236
Feb-06	5,188	5,172
Mar-06	5,083	5,135
Apr-06	5,072	5,091
May-06	5,085	5,132
Jun-06	5,092	5,089
Jul-06	5,090	5,089
Aug-06	5,099	5,082
Sep-06	5,100	5,136
Oct-06	5,080	5,096
Nov-06	5,021	5,018
Dec-06	5,001	5,011

Forecasts

Date	Actual	Forecast
Jan-07	4,988	4,991
Feb-07	4,950	4,936
Mar-07	4,968	4,897
Apr-07	4,922	4,943
May-07	4,993	4,958
Jun-07	4,951	4,958
Jul-07	4,892	4,923
Aug-07	4,904	4,874
Sep-07	4,860	4,930
Oct-07	4,838	4,857
Nov-07	4,803	4,777
Dec-07	4,819	4,787
Jan-08	4,823	4,793
Feb-08	4,800	4,751
Mar-08	4,748	4,723
Apr-08	4,749	4,717
May-08	4,764	4,767
Jun-08	4,705	4,726
Jul-08	4,690	4,679
Aug-08	4,679	4,662
Sep-08	4,701	4,702
Oct-08	4,690	4,677
Nov-08	4,605	4,605
Dec-08	4,574	4,579
Jan-09	4,562	4,551
Feb-09	4,489	4,497
Mar-09	4,409	4,432
Apr-09	4,387	4,406
May-09	4,400	4,439
Jun-09		4,397
Jul-09		4,390
Aug-09		4,378
Sep-09		4,418
Oct-09		4,406
Nov-09		4,334
Dec-09		4,317
Jan-10		4,298
Feb-10		4,241
Mar-10		4,187
Apr-10		4,180
May-10		4,224
Jun-10		4,204
Jul-10		4,185
Aug-10		4,165
Sep-10		4,199
Oct-10		4,182
Nov-10		4,106
Dec-10		4,086
Jan-11		4,066
Feb-11		4,007
Mar-11		3,952
Apr-11		3,945
May-11		3,988
Jun-11		3,968
Jul-11		3,949
Aug-11		3,929
Sep-11		3,962
Oct-11		3,945
Nov-11		3,869
Dec-11		3,849
Jan-12		3,829
Feb-12		3,770
Mar-12		3,715
Apr-12		3,707
May-12		3,751
Jun-12		3,730
Jul-12		3,711
Aug-12		3,691
Sep-12		3,724
Oct-12		3,707
Nov-12		3,631
Dec-12		3,612
Jan-13		3,591
Feb-13		3,532
Mar-13		3,478
Apr-13		3,470
May-13		3,513
Jun-13		3,493

Forecasts

Date	Actual	Forecast
Jul-13		3,474
Aug-13		3,454
Sep-13		3,487
Oct-13		3,470
Nov-13		3,394
Dec-13		3,374
Jan-14		3,354
Feb-14		3,295
Mar-14		3,241
Apr-14		3,233
May-14		3,276
Jun-14		3,256
Jul-14		3,237
Aug-14		3,217
Sep-14		3,250
Oct-14		3,233
Nov-14		3,157
Dec-14		3,137
Jan-15		3,117
Feb-15		3,058
Mar-15		3,003
Apr-15		2,996
May-15		3,039
Jun-15		3,019
Jul-15		3,000
Aug-15		2,979
Sep-15		3,013
Oct-15		2,996

Split-year
Nov-Oct

Nov. 2004- Oct. 2005	5,402	5,406
Nov. 2005- Oct. 2006	5,136	5,150
Nov. 2006- Oct. 2007	4,941	4,941
Nov. 2007- Oct. 2008	4,748	4,730
Nov. 2008- Oct. 2009		4,458
Nov. 2009- Oct. 2010		4,226
Nov. 2010- Oct. 2011		3,992
Nov. 2011- Oct. 2012		3,754
Nov. 2012- Oct. 2013		3,517
Nov. 2013- Oct. 2014		3,280
Nov. 2014- Oct. 2015		3,043

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Non-Heat Use Per Forecasting

Regression Model:	BN4b23								
Dependent Variable:	USERN								
Independent Variable:	Intercept	BDDA	prcG_1	d2	d8	d9	d10	d11	

Model	obNum	DFE	rsq	DW	SSE	MSE
BN4b23	0	66	0.979466998	1.663013696	0.70757935	0.0107209

Model	R_MSE	SBC	AIC	Nor	NorPct
BN4b23	0.10354178	-93.64786	-116.9551964	0	0

model		Intercept	BDDA	prcG_1	d2	d8
BN4b23	DF	1	1	1	1	1
BN4b23	Estimate	1.501272	0.001335847	-0.013557813	-0.1432105	-0.1684024
BN4b23	StdErr	0.097397	3.74358E-05	0.005998347	0.04408493	0.05354914
BN4b23	tValue	15.41399	35.68371354	-2.323609766	-3.2485143	-3.1448204
BN4b23	Probt	1.48E-23	7.22525E-45	0.023236203	0.00182612	0.00249158

model		d9	d10	d11	AR11	AR14
BN4b23	DF	1	1	1	1	1
BN4b23	Estimate	-0.241872	-0.28262799	-0.234606369	-0.260351	0.34226912
BN4b23	StdErr	0.056776	0.04952091	0.04634033	0.116185576	0.12011165
BN4b23	tValue	-4.260101	-5.707245448	-5.062682267	-2.2408165	2.84959138
BN4b23	Probt	6.63E-05	2.95015E-07	3.54483E-06	0.02840826	0.00583378

Forecasts

Date	Actual	Forecast
Jan-03		
Feb-03	2.98	3.10
Mar-03	2.84	2.89
Apr-03	2.44	2.49
May-03	2.23	2.04
Jun-03	1.42	1.60
Jul-03	1.24	1.36
Aug-03	1.20	1.09
Sep-03	1.12	1.13
Oct-03	1.42	1.40
Nov-03	1.90	1.91
Dec-03	2.60	2.59
Jan-04	3.02	3.13
Feb-04	3.04	3.01
Mar-04	2.80	2.69
Apr-04	2.46	2.41
May-04	1.87	1.82
Jun-04	1.53	1.50
Jul-04	1.31	1.32
Aug-04	1.20	1.16
Sep-04	1.20	1.17
Oct-04	1.40	1.37
Nov-04	1.81	1.87
Dec-04	2.37	2.54
Jan-05	3.00	3.03
Feb-05	2.90	2.88
Mar-05	3.00	2.85
Apr-05	2.25	2.35
May-05	1.88	1.88
Jun-05	1.54	1.55
Jul-05	1.34	1.37
Aug-05	1.06	1.12
Sep-05	1.19	1.07
Oct-05	1.34	1.23
Nov-05	1.82	1.71
Dec-05	2.57	2.55
Jan-06	3.05	2.82
Feb-06	2.71	2.75
Mar-06	2.77	2.66
Apr-06	2.38	2.24
May-06	1.82	1.71
Jun-06	1.65	1.56
Jul-06	1.31	1.31
Aug-06	1.06	1.17
Sep-06	1.19	1.13
Oct-06	1.41	1.39
Nov-06	1.80	1.71
Dec-06	2.53	2.39
Jan-07	2.78	2.72
Feb-07	2.87	2.83
Mar-07	2.74	2.77
Apr-07	2.12	2.36
May-07	1.82	1.85
Jun-07	1.50	1.43
Jul-07	1.21	1.30
Aug-07	1.05	1.07
Sep-07	1.09	1.10
Oct-07	1.25	1.30
Nov-07	1.72	1.85

Forecasts

Date	Actual	Forecast
Dec-07	2.45	2.71
Jan-08	2.72	2.95
Feb-08	2.74	2.63
Mar-08	2.52	2.64
Apr-08	2.29	2.30
May-08	1.89	1.85
Jun-08	1.53	1.54
Jul-08	1.31	1.27
Aug-08	1.10	1.08
Sep-08	0.90	1.13
Oct-08	1.32	1.35
Nov-08	1.79	1.82
Dec-08	2.56	2.53
Jan-09	3.19	3.08
Feb-09	2.78	2.84
Mar-09	2.65	2.69
Apr-09	2.33	2.25
May-09	1.84	1.84
Jun-09		1.53
Jul-09		1.30
Aug-09		1.03
Sep-09		1.10
Oct-09		1.37
Nov-09		1.95
Dec-09		2.65
Jan-10		2.97
Feb-10		2.80
Mar-10		2.68
Apr-10		2.38
May-10		1.88
Jun-10		1.50
Jul-10		1.29
Aug-10		1.09
Sep-10		1.12
Oct-10		1.43
Nov-10		1.90
Dec-10		2.60
Jan-11		2.91
Feb-11		2.75
Mar-11		2.71
Apr-11		2.33
May-11		1.87
Jun-11		1.50
Jul-11		1.32
Aug-11		1.12
Sep-11		1.15
Oct-11		1.41
Nov-11		1.89
Dec-11		2.57
Jan-12		2.93
Feb-12		2.78
Mar-12		2.72
Apr-12		2.35
May-12		1.87
Jun-12		1.53
Jul-12		1.34
Aug-12		1.13
Sep-12		1.13
Oct-12		1.41
Nov-12		1.88
Dec-12		2.59
Jan-13		2.95
Feb-13		2.79
Mar-13		2.72
Apr-13		2.35
May-13		1.88
Jun-13		1.53
Jul-13		1.34
Aug-13		1.11
Sep-13		1.13
Oct-13		1.40
Nov-13		1.89
Dec-13		2.60
Jan-14		2.96
Feb-14		2.79
Mar-14		2.72
Apr-14		2.34
May-14		1.88
Jun-14		1.53
Jul-14		1.34
Aug-14		1.11
Sep-14		1.13
Oct-14		1.41
Nov-14		1.90
Dec-14		2.60
Jan-15		2.95
Feb-15		2.78
Mar-15		2.71
Apr-15		2.34

Forecasts

Date	Actual	Forecast
May-15		1.88
Jun-15		1.53
Jul-15		1.34
Aug-15		1.11
Sep-15		1.13
Oct-15		1.41

Split-year
Nov-Oct

Nov. 2004- Oct. 2005	23.67	23.74
Nov. 2005- Oct. 2006	23.74	22.99
Nov. 2006- Oct. 2007	22.77	22.84
Nov. 2007- Oct. 2008	22.49	23.28
Nov. 2008- Oct. 2009		23.39
Nov. 2009- Oct. 2010		23.75
Nov. 2010- Oct. 2011		23.57
Nov. 2011- Oct. 2012		23.65
Nov. 2012- Oct. 2013		23.67
Nov. 2013- Oct. 2014		23.70
Nov. 2014- Oct. 2015		23.70

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Non-Heat Volume Forecasting

Regression Model:		CN4a11					
Dependent Variable:		VOLRN					
Independent Variable:		Intercept	VOLRN_1	BDDA	prcG	GSPR	PIP
		d1	d3	d12			

Model		obNum	DFE	rsq	DW	SSE	MSE
CN4a11		0	66	0.980658	2.082440655	19253810.4	291724.4

Model	R_MSE	SBC	AIC	Nor		NorPct	
CN4a11	540.115173	1206.05	1182.742		0	0	

Model		Intercept	VOLRN_1	BDDA	prcG	GSPR	PIP
CN4a11	DF	1	1	1	1	1	1
CN4a11	Estimate	5660.441	0.299798	4.715507733	-104.64205	0.21302613	-260.222
CN4a11	StdErr	3761.88	0.039887	0.357602304	46.4750326	0.10158107	52.04951
CN4a11	tValue	1.504684	7.516274	13.18645791	-2.2515755	2.09710455	-4.99952
CN4a11	Probt	0.137176	1.94E-10	3.65585E-20	0.02768325	0.03981932	4.5E-06

Model		d1	d3	d12	AR11
CN4a11	DF	1	1	1	1
CN4a11	Estimate	1414.05	500.9936	1547.468332	-0.3496845
CN4a11	StdErr	262.4867	210.184	265.984939	0.12405327
CN4a11	tValue	5.387131	2.383595	5.817879528	-2.8188252
CN4a11	Probt	1.03E-06	0.020029	1.90779E-07	0.00635557

Forecasts

Date	Actual	Forecast
Jan-03		
Feb-03	17,447	17,471
Mar-03	16,470	16,457
Apr-03	14,144	14,190
May-03	13,115	11,721
Jun-03	8,344	9,776
Jul-03	7,165	7,387
Aug-03	7,051	7,018
Sep-03	6,698	7,175
Oct-03	8,411	8,468
Nov-03	11,060	10,590
Dec-03	15,057	14,358
Jan-04	17,602	17,430
Feb-04	17,455	16,810
Mar-04	15,825	15,518
Apr-04	13,904	13,658
May-04	10,629	10,386
Jun-04	8,687	8,784
Jul-04	7,327	7,252
Aug-04	6,789	6,670
Sep-04	6,743	7,011
Oct-04	7,816	8,079
Nov-04	9,952	10,235
Dec-04	12,984	13,870
Jan-05	16,544	16,655
Feb-05	15,650	16,099
Mar-05	16,000	15,525
Apr-05	12,033	13,166
May-05	10,202	10,339
Jun-05	8,314	8,891
Jul-05	7,154	7,078
Aug-05	5,631	6,308
Sep-05	6,415	5,979
Oct-05	7,177	7,339
Nov-05	9,585	8,950
Dec-05	13,495	13,308
Jan-06	15,912	14,947
Feb-06	14,045	14,515
Mar-06	14,097	13,539
Apr-06	12,083	11,826
May-06	9,253	9,597
Jun-06	8,398	7,920
Jul-06	6,670	6,444
Aug-06	5,397	6,116
Sep-06	6,085	5,760
Oct-06	7,145	7,265
Nov-06	9,034	8,847
Dec-06	12,667	11,914
Jan-07	13,844	14,033
Feb-07	14,222	13,912
Mar-07	13,609	13,915
Apr-07	10,442	11,292
May-07	9,102	8,935
Jun-07	7,443	6,852
Jul-07	5,933	5,565
Aug-07	5,158	5,325
Sep-07	5,319	5,420
Oct-07	6,033	6,316
Nov-07	8,243	8,506

Forecasts

Date	Actual	Forecast
Dec-07	11,811	12,450
Jan-08	13,108	14,439
Feb-08	13,172	12,894
Mar-08	11,956	12,649
Apr-08	10,877	10,700
May-08	8,994	8,575
Jun-08	7,196	6,606
Jul-08	6,137	5,360
Aug-08	5,167	4,994
Sep-08	4,225	4,891
Oct-08	6,210	5,942
Nov-08	8,238	7,888
Dec-08	11,701	11,511
Jan-09	14,549	14,193
Feb-09	12,500	12,992
Mar-09	11,700	12,115
Apr-09	10,217	10,088
May-09	8,098	7,986
Jun-09		6,517
Jul-09		5,063
Aug-09		4,163
Sep-09		4,662
Oct-09		6,011
Nov-09		7,884
Dec-09		11,854
Jan-10		13,649
Feb-10		12,901
Mar-10		12,654
Apr-10		10,765
May-10		8,487
Jun-10		6,426
Jul-10		4,833
Aug-10		4,239
Sep-10		4,395
Oct-10		5,635
Nov-10		7,677
Dec-10		11,298
Jan-11		13,578
Feb-11		12,907
Mar-11		12,453
Apr-11		10,464
May-11		8,185
Jun-11		6,183
Jul-11		4,799
Aug-11		4,201
Sep-11		4,413
Oct-11		5,783
Nov-11		7,709
Dec-11		11,476
Jan-12		13,697
Feb-12		12,921
Mar-12		12,426
Apr-12		10,420
May-12		8,144
Jun-12		6,194
Jul-12		4,780
Aug-12		4,176
Sep-12		4,403
Oct-12		5,720
Nov-12		7,682
Dec-12		11,439
Jan-13		13,595
Feb-13		12,793
Mar-13		12,283
Apr-13		10,270
May-13		8,001
Jun-13		6,026
Jul-13		4,596
Aug-13		3,985
Sep-13		4,184
Oct-13		5,504
Nov-13		7,455
Dec-13		11,192
Jan-14		13,325
Feb-14		12,511
Mar-14		11,996
Apr-14		9,982
May-14		7,701
Jun-14		5,718
Jul-14		4,281
Aug-14		3,658
Sep-14		3,856
Oct-14		5,172
Nov-14		7,117
Dec-14		10,852
Jan-15		12,977
Feb-15		12,162
Mar-15		11,650
Apr-15		9,638

Forecasts

Date	Actual	Forecast
May-15		7,361
Jun-15		5,383
Jul-15		3,949
Aug-15		3,330
Sep-15		3,529
Oct-15		4,842

Split-year
Nov-Oct

Nov. 2004- Oct. 2005	128,055	131,483
Nov. 2005- Oct. 2006	122,165	120,188
Nov. 2006- Oct. 2007	112,808	112,327
Nov. 2007- Oct. 2008	107,096	108,008
Nov. 2008- Oct. 2009		103,191
Nov. 2009- Oct. 2010		103,722
Nov. 2010- Oct. 2011		101,940
Nov. 2011- Oct. 2012		102,066
Nov. 2012- Oct. 2013		100,358
Nov. 2013- Oct. 2014		96,846
Nov. 2014- Oct. 2015		92,792

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Non-Heat

alpha value calculation

$$P_{c,T+j} = \alpha \cdot P_{1\,T+j} + (1-\alpha) \cdot P_{2,T+j}$$

$$\alpha = \frac{VAR\ [e_{2,t}] - COV\ [e_{1,t}, e_{2,t}]}{VAR\ [e_{1,t}] + VAR\ [e_{2,t}] - 2COV\ [e_{1,t}, e_{2,t}]}$$

	V[E1]	V[E2}	C[E1,E2]	**alpha**
Reg	258484.808	264845.6	190656.752	0.522395

Regression Forecast Error

Date	Sales E1	Volume E2
Jan-03	0	0
Feb-03	-856.4625129	-24.25897526
Mar-03	-314.4413917	13.1357006
Apr-03	-306.3304454	-45.11563021
May-03	1199.625829	1394.346388
Jun-03	-1048.165421	-1431.446819
Jul-03	-793.3480228	-222.4174952
Aug-03	717.4406731	32.21676093
Sep-03	26.93124949	-476.8532451
Oct-03	96.74045695	-57.04781862
Nov-03	-75.2351793	470.1093782
Dec-03	118.0861423	699.1630819
Jan-04	-405.9740726	171.6824025
Feb-04	157.3464362	645.2276978
Mar-04	583.382595	307.9529294
Apr-04	331.5866624	246.4191976
May-04	291.4314431	242.4509797
Jun-04	199.3679717	-97.53809005
Jul-04	-99.26900748	75.16335355
Aug-04	293.5733605	118.8745895
Sep-04	127.572908	-267.6158796
Oct-04	133.8594935	-263.1495779
Nov-04	-388.7072562	-283.452702
Dec-04	-965.3850121	-885.8661685
Jan-05	-33.67689232	-110.2922659
Feb-05	-67.04602606	-448.8155197
Mar-05	725.1685993	474.9753588
Apr-05	-505.0258285	-1133.208994
May-05	56.73608615	-137.0481772
Jun-05	-37.15181419	-576.929631
Jul-05	-198.8896258	75.80606441

Regression Forecast Error

Date	Sales E1	Volume E2
Aug-05	-340.4147176	-676.8080895
Sep-05	689.7981811	435.9369717
Oct-05	563.221	-161.9570779
Nov-05	568.08839	634.4640805
Dec-05	77.09284173	187.281902
Jan-06	1127.460647	964.9416924
Feb-06	-154.4683869	-470.3858838
Mar-06	462.1401036	558.2379981
Apr-06	668.0602143	256.9864477
May-06	461.2457501	-344.1727328
Jun-06	477.2669514	478.2580199
Jul-06	-12.46722731	226.3107938
Aug-06	-535.6884828	-719.742482
Sep-06	302.7415147	324.5031244
Oct-06	51.11789386	-119.5708023
Nov-06	434.2156634	187.9464749
Dec-06	682.2918985	752.8871477
Jan-07	270.737593	-188.9372421
Feb-07	259.9548873	309.7058108
Mar-07	40.65762522	-305.863053
Apr-07	-1235.424401	-849.529313
May-07	-82.72378115	166.7898016
Jun-07	329.5716578	591.0850643
Jul-07	-456.5518653	368.6276491
Aug-07	-51.36440751	-167.4649905
Sep-07	-124.5368633	-101.082925
Oct-07	-265.6405384	-282.7160288
Nov-07	-589.9988541	-263.5901098
Dec-07	-1141.352998	-639.1549238
Jan-08	-1016.559433	-1331.502576
Feb-08	662.5912654	277.5571676
Mar-08	-520.3572464	-693.4978819
Apr-08	43.46644979	177.2395225
May-08	186.1968454	419.2224271
Jun-08	-70.21971311	589.7798141
Jul-08	196.4445719	776.6254456
Aug-08	125.5296264	173.2711273
Sep-08	-1070.866244	-666.3685527
Oct-08	-97.04813579	268.3121005
Nov-08	-135.9310497	349.7998253
Dec-08	121.275553	189.5767655
Jan-09	529.7957324	355.9850599
Feb-09	-273.1837413	-492.1625522
Mar-09	-240.334872	-415.8405834
Apr-09	307.2786382	128.2157923
May-09	-60.59669559	111.4380391

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Non-Heat Sales Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
Jan-03	-	-	-	-
Feb-03	17,447	18,303	17,471	17,906
Mar-03	16,470	16,785	16,457	16,628
Apr-03	14,144	14,451	14,190	14,326
May-03	13,115	11,916	11,721	11,823
Jun-03	8,344	9,392	9,776	9,576
Jul-03	7,165	7,958	7,387	7,685
Aug-03	7,051	6,333	7,018	6,660
Sep-03	6,698	6,671	7,175	6,911
Oct-03	8,411	8,315	8,468	8,388
Nov-03	11,060	11,135	10,590	10,875
Dec-03	15,057	14,939	14,358	14,662
Jan-04	17,602	18,008	17,430	17,732
Feb-04	17,455	17,298	16,810	17,065
Mar-04	15,825	15,242	15,518	15,374
Apr-04	13,904	13,573	13,658	13,613
May-04	10,629	10,337	10,386	10,361
Jun-04	8,687	8,487	8,784	8,629
Jul-04	7,327	7,426	7,252	7,343
Aug-04	6,789	6,495	6,670	6,579
Sep-04	6,743	6,616	7,011	6,804
Oct-04	7,816	7,682	8,079	7,871
Nov-04	9,952	10,340	10,235	10,290
Dec-04	12,984	13,949	13,870	13,911
Jan-05	16,544	16,578	16,655	16,615
Feb-05	15,650	15,717	16,099	15,900
Mar-05	16,000	15,275	15,525	15,395
Apr-05	12,033	12,538	13,166	12,838
May-05	10,202	10,146	10,339	10,238
Jun-05	8,314	8,351	8,891	8,609
Jul-05	7,154	7,353	7,078	7,222
Aug-05	5,631	5,971	6,308	6,132
Sep-05	6,415	5,725	5,979	5,846
Oct-05	7,177	6,613	7,339	6,960
Nov-05	9,585	9,017	8,950	8,985
Dec-05	13,495	13,418	13,308	13,365
Jan-06	15,912	14,785	14,947	14,862
Feb-06	14,045	14,199	14,515	14,350
Mar-06	14,097	13,635	13,539	13,589
Apr-06	12,083	11,415	11,826	11,611
May-06	9,253	8,792	9,597	9,177
Jun-06	8,398	7,921	7,920	7,921
Jul-06	6,670	6,683	6,444	6,569
Aug-06	5,397	5,932	6,116	6,020
Sep-06	6,085	5,782	5,760	5,772
Oct-06	7,145	7,094	7,265	7,175
Nov-06	9,034	8,600	8,847	8,718
Dec-06	12,667	11,985	11,914	11,951
Jan-07	13,844	13,574	14,033	13,793
Feb-07	14,222	13,962	13,912	13,938
Mar-07	13,609	13,568	13,915	13,734
Apr-07	10,442	11,678	11,292	11,493
May-07	9,102	9,185	8,935	9,066
Jun-07	7,443	7,114	6,852	6,989
Jul-07	5,933	6,390	5,565	5,996
Aug-07	5,158	5,209	5,325	5,265
Sep-07	5,319	5,444	5,420	5,433
Oct-07	6,033	6,299	6,316	6,307
Nov-07	8,243	8,833	8,506	8,677
Dec-07	11,811	12,953	12,450	12,713

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Non-Heat Sales Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
Jan-08	13,108	14,124	14,439	14,275
Feb-08	13,172	12,509	12,894	12,693
Mar-08	11,956	12,476	12,649	12,559
Apr-08	10,877	10,834	10,700	10,770
May-08	8,994	8,808	8,575	8,697
Jun-08	7,196	7,266	6,606	6,951
Jul-08	6,137	5,940	5,360	5,663
Aug-08	5,167	5,042	4,994	5,019
Sep-08	4,225	5,296	4,891	5,103
Oct-08	6,210	6,308	5,942	6,133
Nov-08	8,238	8,374	7,888	8,142
Dec-08	11,701	11,579	11,511	11,547
Jan-09	14,549	14,019	14,193	14,102
Feb-09	12,500	12,773	12,992	12,878
Mar-09	11,700	11,940	12,115	12,024
Apr-09	10,217	9,909	10,088	9,995
May-09	8,098	8,158	7,986	8,076
Jun-09		6,729	6,517	6,628
Jul-09		5,716	5,063	5,404
Aug-09		4,524	4,163	4,352
Sep-09		4,859	4,662	4,765
Oct-09		6,048	6,011	6,030
Nov-09		8,463	7,884	8,186
Dec-09		11,432	11,854	11,633
Jan-10		12,786	13,649	13,198
Feb-10		11,872	12,901	12,363
Mar-10		11,235	12,654	11,913
Apr-10		9,947	10,765	10,338
May-10		7,958	8,487	8,211
Jun-10		6,291	6,426	6,355
Jul-10		5,382	4,833	5,120
Aug-10		4,556	4,239	4,405
Sep-10		4,694	4,395	4,551
Oct-10		5,994	5,635	5,823
Nov-10		7,786	7,677	7,734
Dec-10		10,604	11,298	10,935
Jan-11		11,843	13,578	12,672
Feb-11		11,016	12,907	11,919
Mar-11		10,700	12,453	11,537
Apr-11		9,204	10,464	9,806
May-11		7,476	8,185	7,814
Jun-11		5,942	6,183	6,057
Jul-11		5,231	4,799	5,025
Aug-11		4,383	4,201	4,297
Sep-11		4,559	4,413	4,489
Oct-11		5,575	5,783	5,675
Nov-11		7,331	7,709	7,511
Dec-11		9,905	11,476	10,655
Jan-12		11,219	13,697	12,402
Feb-12		10,463	12,921	11,637
Mar-12		10,094	12,426	11,208
Apr-12		8,725	10,420	9,534
May-12		7,026	8,144	7,560
Jun-12		5,704	6,194	5,938
Jul-12		4,959	4,780	4,874
Aug-12		4,154	4,176	4,164
Sep-12		4,219	4,403	4,307
Oct-12		5,212	5,720	5,454
Nov-12		6,832	7,682	7,238
Dec-12		9,353	11,439	10,350

National Grid New Hampshire
EnergyNorth Gas Inc.
Residential Non-Heat Sales Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
Jan-13		10,582	13,595	12,021
Feb-13		9,857	12,793	11,259
Mar-13		9,466	12,283	10,811
Apr-13		8,143	10,270	9,159
May-13		6,606	8,001	7,272
Jun-13		5,336	6,026	5,666
Jul-13		4,661	4,596	4,630
Aug-13		3,842	3,985	3,910
Sep-13		3,939	4,184	4,056
Oct-13		4,865	5,504	5,170
Nov-13		6,431	7,455	6,920
Dec-13		8,771	11,192	9,927
Jan-14		9,924	13,325	11,548
Feb-14		9,186	12,511	10,774
Mar-14		8,802	11,996	10,327
Apr-14		7,577	9,982	8,726
May-14		6,156	7,701	6,894
Jun-14		4,987	5,718	5,336
Jul-14		4,325	4,281	4,304
Aug-14		3,579	3,658	3,617
Sep-14		3,664	3,856	3,756
Oct-14		4,560	5,172	4,853
Nov-14		5,995	7,117	6,531
Dec-14		8,171	10,852	9,452
Jan-15		9,209	12,977	11,009
Feb-15		8,510	12,162	10,255
Mar-15		8,143	11,650	9,818
Apr-15		7,021	9,638	8,271
May-15		5,718	7,361	6,503
Jun-15		4,621	5,383	4,985
Jul-15		4,008	3,949	3,980
Aug-15		3,307	3,330	3,318
Sep-15		3,407	3,529	3,465
Oct-15		4,227	4,842	4,521
Split-year				
Nov-Oct				
Nov. 2004-	128,055	128,557	131,483	129,954
Nov. 2005-	122,165	118,673	120,188	119,397
Nov. 2006-	112,808	113,007	112,327	112,682
Nov. 2007-	107,096	110,388	108,008	109,251
Nov. 2008- Oct. 2009		104,629	103,191	103,942
Nov. 2009- Oct. 2010		100,610	103,722	102,096
Nov. 2010- Oct. 2011		94,319	101,940	97,959
Nov. 2011- Oct. 2012		89,009	102,066	95,245
Nov. 2012- Oct. 2013		83,483	100,358	91,543
Nov. 2013- Oct. 2014		77,964	96,846	86,982
Nov. 2014- Oct. 2015		72,337	92,792	82,107

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Heating Customers Forecasting

Regression Model:	DH1a114						
Dependent Variable:	CUSCH						
Independent Variable:	GSPR	d2	d3	d4	d10	d11	d12

Model	obNum	DFE	rsq	DW	SSE	MSE
DH1a114	0	74	0.999922282	1.97139077	522047.788	7054.69983

Model	R_MSE	SBC	AIC	Nor	NorPct	Status
DH1a114	83.9922606	1019.741496	995.4333281	0	0	0

Model		GSPR	d2	d3	d4	d10
DH1a114	DF	1	1	1	1	1
DH1a114	Estimate	0.187135831	65.46792968	167.328933	122.021941	-92.759488
DH1a114	StdErr	0.002039426	27.16160989	31.5851035	28.0218289	26.546098
DH1a114	tValue	91.75908756	2.410311095	5.29771678	4.35453167	-3.4942796
DH1a114	Probt	5.65767E-78	0.018423753	1.1621E-06	4.2201E-05	0.0008065

Model		d11	d12	AR1	AR4	AR5
DH1a114	DF	1	1	1	1	1
DH1a114	Estimate	-194.1966243	-174.0317509	-1.0105142	0.64746885	-0.5510308
DH1a114	StdErr	30.53590618	26.63997685	0.06053305	0.11392867	0.10440836
DH1a114	tValue	-6.359615566	-6.53272906	-16.693595	5.68310706	-5.2776504
DH1a114	Probt	1.49745E-08	7.21147E-09	8.3975E-27	2.4687E-07	1.2583E-06

Commercial and Industrial Heating Customers Forecasting
Forecasts

Date	Actual	Forecast
May-02	8,327	8,303
Jun-02	8,230	8,341
Jul-02	8,091	8,252
Aug-02	8,070	8,122
Sep-02	7,968	8,103
Oct-02	8,161	7,953
Nov-02	8,227	8,175
Dec-02	8,240	8,304
Jan-03	8,621	8,526
Feb-03	8,514	8,558
Mar-03	8,555	8,537
Apr-03	8,546	8,530
May-03	8,444	8,318
Jun-03	8,469	8,579
Jul-03	8,491	8,568
Aug-03	8,649	8,542
Sep-03	8,580	8,704
Oct-03	8,507	8,530
Nov-03	8,453	8,448
Dec-03	8,355	8,432
Jan-04	8,524	8,622
Feb-04	8,711	8,627
Mar-04	8,884	8,830
Apr-04	8,952	8,959
May-04	8,842	8,896
Jun-04	8,771	8,830
Jul-04	8,758	8,784
Aug-04	8,783	8,739
Sep-04	8,756	8,822
Oct-04	8,706	8,758
Nov-04	8,644	8,665
Dec-04	8,597	8,692

Commercial and Industrial Heating Customers Forecasting
Forecasts

Date	Actual	Forecast
Jan-05	8,657	8,814
Feb-05	8,689	8,718
Mar-05	8,745	8,782
Apr-05	8,814	8,761
May-05	8,890	8,792
Jun-05	8,968	8,954
Jul-05	9,035	9,048
Aug-05	9,004	9,019
Sep-05	9,091	8,919
Oct-05	8,983	8,965
Nov-05	8,826	8,851
Dec-05	8,872	8,886
Jan-06	9,016	9,031
Feb-06	9,083	9,124
Mar-06	9,166	9,255
Apr-06	9,225	9,135
May-06	9,029	9,155
Jun-06	9,189	9,061
Jul-06	9,306	9,236
Aug-06	9,256	9,270
Sep-06	9,233	9,325
Oct-06	9,080	9,066
Nov-06	8,855	8,911
Dec-06	8,943	8,889
Jan-07	9,225	9,100
Feb-07	9,221	9,302
Mar-07	9,534	9,388
Apr-07	9,423	9,463
May-07	9,281	9,249
Jun-07	9,396	9,336
Jul-07	9,183	9,278
Aug-07	9,213	9,227
Sep-07	9,147	9,232
Oct-07	8,964	8,977
Nov-07	9,018	8,980
Dec-07	9,186	9,021
Jan-08	9,418	9,410
Feb-08	9,611	9,557
Mar-08	9,642	9,639
Apr-08	9,486	9,515
May-08	9,439	9,333
Jun-08	9,407	9,361
Jul-08	9,433	9,445
Aug-08	9,472	9,496
Sep-08	9,416	9,415
Oct-08	9,270	9,310
Nov-08	9,152	9,107
Dec-08	9,246	9,084
Jan-09	9,466	9,378
Feb-09	9,580	9,489
Mar-09	9,688	9,613
Apr-09	9,459	9,520
May-09	-	9,226
Jun-09		9,114
Jul-09		9,026
Aug-09		9,067
Sep-09		9,087
Oct-09		9,034
Nov-09		8,971
Dec-09		8,957
Jan-10		9,105

Commercial and Industrial Heating Customers Forecasting
Forecasts

Date	Actual	Forecast
Feb-10		9,132
Mar-10		9,195
Apr-10		9,159
May-10		9,047
Jun-10		9,069
Jul-10		9,099
Aug-10		9,106
Sep-10		9,116
Oct-10		9,028
Nov-10		8,928
Dec-10		8,964
Jan-11		9,155
Feb-11		9,241
Mar-11		9,371
Apr-11		9,349
May-11		9,252
Jun-11		9,275
Jul-11		9,296
Aug-11		9,321
Sep-11		9,346
Oct-11		9,282
Nov-11		9,211
Dec-11		9,259
Jan-12		9,460
Feb-12		9,549
Mar-12		9,675
Apr-12		9,656
May-12		9,563
Jun-12		9,591
Jul-12		9,620
Aug-12		9,649
Sep-12		9,677
Oct-12		9,613
Nov-12		9,538
Dec-12		9,584
Jan-13		9,783
Feb-13		9,869
Mar-13		9,994
Apr-13		9,973
May-13		9,875
Jun-13		9,899
Jul-13		9,922
Aug-13		9,945
Sep-13		9,967
Oct-13		9,898
Nov-13		9,819
Dec-13		9,862
Jan-14		10,059
Feb-14		10,145
Mar-14		10,270
Apr-14		10,247
May-14		10,148
Jun-14		10,169
Jul-14		10,191
Aug-14		10,212
Sep-14		10,233
Oct-14		10,162
Nov-14		10,083
Dec-14		10,126
Jan-15		10,321
Feb-15		10,406

Commercial and Industrial Heating Customers Forecasting
Forecasts

Date	Actual	Forecast
Mar-15		10,530
Apr-15		10,508
May-15		10,412
Jun-15		10,436
Jul-15		10,460
Aug-15		10,484
Sep-15		10,506
Oct-15		10,437

Split-year
Nov-Oct

Nov. 2004- Oct. 2005	8,843	8,844
Nov. 2005- Oct. 2006	9,107	9,116
Nov. 2006- Oct. 2007	9,199	9,196
Nov. 2007- Oct. 2008	9,400	9,374
Nov. 2008- Oct. 2009		9,229
Nov. 2009- Oct. 2010		9,082
Nov. 2010- Oct. 2011		9,232
Nov. 2011- Oct. 2012		9,544
Nov. 2012- Oct. 2013		9,854
Nov. 2013- Oct. 2014		10,127
Nov. 2014- Oct. 2015		10,392

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Heating Use Per Forecasting

Regression Model:	EH1a128					
Dependent Variable:	USECH					
Independent Variable:	LBF	d1	d2	d3	d4	d5
	d6	d10	d11	d12		

Model	obNum	DFE	rsq	DW	SSE	MSE
EH1a128	84	0	0.995337965	2.293205145	1346.16339	16.0257546

Model	R_MSE	SBC	AIC	Nor	NorPct	Status
EH1a128	0	473.8797	430.1250166	6.216636657	0.04467602	0

model		d1	d2	d3	d4	d5	d6	d10	d11	d12
EH1a128	DF	1	1	1	1	1	1	1	1	1
EH1a128	Estimate	87.43094	92.78427789	81.52080067	54.2671334	23.8418072	8.442388	6.119088382	28.3561475	61.02033183
EH1a128	StdErr	0.003186	0.003163303	0.00319154	0.00315558	0.00317086	0.003147	0.003222993	0.003354581	0.003220577
EH1a128	tValue	27445.76	29331.45409	25542.78198	17197.1741	7519.02843	2682.836	1898.573175	8452.962125	18947.01577
EH1a128	Probt	0	0	0	0	0	0	0	0	0

model		LBF	AR24	EARCH0	EARCH1	EARCH2	EARCH8	EARCH12	EGARCH9	THETA
EH1a128	DF	1	1	1	1	1	1	1	1	1
EH1a128	Estimate	0.01356	0.228743227	2.608746812	1.03391571	1.85418335	-1.12213	1.22292474	-0.43143938	0.072797035
EH1a128	StdErr	1.55E-05	0.004608452	0.003221998	0.00472072	0.00393062	0.003363	0.003178053	0.002976693	0.006604602
EH1a128	tValue	873.1908	49.63558922	809.6675239	219.016692	471.728198	-333.674	384.8031359	-144.9391456	11.02216869
EH1a128	Probt	0	0	0	0	0	0	0	0	2.98773E-28

Commercial and Industrial Heating Use Per Forecasting
Forecasts

Date	Actual	Forecast
May-02	36.38	33.48
Jun-02	23.42	18.10
Jul-02	9.09	9.66
Aug-02	3.78	9.67
Sep-02	11.42	9.67
Oct-02	10.93	15.80
Nov-02	34.90	38.05
Dec-02	75.08	70.71
Jan-03	99.97	97.10
Feb-03	94.07	102.42
Mar-03	95.02	91.14
Apr-03	65.66	63.88
May-03	36.71	33.46
Jun-03	18.50	18.07
Jul-03	10.63	9.64
Aug-03	9.80	9.65
Sep-03	8.66	9.66
Oct-03	15.78	15.78
Nov-03	39.13	38.02
Dec-03	73.32	70.69
Jan-04	88.83	97.10
Feb-04	122.82	102.46
Mar-04	89.38	91.20
Apr-04	63.22	63.95
May-04	30.12	32.87
Jun-04	15.72	16.92
Jul-04	10.95	9.83
Aug-04	8.91	11.05
Sep-04	11.48	9.31
Oct-04	15.40	16.95
Nov-04	38.51	38.80
Dec-04	63.06	69.75
Jan-05	98.56	96.51
Feb-05	110.49	104.45
Mar-05	93.64	90.40
Apr-05	66.56	63.63
May-05	32.88	32.88
Jun-05	18.43	18.13
Jul-05	11.08	9.58
Aug-05	7.05	9.78
Sep-05	7.62	10.05
Oct-05	17.10	15.96
Nov-05	38.90	37.95
Dec-05	70.68	70.28
Jan-06	107.23	99.19
Feb-06	90.61	98.00
Mar-06	93.03	91.82
Apr-06	61.37	64.33

Commercial and Industrial Heating Use Per Forecasting
Forecasts

Date	Actual	Forecast
May-06	34.92	34.53
Jun-06	19.60	18.92
Jul-06	10.52	9.65
Aug-06	7.65	10.13
Sep-06	11.16	9.55
Oct-06	18.53	16.19
Nov-06	42.36	38.23
Dec-06	67.75	72.77
Jan-07	88.94	97.11
Feb-07	105.28	100.97
Mar-07	94.35	91.00
Apr-07	63.47	63.71
May-07	31.50	34.03
Jun-07	17.35	18.41
Jul-07	10.49	9.72
Aug-07	9.27	10.64
Sep-07	10.36	10.51
Oct-07	15.47	15.86
Nov-07	36.83	38.20
Dec-07	74.23	71.07
Jan-08	96.01	95.17
Feb-08	96.71	105.56
Mar-08	85.00	91.17
Apr-08	64.86	64.93
May-08	35.09	33.60
Jun-08	19.60	18.18
Jul-08	10.70	9.88
Aug-08	9.95	10.54
Sep-08	11.45	9.74
Oct-08	16.95	15.57
Nov-08	38.19	37.44
Dec-08	74.77	71.78
Jan-09	99.22	99.40
Feb-09	103.54	102.26
Mar-09	88.20	90.94
Apr-09	60.23	64.52
May-09	-	34.44
Jun-09		18.75
Jul-09		9.95
Aug-09		10.22
Sep-09		9.97
Oct-09		16.33
Nov-09		38.76
Dec-09		70.35
Jan-10		97.82
Feb-10		104.24
Mar-10		93.09
Apr-10		64.21
May-10		33.63
Jun-10		18.26
Jul-10		9.92
Aug-10		10.09
Sep-10		9.75
Oct-10		16.02
Nov-10		38.49
Dec-10		70.26
Jan-11		97.13
Feb-11		102.73
Mar-11		92.41
Apr-11		65.33
May-11		33.85
Jun-11		18.52
Jul-11		10.17
Aug-11		10.11
Sep-11		10.18
Oct-11		16.25
Nov-11		38.45
Dec-11		71.37
Jan-12		97.54
Feb-12		102.66
Mar-12		91.38
Apr-12		64.51
May-12		34.13
Jun-12		18.73
Jul-12		10.27
Aug-12		10.24
Sep-12		10.33

Commercial and Industrial Heating Use Per Forecasting
Forecasts

Date	Actual	Forecast
Oct-12		16.42
Nov-12		38.61
Dec-12		71.49
Jan-13		97.81
Feb-13		103.11
Mar-13		91.64
Apr-13		64.36
May-13		34.18
Jun-13		18.77
Jul-13		10.32
Aug-13		10.34
Sep-13		10.34
Oct-13		16.47
Nov-13		38.73
Dec-13		71.34
Jan-14		97.82
Feb-14		103.23
Mar-14		91.98
Apr-14		64.65
May-14		34.22
Jun-14		18.83
Jul-14		10.40
Aug-14		10.42
Sep-14		10.41
Oct-14		16.54
Nov-14		38.80
Dec-14		71.42
Jan-15		97.86
Feb-15		103.24
Mar-15		92.03
Apr-15		64.80
May-15		34.32
Jun-15		18.94
Jul-15		10.50
Aug-15		10.51
Sep-15		10.52
Oct-15		16.64

Split-year
Nov-Oct

Nov. 2004- Oct. 2005	564.99	559.92
Nov. 2005- Oct. 2006	564.21	560.53
Nov. 2006- Oct. 2007	556.59	562.96
Nov. 2007- Oct. 2008	557.37	563.63
Nov. 2008- Oct. 2009		566.01
Nov. 2009- Oct. 2010		566.14
Nov. 2010- Oct. 2011		565.44
Nov. 2011- Oct. 2012		566.03
Nov. 2012- Oct. 2013		567.44
Nov. 2013- Oct. 2014		568.59
Nov. 2014- Oct. 2015		569.59

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Heating Volume Forecasting

Regression Model:	FH1a47				
Dependent Variable:	VOLCH				
Independent Variable:	Intercept	BDDA	GSP	d2	
	d3	d5	d10	d11	d12

Model	obNum	DFE	rsq	DW	SSE	MSE
FH1a47	84	0	0.983388074	1.78703038	1.4269E+11	1698634609

Model	R_MSE	SBC	AIC	Nor	NorPct	Status
FH1a47	0	2046.604316	2010.142064	1.669768121	0.43392479	0

Model		Intercept	BDDA	GSP	d2	d3	d5	d10
FH1a47	DF	1	1	1	1	1	1	1
FH1a47	Estimate	-289888.372	625.5087723	6.861852615	60215.8007	67678.6849	-37460.21197	-99436.46077
FH1a47	StdErr	0.194771712	3.4958964	0.076992025	0.19476236	0.19499251	0.194786055	0.194824865
FH1a47	tValue	-1488349.45	178.9265758	89.1241993	309175.766	347083.518	-192314.6494	-510388.9638
FH1a47	Probt	0	0	0	0	0	0	0

Model		d11	d12	AR11	EARCH0	EARCH2	EARCH3	EARCH12	THETA
FH1a47	DF	1	1	1	1	1	1	1	1
FH1a47	Estimate	-116528.761	-52100.99187	-0.320200947	20.7340593	-1.4069171	0.586512359	1.709542542	-0.215371371
FH1a47	StdErr	0.194956423	0.19481874	0.030785218	0.18609843	0.30369637	0.145228619	0.281139799	0.088656107
FH1a47	tValue	-597716.96	-267433.1627	-10.40112656	111.41448	-4.6326439	4.038545326	6.080756089	-2.429289725
FH1a47	Probt	0	0	2.45019E-25	0	3.6103E-06	5.37837E-05	1.19617E-09	0.015128438

Commercial and Industrial Heating Volume Forecasting
Forecasts

Date	Actual	Forecast
May-02	302,915	261,608
Jun-02	192,735	165,504
Jul-02	73,573	65,659
Aug-02	30,527	38,496
Sep-02	90,971	60,325
Oct-02	89,229	125,467
Nov-02	287,154	344,677
Dec-02	618,664	614,991
Jan-03	861,842	889,206
Feb-03	800,949	971,303
Mar-03	812,850	813,392
Apr-03	561,072	574,231
May-03	309,999	319,444
Jun-03	156,668	163,157
Jul-03	90,225	61,059
Aug-03	84,798	58,606
Sep-03	74,336	66,010
Oct-03	134,233	109,815
Nov-03	330,722	320,389
Dec-03	612,578	575,304
Jan-04	757,203	859,561
Feb-04	1,069,808	978,723
Mar-04	794,034	773,580
Apr-04	565,938	528,358
May-04	266,318	275,905
Jun-04	137,918	173,991
Jul-04	95,942	100,573
Aug-04	78,270	70,929
Sep-04	100,539	107,546
Oct-04	134,079	152,285
Nov-04	332,888	348,250
Dec-04	542,162	571,138
Jan-05	853,270	910,926
Feb-05	960,020	929,998
Mar-05	818,820	824,405
Apr-05	586,635	551,093
May-05	292,312	309,416
Jun-05	165,299	228,345
Jul-05	100,084	103,272
Aug-05	63,466	79,997

Commercial and Industrial Heating Volume Forecasting

Forecasts

Date	Actual	Forecast
Sep-05	69,305	95,706
Oct-05	153,636	132,435
Nov-05	343,346	301,325
Dec-05	627,072	626,066
Jan-06	966,792	811,626
Feb-06	823,006	843,662
Mar-06	852,748	819,617
Apr-06	566,163	535,683
May-06	315,295	286,793
Jun-06	180,105	209,284
Jul-06	97,918	110,019
Aug-06	70,779	96,837
Sep-06	103,078	153,065
Oct-06	168,287	189,760
Nov-06	375,140	313,154
Dec-06	605,868	582,351
Jan-07	820,507	765,510
Feb-07	970,725	953,676
Mar-07	899,468	893,903
Apr-07	598,066	627,795
May-07	292,354	334,628
Jun-07	163,025	194,565
Jul-07	96,296	120,410
Aug-07	85,441	101,736
Sep-07	94,809	145,432
Oct-07	138,679	162,194
Nov-07	332,159	382,296
Dec-07	681,876	734,100
Jan-08	904,226	893,258
Feb-08	929,509	908,863
Mar-08	819,511	845,993
Apr-08	615,268	581,659
May-08	331,179	316,656
Jun-08	184,332	203,039
Jul-08	100,968	119,217
Aug-08	94,260	105,365
Sep-08	107,782	160,731
Oct-08	157,105	202,119
Nov-08	349,498	392,574
Dec-08	691,310	684,981
Jan-09	939,266	945,241
Feb-09	991,893	962,289
Mar-09	854,443	829,761
Apr-09	569,696	574,134
May-09	-	293,485
Jun-09		211,421
Jul-09		122,671
Aug-09		98,526
Sep-09		145,634
Oct-09		192,616
Nov-09		392,719
Dec-09		666,432
Jan-10		888,007
Feb-10		945,017
Mar-10		840,714
Apr-10		598,554
May-10		346,699
Jun-10		222,252
Jul-10		132,784
Aug-10		118,140
Sep-10		165,716
Oct-10		221,151
Nov-10		399,364
Dec-10		679,310
Jan-11		897,868
Feb-11		948,593
Mar-11		855,479
Apr-11		616,211
May-11		364,923

Commercial and Industrial Heating Volume Forecasting

Forecasts

Date	Actual	Forecast
Jun-11		240,443
Jul-11		154,242
Aug-11		139,966
Sep-11		190,414
Oct-11		239,010
Nov-11		419,326
Dec-11		698,367
Jan-12		914,942
Feb-12		969,240
Mar-12		877,000
Apr-12		637,841
May-12		386,495
Jun-12		263,032
Jul-12		176,962
Aug-12		163,635
Sep-12		211,897
Oct-12		261,153
Nov-12		441,142
Dec-12		719,516
Jan-13		937,200
Feb-13		991,688
Mar-13		899,450
Apr-13		660,213
May-13		409,110
Jun-13		285,581
Jul-13		199,691
Aug-13		185,533
Sep-13		233,873
Oct-13		282,892
Nov-13		462,567
Dec-13		741,258
Jan-14		959,077
Feb-14		1,013,660
Mar-14		921,504
Apr-14		682,410
May-14		431,317
Jun-14		307,863
Jul-14		221,727
Aug-14		207,625
Sep-14		255,936
Oct-14		304,908
Nov-14		484,721
Dec-14		763,451
Jan-15		981,264
Feb-15		1,035,834
Mar-15		943,725
Apr-15		704,691
May-15		453,721
Jun-15		330,300
Jul-15		244,295
Aug-15		230,293
Sep-15		278,690
Oct-15		327,811

Split-year
Nov-Oct

Nov. 2004-	4,937,896	5,084,980
Nov. 2005-	5,114,589	4,983,736
Nov. 2006-	5,140,377	5,195,353
Nov. 2007-	5,258,177	5,453,296
Nov. 2008- Oct. 2009		5,453,334
Nov. 2009- Oct. 2010		5,538,185
Nov. 2010- Oct. 2011		5,725,823
Nov. 2011- Oct. 2012		5,979,890
Nov. 2012- Oct. 2013		6,245,890
Nov. 2013- Oct. 2014		6,509,852
Nov. 2014- Oct. 2015		6,778,797

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Heating

alpha value calculation

$$P_{c,T+j} = \alpha \cdot P_{1,T+j} + (1-\alpha) \cdot P_{2,T+j}$$

$$\alpha = \frac{VAR\,[e_{2,t}] - COV\,[e_{1,t}, e_{2,t}]}{VAR\,[e_{1,t}] + VAR\,[e_{2,t}] - 2COV\,[e_{1,t}, e_{2,t}]}$$

	V[E1]	V[E2}	C[E1,E2]	**alpha**
Reg	2501617815	2.66E+09	1743876116	0.548292

Regression Forecast Error

Date	Sales E1	Volume E2
May-02	24895.6774	41306.43358
Jun-02	41804.35756	27231.83815
Jul-02	-6140.875937	7914.318488
Aug-02	-47983.5544	-7969.22059
Sep-02	12588.78218	30646.38521
Oct-02	-36447.04781	-36237.9852
Nov-02	-23878.49536	-57522.40079
Dec-02	31547.96209	3673.396615
Jan-03	33977.29999	-27363.735
Feb-03	-75628.78015	-170354.6429
Mar-03	34833.04917	-541.8992877
Apr-03	16176.32889	-13159.21927
May-03	31667.50315	-9444.975011
Jun-03	1634.213146	-6488.596247
Jul-03	7622.849254	29165.84946
Aug-03	2379.806477	26192.25911
Sep-03	-9705.152803	8326.30582
Oct-03	-369.9418568	24417.44345
Nov-03	9530.018596	10333.35045
Dec-03	16570.5491	37273.80296
Jan-04	-79988.47238	-102357.9466
Feb-04	185873.3782	91085.62309
Mar-04	-11276.39643	20453.88208
Apr-04	-6972.484263	37580.11152
May-04	-26087.2339	-9587.254359
Jun-04	-11487.77852	-36073.56344
Jul-04	9579.479444	-4631.18595
Aug-04	-18326.91128	7341.088353
Sep-04	18378.54031	-7006.236105
Oct-04	-14357.51893	-18205.86084
Nov-04	-3267.924109	-15362.58406
Dec-04	-64074.52885	-28975.79308
Jan-05	2615.363564	-57655.73344
Feb-05	49498.3469	30021.45338
Mar-05	24953.15318	-5584.81991
Apr-05	29111.49709	35542.00623
May-05	3218.236813	-17103.74583
Jun-05	2926.627095	-63046.25886

APPENDIX A
CIHalpha

Regression Forecast Error

Date	Sales E1	Volume E2
Jul-05	13439.55337	-3187.49396
Aug-05	-24737.67593	-16530.881
Sep-05	-20366.24603	-26400.86888
Oct-05	10574.3198	21201.16713
Nov-05	7428.616024	42020.69803
Dec-05	2591.177275	1006.318456
Jan-06	71056.55398	155166.0212
Feb-06	-71189.93576	-20656.26823
Mar-06	2937.895738	33131.89123
Apr-06	-21518.44012	30480.03896
May-06	-825.1474777	28501.74976
Jun-06	8713.871128	-29178.1734
Jul-06	8818.909553	-12100.84715
Aug-06	-23104.5696	-26058.04806
Sep-06	14008.6262	-49987.58942
Oct-06	21539.76599	-21472.82902
Nov-06	34416.33759	61986.58786
Dec-06	-40926.6616	23517.36911
Jan-07	-63166.30238	54996.83294
Feb-07	31469.11963	17049.03766
Mar-07	45155.68687	5564.476419
Apr-07	-4833.008303	-29729.20953
May-07	-22387.89239	-42274.43963
Jun-07	-8871.033967	-31540.14344
Jul-07	6104.254358	-24114.12538
Aug-07	-12747.64376	-16295.03429
Sep-07	-2220.726165	-50622.78323
Oct-07	-3703.166298	-23514.77713
Nov-07	-10868.38717	-50137.05308
Dec-07	40700.4442	-52223.64946
Jan-08	8625.882962	10967.93951
Feb-08	-79381.76351	20646.77686
Mar-08	-59331.54481	-26482.15504
Apr-08	-2542.095353	33608.57004
May-08	17591.08375	14523.33882
Jun-08	14135.46381	-18706.99344
Jul-08	7603.767918	-18248.60997
Aug-08	-5870.416258	-11104.76894
Sep-08	16085.9674	-52948.55503
Oct-08	12136.85128	-45013.81876
Nov-08	8509.281956	-43076.37266
Dec-08	39250.53765	6328.594062
Jan-09	7046.87621	-5975.327149
Feb-09	21518.44546	29603.89005
Mar-09	-19763.0687	24681.80254
Apr-09	-44504.27537	-4438.349787
May-09	-317759.7389	-293485.4213

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Heating Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
May-02	302,915	278,019	261,608	270,606
Jun-02	192,735	150,931	165,504	157,514
Jul-02	73,573	79,714	65,659	73,365
Aug-02	30,527	78,511	38,496	60,436
Sep-02	90,971	78,383	60,325	70,226
Oct-02	89,229	125,676	125,467	125,582
Nov-02	287,154	311,033	344,677	326,230
Dec-02	618,664	587,116	614,991	599,708
Jan-03	861,842	827,865	889,206	855,573
Feb-03	800,949	876,577	971,303	919,366
Mar-03	812,850	778,017	813,392	793,996
Apr-03	561,072	544,896	574,231	558,147
May-03	309,999	278,331	319,444	296,902
Jun-03	156,668	155,034	163,157	158,703
Jul-03	90,225	82,602	61,059	72,871
Aug-03	84,798	82,418	58,606	71,662
Sep-03	74,336	84,041	66,010	75,896
Oct-03	134,233	134,603	109,815	123,406
Nov-03	330,722	321,192	320,389	320,830
Dec-03	612,578	596,007	575,304	586,655
Jan-04	757,203	837,192	859,561	847,296
Feb-04	1,069,808	883,935	978,723	926,752
Mar-04	794,034	805,310	773,580	790,978
Apr-04	565,938	572,911	528,358	552,786
May-04	266,318	292,405	275,905	284,952
Jun-04	137,918	149,406	173,991	160,511
Jul-04	95,942	86,363	100,573	92,782
Aug-04	78,270	96,597	70,929	85,002
Sep-04	100,539	82,161	107,546	93,627
Oct-04	134,079	148,437	152,285	150,175
Nov-04	332,888	336,156	348,250	341,619
Dec-04	542,162	606,236	571,138	590,382
Jan-05	853,270	850,655	910,926	877,879
Feb-05	960,020	910,521	929,998	919,319
Mar-05	818,820	793,867	824,405	807,662
Apr-05	586,635	557,523	551,093	554,618
May-05	292,312	289,094	309,416	298,273
Jun-05	165,299	162,372	228,345	192,173
Jul-05	100,084	86,645	103,272	94,155
Aug-05	63,466	88,203	79,997	84,496
Sep-05	69,305	89,671	95,706	92,397
Oct-05	153,636	143,062	132,435	138,261
Nov-05	343,346	335,917	301,325	320,292
Dec-05	627,072	624,481	626,066	625,197
Jan-06	966,792	895,735	811,626	857,742
Feb-06	823,006	894,196	843,662	871,369
Mar-06	852,748	849,811	819,617	836,172
Apr-06	566,163	587,681	535,683	564,193
May-06	315,295	316,120	286,793	302,873
Jun-06	180,105	171,392	209,284	188,508
Jul-06	97,918	89,099	110,019	98,548
Aug-06	70,779	93,883	96,837	95,217
Sep-06	103,078	89,069	153,065	117,977
Oct-06	168,287	146,747	189,760	166,176
Nov-06	375,140	340,724	313,154	328,270
Dec-06	605,868	646,795	582,351	617,685
Jan-07	820,507	883,673	765,510	830,298
Feb-07	970,725	939,256	953,676	945,770
Mar-07	899,468	854,312	893,903	872,196
Apr-07	598,066	602,899	627,795	614,145
May-07	292,354	314,741	334,628	323,724
Jun-07	163,025	171,896	194,565	182,135

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Heating Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
Jul-07	96,296	90,191	120,410	103,841
Aug-07	85,441	98,188	101,736	99,791
Sep-07	94,809	97,030	145,432	118,894
Oct-07	138,679	142,383	162,194	151,332
Nov-07	332,159	343,027	382,296	360,765
Dec-07	681,876	641,176	734,100	683,150
Jan-08	904,226	895,600	893,258	894,542
Feb-08	929,509	1,008,891	908,863	963,707
Mar-08	819,511	878,843	845,993	864,004
Apr-08	615,268	617,810	581,659	601,480
May-08	331,179	313,588	316,656	314,974
Jun-08	184,332	170,197	203,039	185,032
Jul-08	100,968	93,364	119,217	105,042
Aug-08	94,260	100,130	105,365	102,495
Sep-08	107,782	91,696	160,731	122,880
Oct-08	157,105	144,968	202,119	170,784
Nov-08	349,498	340,988	392,574	364,290
Dec-08	691,310	652,059	684,981	666,930
Jan-09	939,266	932,219	945,241	938,102
Feb-09	991,893	970,375	962,289	966,723
Mar-09	854,443	874,206	829,761	854,130
Apr-09	569,696	614,200	574,134	596,102
May-09	-	317,760	293,485	306,795
Jun-09		170,916	211,421	189,212
Jul-09		89,772	122,671	104,633
Aug-09		92,691	98,526	95,327
Sep-09		90,644	145,634	115,483
Oct-09		147,489	192,616	167,873
Nov-09		347,775	392,719	368,077
Dec-09		630,110	666,432	646,517
Jan-10		890,649	888,007	889,456
Feb-10		951,940	945,017	948,812
Mar-10		855,952	840,714	849,069
Apr-10		588,090	598,554	592,817
May-10		304,292	346,699	323,447
Jun-10		165,574	222,252	191,176
Jul-10		90,243	132,784	109,459
Aug-10		91,892	118,140	103,749
Sep-10		88,894	165,716	123,595
Oct-10		144,594	221,151	179,176
Nov-10		343,598	399,364	368,788
Dec-10		629,874	679,310	652,205
Jan-11		889,257	897,868	893,147
Feb-11		949,353	948,593	949,009
Mar-11		866,023	855,479	861,260
Apr-11		610,745	616,211	613,214
May-11		313,179	364,923	336,552
Jun-11		171,790	240,443	202,801
Jul-11		94,534	154,242	121,505
Aug-11		94,271	139,966	114,912
Sep-11		95,125	190,414	138,168
Oct-11		150,851	239,010	190,673
Nov-11		354,167	419,326	383,600
Dec-11		660,837	698,367	677,790
Jan-12		922,782	914,942	919,241
Feb-12		980,287	969,240	975,297
Mar-12		884,114	877,000	880,901
Apr-12		622,899	637,841	629,648
May-12		326,326	386,495	353,505
Jun-12		179,628	263,032	217,302
Jul-12		98,815	176,962	134,115
Aug-12		98,808	163,635	128,091

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Heating Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
Sep-12		99,925	211,897	150,504
Oct-12		157,851	261,153	204,513
Nov-12		368,292	441,142	401,199
Dec-12		685,192	719,516	700,696
Jan-13		956,792	937,200	947,942
Feb-13		1,017,585	991,688	1,005,887
Mar-13		915,883	899,450	908,460
Apr-13		641,793	660,213	650,114
May-13		337,554	409,110	369,877
Jun-13		185,847	285,581	230,898
Jul-13		102,401	199,691	146,348
Aug-13		102,853	185,533	140,200
Sep-13		103,020	233,873	162,128
Oct-13		163,056	282,892	217,187
Nov-13		380,274	462,567	417,447
Dec-13		703,616	741,258	720,619
Jan-14		983,976	959,077	972,729
Feb-14		1,047,333	1,013,660	1,032,122
Mar-14		944,654	921,504	934,197
Apr-14		662,467	682,410	671,475
May-14		347,301	431,317	385,252
Jun-14		191,522	307,863	244,074
Jul-14		106,026	221,727	158,289
Aug-14		106,417	207,625	152,134
Sep-14		106,523	255,936	174,014
Oct-14		168,118	304,908	229,907
Nov-14		391,202	484,721	433,445
Dec-14		723,191	763,451	741,377
Jan-15		1,010,071	981,264	997,059
Feb-15		1,074,295	1,035,834	1,056,922
Mar-15		969,134	943,725	957,657
Apr-15		680,908	704,691	691,651
May-15		357,367	453,721	400,891
Jun-15		197,610	330,300	257,547
Jul-15		109,881	244,295	170,597
Aug-15		110,167	230,293	164,429
Sep-15		110,506	278,690	186,476
Oct-15		173,691	327,811	243,308

Split-year
Nov-Oct

Nov. 2004- Oct. 2005	4,937,896	4,914,005	5,084,960	4,991,236
Nov. 2005- Oct. 2006	5,114,589	5,094,131	4,983,736	5,044,265
Nov. 2006- Oct. 2007	5,140,377	5,182,088	5,195,353	5,188,080
Nov. 2007- Oct. 2008	5,258,177	5,299,292	5,453,296	5,368,857
Nov. 2008- Oct. 2009		5,293,320	5,453,334	5,365,600
Nov. 2009- Oct. 2010		5,150,005	5,538,185	5,325,349
Nov. 2010- Oct. 2011		5,208,599	5,725,823	5,442,234
Nov. 2011- Oct. 2012		5,386,440	5,979,890	5,654,506
Nov. 2012- Oct. 2013		5,580,270	6,245,890	5,880,936
Nov. 2013- Oct. 2014		5,748,227	6,509,852	6,092,259
Nov. 2014- Oct. 2015		5,908,024	6,778,797	6,301,359

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Non-Heat Customers Forecasting

Regression Model:	DN1a98				
Dependent Variable:	CUSCN				
Independent Variable:	LBF	RSALE	d3	d5	d8
	d9	d10	d11	d12	

Model	obNum	DFE	rsq	DW	SSE	MSE
DN1a98	84	0	0.999899709	2.02230824	11177.8782	133.069978

Model	R_MSE	SBC	AIC	Nor	NorPct	Status
DN1a98	0	720.5441978	669.497045	4.86531874	0.08780302	0

Model		LBF	RSALE	d3	d5	d8	d9	d10	d11
DN1a98	DF	1	1	1	1	1	1	1	1
DN1a98	Estimate	1.323100139	0.006564573	14.2905669	-12.950848	14.124698	25.2901219	34.0531978	29.52317662
DN1a98	StdErr	0.096758978	0.003110946	0.02964477	0.03859317	0.02950933	0.02919653	0.03194827	0.031453001
DN1a98	tValue	13.67418477	2.110153244	482.060249	-335.57354	478.65198	866.203031	1065.88539	938.6441918
DN1a98	Probt	1.44821E-42	0.034845158	0	0	0	0	0	0

Model		d12	AR1	AR4	AR5	EARCH0	EARCH2	EARCH3	EARCH5
DN1a98	DF	1	1	1	1	1	1	1	1
DN1a98	Estimate	34.80881798	-1.003763448	0.59964447	-0.4508493	5.00388768	0.6550121	-0.30687126	-0.69617992
DN1a98	StdErr	0.027210641	0.037137765	0.05756569	0.06804865	0.02611422	0.13052259	0.05313653	0.095138779
DN1a98	tValue	1279.235485	-27.02810602	10.4166992	-6.6253967	191.615472	5.01838105	-5.77514674	-7.317520042
DN1a98	Probt	0	6.9096E-161	2.0805E-25	3.4632E-11	0	5.2109E-07	7.6886E-09	2.52595E-13

Model		EARCH6	EARCH12	EGARCH3	EGARCH12	THETA
DN1a98	DF	1	1	1	1	1
DN1a98	Estimate	-0.531162298	-0.892750271	-0.3605258	0.29758504	-0.0981831
DN1a98	StdErr	0.087331671	0.130384364	0.06471904	0.06356259	0.05714401
DN1a98	tValue	-6.082126845	-6.84706544	-5.5706298	4.68176391	-1.7181691
DN1a98	Probt	1.18599E-09	7.53802E-12	2.5382E-08	2.8442E-06	0.08576578

Commercial and Industrial Non-Heat Customers Forecasting
Forecasts

Date	Actual	Forecast
May-02	1,074	1,068
Jun-02	1,069	1,088
Jul-02	1,066	1,069
Aug-02	1,071	1,081
Sep-02	1,070	1,083
Oct-02	1,109	1,090
Nov-02	1,117	1,110
Dec-02	1,119	1,131
Jan-03	1,112	1,094
Feb-03	1,100	1,098
Mar-03	1,105	1,107
Apr-03	1,099	1,092
May-03	1,058	1,070
Jun-03	1,068	1,075
Jul-03	1,088	1,072
Aug-03	1,118	1,097
Sep-03	1,125	1,145
Oct-03	1,130	1,139
Nov-03	1,123	1,118
Dec-03	1,109	1,120
Jan-04	1,072	1,077
Feb-04	1,095	1,075
Mar-04	1,114	1,112
Apr-04	1,116	1,113
May-04	1,107	1,109
Jun-04	1,105	1,112
Jul-04	1,122	1,104
Aug-04	1,136	1,128
Sep-04	1,146	1,144
Oct-04	1,155	1,163
Nov-04	1,148	1,142
Dec-04	1,141	1,152
Jan-05	1,089	1,105
Feb-05	1,093	1,088

Commercial and Industrial Non-Heat Customers Forecasting
Forecasts

Date	Actual	Forecast
Mar-05	1,097	1,108
Apr-05	1,099	1,090
May-05	1,112	1,099
Jun-05	1,132	1,129
Jul-05	1,156	1,144
Aug-05	1,164	1,167
Sep-05	1,190	1,163
Oct-05	1,194	1,195
Nov-05	1,174	1,175
Dec-05	1,179	1,182
Jan-06	1,137	1,135
Feb-06	1,144	1,136
Mar-06	1,152	1,164
Apr-06	1,154	1,137
May-06	1,131	1,145
Jun-06	1,160	1,141
Jul-06	1,192	1,164
Aug-06	1,196	1,199
Sep-06	1,210	1,213
Oct-06	1,207	1,211
Nov-06	1,177	1,182
Dec-06	1,190	1,182
Jan-07	1,165	1,149
Feb-07	1,163	1,168
Mar-07	1,200	1,192
Apr-07	1,179	1,183
May-07	1,161	1,160
Jun-07	1,185	1,173
Jul-07	1,179	1,169
Aug-07	1,193	1,192
Sep-07	1,201	1,204
Oct-07	1,194	1,201
Nov-07	1,201	1,189
Dec-07	1,224	1,202
Jan-08	1,189	1,188
Feb-08	1,212	1,196
Mar-08	1,213	1,219
Apr-08	1,185	1,186
May-08	1,182	1,167
Jun-08	1,186	1,177
Jul-08	1,208	1,186
Aug-08	1,224	1,222
Sep-08	1,236	1,220
Oct-08	1,234	1,238
Nov-08	1,218	1,207
Dec-08	1,231	1,213
Jan-09	1,193	1,187
Feb-09	1,207	1,189
Mar-09	1,218	1,218
Apr-09	1,181	1,190
May-09	-	1,161
Jun-09		1,158
Jul-09		1,151
Aug-09		1,169
Sep-09		1,178
Oct-09		1,192
Nov-09		1,189
Dec-09		1,191
Jan-10		1,156
Feb-10		1,153
Mar-10		1,164
Apr-10		1,151
May-10		1,137
Jun-10		1,151
Jul-10		1,153
Aug-10		1,168
Sep-10		1,180
Oct-10		1,189
Nov-10		1,185
Dec-10		1,191

Commercial and Industrial Non-Heat Customers Forecasting
Forecasts

Date	Actual	Forecast
Jan-11		1,157
Feb-11		1,158
Mar-11		1,174
Apr-11		1,161
May-11		1,150
Jun-11		1,165
Jul-11		1,166
Aug-11		1,182
Sep-11		1,194
Oct-11		1,205
Nov-11		1,202
Dec-11		1,208
Jan-12		1,175
Feb-12		1,177
Mar-12		1,193
Apr-12		1,180
May-12		1,169
Jun-12		1,183
Jul-12		1,185
Aug-12		1,201
Sep-12		1,213
Oct-12		1,224
Nov-12		1,221
Dec-12		1,227
Jan-13		1,194
Feb-13		1,196
Mar-13		1,211
Apr-13		1,199
May-13		1,187
Jun-13		1,202
Jul-13		1,203
Aug-13		1,219
Sep-13		1,231
Oct-13		1,241
Nov-13		1,238
Dec-13		1,245
Jan-14		1,212
Feb-14		1,213
Mar-14		1,229
Apr-14		1,216
May-14		1,205
Jun-14		1,219
Jul-14		1,220
Aug-14		1,236
Sep-14		1,249
Oct-14		1,259
Nov-14		1,255
Dec-14		1,262
Jan-15		1,229
Feb-15		1,231
Mar-15		1,247
Apr-15		1,234
May-15		1,223
Jun-15		1,237
Jul-15		1,239
Aug-15		1,254
Sep-15		1,267
Oct-15		1,277

Commercial and Industrial Non-Heat Customers Forecasting
Forecasts

Date	Actual	Forecast
Split-year		
Nov-Oct		
Nov. 2004- Oct. 2005	1,134	1,132
Nov. 2005- Oct. 2006	1,170	1,167
Nov. 2006- Oct. 2007	1,182	1,180
Nov. 2007- Oct. 2008	1,208	1,199
Nov. 2008- Oct. 2009		1,184
Nov. 2009- Oct. 2010		1,165
Nov. 2010- Oct. 2011		1,174
Nov. 2011- Oct. 2012		1,192
Nov. 2012- Oct. 2013		1,211
Nov. 2013- Oct. 2014		1,228
Nov. 2014- Oct. 2015		1,246

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Non-Heat Use Per Forecasting

Regression Model:	EN1a68					
Dependent Variable:	USECN					
Independent Variable:	HDDA_1	EMP	d2	d6	d9	

Model	obNum	DFE	rsq	DW	SSE	MSE
EN1a68	84	0	0.940231298	2.061916375	37982.0952	452.1678

Model	R_MSE	SBC	AIC	Nor	NorPct
EN1a68	0	784.5231991	760.2150311	1.125566175	0.56962155

Model		HDDA_1	EMP	d2	d6	d9	AR3
EN1a68	DF	1	1	1	1	1	1
EN1a68	Estimate	0.048448502	0.075124681	26.19229601	20.016682	29.9385637	-0.36453102
EN1a68	StdErr	0.008809213	0.007740803	13.38695173	6.99032104	8.87886663	0.053937662
EN1a68	tValue	5.49975383	9.705023806	1.956554154	2.86348537	3.37189024	-6.75837639
EN1a68	Probt	3.80322E-08	2.87009E-22	0.05039991	0.00419008	0.00074654	1.39547E-11

Model		EARCH0	EARCH7	EARCH12	THETA
EN1a68	DF	1	1	1	1
EN1a68	Estimate	6.015076673	-1.228391639	-0.980107577	-0.1907386
EN1a68	StdErr	0.08521265	0.604062358	0.336310502	0.20704153
EN1a68	tValue	70.58901048	-2.033551044	-2.914293698	-0.9212577
EN1a68	Probt	0	0.041996882	0.003564943	0.35691589

Commercial and Industrial Non-Heat Use Per Forecasting
Forecasts

Date	Actual	Forecast
May-02	72.82	72.82
Jun-02	152.05	82.65
Jul-02	34.46	51.99
Aug-02	14.56	47.02
Sep-02	120.60	102.84
Oct-02	12.59	43.80
Nov-02	94.77	61.03
Dec-02	109.30	102.25
Jan-03	92.29	90.80
Feb-03	133.70	154.92
Mar-03	110.16	116.01
Apr-03	77.39	90.50
May-03	39.81	74.15
Jun-03	75.48	82.78
Jul-03	47.11	43.39
Aug-03	40.26	32.38
Sep-03	63.49	74.90
Oct-03	38.49	50.01
Nov-03	94.90	68.15
Dec-03	91.60	78.15
Jan-04	94.60	96.82
Feb-04	179.35	161.01
Mar-04	34.37	104.85
Apr-04	93.99	90.24
May-04	79.58	84.13
Jun-04	49.99	54.94
Jul-04	34.07	51.47
Aug-04	64.01	49.47
Sep-04	57.03	67.35
Oct-04	41.00	46.37
Nov-04	59.93	76.06

Commercial and Industrial Non-Heat Use Per Forecasting
Forecasts

Date	Actual	Forecast
Dec-04	74.40	76.86
Jan-05	108.92	99.46
Feb-05	116.14	139.28
Mar-05	83.96	97.14
Apr-05	97.48	100.43
May-05	56.98	61.67
Jun-05	47.06	81.60
Jul-05	38.29	50.95
Aug-05	77.26	42.96
Sep-05	92.37	63.20
Oct-05	34.91	46.28
Nov-05	82.29	79.35
Dec-05	59.10	88.65
Jan-06	118.22	100.49
Feb-06	121.45	131.54
Mar-06	113.02	94.16
Apr-06	105.35	98.20
May-06	84.50	70.38
Jun-06	57.72	86.50
Jul-06	57.25	55.68
Aug-06	50.74	52.74
Sep-06	58.12	70.82
Oct-06	64.62	56.53
Nov-06	125.31	72.10
Dec-06	110.83	69.42
Jan-07	87.36	97.94
Feb-07	140.92	152.85
Mar-07	107.91	123.19
Apr-07	75.90	95.03
May-07	66.96	83.61
Jun-07	86.82	78.50
Jul-07	50.05	44.59
Aug-07	46.68	43.80
Sep-07	68.21	82.40
Oct-07	55.91	53.29
Nov-07	49.68	63.33
Dec-07	75.01	85.89
Jan-08	128.07	110.70
Feb-08	158.96	128.46
Mar-08	83.46	98.40
Apr-08	102.08	104.90
May-08	98.45	83.58
Jun-08	97.68	74.64
Jul-08	62.51	52.00
Aug-08	42.29	57.34
Sep-08	62.04	85.13
Oct-08	40.79	58.75
Nov-08	72.71	70.04
Dec-08	56.82	80.85
Jan-09	132.64	100.02
Feb-09	136.30	145.76
Mar-09	66.52	90.24
Apr-09	129.76	105.16
May-09	-	69.30
Jun-09		66.10
Jul-09		63.56
Aug-09		46.49
Sep-09		73.52
Oct-09		59.31
Nov-09		70.25

Commercial and Industrial Non-Heat Use Per Forecasting
Forecasts

Date	Actual	Forecast
Dec-09		83.08
Jan-10		105.19
Feb-10		136.14
Mar-10		101.78
Apr-10		95.05
May-10		75.55
Jun-10		80.90
Jul-10		50.72
Aug-10		47.43
Sep-10		77.90
Oct-10		54.77
Nov-10		70.80
Dec-10		84.95
Jan-11		103.81
Feb-11		136.61
Mar-11		102.70
Apr-11		94.79
May-11		75.98
Jun-11		81.52
Jul-11		50.94
Aug-11		47.94
Sep-11		78.53
Oct-11		55.29
Nov-11		71.46
Dec-11		85.67
Jan-12		104.52
Feb-12		137.39
Mar-12		103.54
Apr-12		95.64
May-12		76.89
Jun-12		82.47
Jul-12		51.91
Aug-12		48.94
Sep-12		79.55
Oct-12		56.32
Nov-12		72.50
Dec-12		86.72
Jan-13		105.58
Feb-13		138.44
Mar-13		104.58
Apr-13		96.66
May-13		77.89
Jun-13		83.45
Jul-13		52.88
Aug-13		49.89
Sep-13		80.49
Oct-13		57.23
Nov-13		73.39
Dec-13		87.58
Jan-14		106.41
Feb-14		139.25
Mar-14		105.36
Apr-14		97.42
May-14		78.62
Jun-14		84.16
Jul-14		53.56
Aug-14		50.55
Sep-14		81.12
Oct-14		57.85
Nov-14		73.99

Commercial and Industrial Non-Heat Use Per Forecasting

Forecasts

Date	Actual	Forecast
Dec-14		88.17
Jan-15		106.98
Feb-15		139.80
Mar-15		105.90
Apr-15		97.95
May-15		79.13
Jun-15		84.66
Jul-15		54.05
Aug-15		51.04
Sep-15		81.60
Oct-15		58.32

Split-year

Nov-Oct

Nov. 2004- Oct. 2005	887.68	935.88
Nov. 2005- Oct. 2006	972.39	985.05
Nov. 2006- Oct. 2007	1,022.88	996.71
Nov. 2007- Oct. 2008	1,001.02	1,003.11
Nov. 2008- Oct. 2009		970.37
Nov. 2009- Oct. 2010		978.77
Nov. 2010- Oct. 2011		983.86
Nov. 2011- Oct. 2012		994.30
Nov. 2012- Oct. 2013		1,006.31
Nov. 2013- Oct. 2014		1,015.28
Nov. 2014- Oct. 2015		1,021.59

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Non-Heat Volume Forecasting

Regression Model:	FN1a88							
Dependent Variable:	VOLCN							
Independent Variable:	GSP	d1	d2	d4	d7	d8	d10	

Model	obNum	DFE	rsq	DW	SSE	MSE
FN1a88	84	0	0.9454895	2.118130854	4.5719E+10	544275463

Model	R_MSE	SBC	AIC	Nor	NorPct	Status
FN1a88	0	1974.000028	1947.261	9.616469544	0.00816226	0

Model		GSP	d1	d2	d4	d7	d8	d10
FN1a88	DF	1	1	1	1	1	1	1
FN1a88	Estimate	1.70080378	31734.526	67728.9453	18685.9268	-37538.558	-33398.604	-42067.30224
FN1a88	StdErr	0.036940191	0.1475857	0.147584101	0.14758419	0.14758432	0.147584197	0.147584427
FN1a88	tValue	46.04209544	215024.4	458917.6268	126611.984	-254353.3	-226302.0347	-285038.8962
FN1a88	Probt	0	0	0	0	0	0	0

Model		AR24	EARCH0	EARCH8	THETA
FN1a88	DF	1	1	1	1
FN1a88	Estimate	0.298725162	20.037589	-0.451221557	-0.4326623
FN1a88	StdErr	0.105099906	0.1335153	0.271074389	0.45735857
FN1a88	tValue	2.842297135	150.07707	-1.664567278	-0.9460025
FN1a88	Probt	0.004478973	0	0.095999118	0.34414733

Commercial and Industrial Non-Heat Volume Forecasting
Forecasts

Date	Actual	Forecast
May-02	78,223	77,918
Jun-02	162,567	78,146
Jul-02	36,742	40,899
Aug-02	15,593	45,360
Sep-02	129,033	79,053
Oct-02	13,960	37,236
Nov-02	105,850	79,501
Dec-02	122,285	79,679
Jan-03	102,640	111,583
Feb-03	147,078	147,730
Mar-03	121,768	80,174
Apr-03	85,033	99,047
May-03	42,096	80,635
Jun-03	80,619	81,045
Jul-03	51,238	44,112
Aug-03	45,011	48,920
Sep-03	71,415	82,873
Oct-03	43,496	41,177
Nov-03	106,525	83,499
Dec-03	101,575	83,797
Jan-04	101,421	115,973
Feb-04	196,448	152,480
Mar-04	38,298	85,340
Apr-04	104,937	104,579
May-04	88,123	86,336
Jun-04	55,232	61,679
Jul-04	38,219	51,038
Aug-04	72,682	63,249
Sep-04	65,357	73,258
Oct-04	47,375	53,566
Nov-04	68,794	81,260

Commercial and Industrial Non-Heat Volume Forecasting

Forecasts

Date	Actual	Forecast
Dec-04	84,888	76,752
Jan-05	118,599	124,051
Feb-05	126,894	157,612
Mar-05	92,097	77,282
Apr-05	107,146	112,646
May-05	63,369	101,452
Jun-05	53,266	90,356
Jul-05	44,250	51,004
Aug-05	89,904	58,924
Sep-05	109,926	94,956
Oct-05	41,672	48,998
Nov-05	96,649	85,064
Dec-05	69,703	86,976
Jan-06	134,377	128,992
Feb-06	138,967	148,189
Mar-06	130,245	108,341
Apr-06	121,550	113,326
May-06	95,592	94,529
Jun-06	66,934	104,674
Jul-06	68,256	61,290
Aug-06	60,710	56,656
Sep-06	70,309	102,530
Oct-06	77,990	53,637
Nov-06	147,458	102,207
Dec-06	131,848	97,623
Jan-07	101,736	128,813
Feb-07	163,910	173,066
Mar-07	129,455	95,562
Apr-07	89,453	115,588
May-07	77,768	104,827
Jun-07	102,842	108,356
Jul-07	59,000	62,848
Aug-07	55,690	55,066
Sep-07	81,895	92,757
Oct-07	66,752	58,595
Nov-07	59,657	96,816
Dec-07	91,809	105,002
Jan-08	152,309	127,302
Feb-08	192,589	173,198
Mar-08	101,206	88,403
Apr-08	120,923	115,693
May-08	116,380	99,549
Jun-08	115,883	108,494
Jul-08	75,523	59,824
Aug-08	51,761	67,872
Sep-08	76,662	108,552
Oct-08	50,324	51,439
Nov-08	88,567	84,908
Dec-08	69,948	89,078
Jan-09	158,211	138,872
Feb-09	164,507	166,741
Mar-09	81,003	88,782
Apr-09	153,269	124,747
May-09	-	103,767
Jun-09		96,172
Jul-09		60,527
Aug-09		66,979
Sep-09		102,626
Oct-09		52,593
Nov-09		109,420

Commercial and Industrial Non-Heat Volume Forecasting

Forecasts

Date	Actual	Forecast
Dec-09		99,927
Jan-10		123,246
Feb-10		158,171
Mar-10		97,768
Apr-10		116,414
May-10		93,807
Jun-10		94,295
Jul-10		58,000
Aug-10		70,879
Sep-10		107,149
Oct-10		60,627
Nov-10		104,017
Dec-10		109,771
Jan-11		124,865
Feb-11		169,992
Mar-11		107,287
Apr-11		110,273
May-11		101,121
Jun-11		103,734
Jul-11		66,022
Aug-11		69,896
Sep-11		103,054
Oct-11		63,824
Nov-11		101,936
Dec-11		105,249
Jan-12		139,983
Feb-12		176,759
Mar-12		107,348
Apr-12		126,550
May-12		109,568
Jun-12		109,949
Jul-12		72,594
Aug-12		74,684
Sep-12		107,770
Oct-12		67,596
Nov-12		109,814
Dec-12		108,665
Jan-13		145,949
Feb-13		179,743
Mar-13		111,101
Apr-13		135,046
May-13		114,098
Jun-13		113,885
Jul-13		76,982
Aug-13		81,783
Sep-13		115,812
Oct-13		73,469
Nov-13		117,276
Dec-13		116,881
Jan-14		148,340
Feb-14		184,677
Mar-14		118,082
Apr-14		137,210
May-14		118,619
Jun-14		119,084
Jul-14		82,087
Aug-14		87,435
Sep-14		121,499
Oct-14		79,455
Nov-14		122,050

Commercial and Industrial Non-Heat Volume Forecasting

Forecasts

Date	Actual	Forecast
Dec-14		122,998
Jan-15		153,699
Feb-15		190,925
Mar-15		124,106
Apr-15		141,833
May-15		124,448
Jun-15		125,114
Jul-15		88,006
Aug-15		92,566
Sep-15		126,369
Oct-15		84,994

Split-year
Nov-Oct

Nov. 2004-	1,000,804	1,075,292
Nov. 2005-	1,131,281	1,144,203
Nov. 2006-	1,207,807	1,195,309
Nov. 2007-	1,205,027	1,202,144
Nov. 2008- Oct. 2009		1,175,792
Nov. 2009- Oct. 2010		1,189,701
Nov. 2010- Oct. 2011		1,233,855
Nov. 2011- Oct. 2012		1,299,987
Nov. 2012- Oct. 2013		1,366,349
Nov. 2013- Oct. 2014		1,430,645
Nov. 2014- Oct. 2015		1,497,108

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Non-Heat

alpha value calculation

$$P_{c,T+j} = \alpha \cdot P_{1,T+j} + (1-\alpha) \cdot P_{2,T+j}$$

$$\alpha = \frac{VAR[e_{2,t}] - COV[e_{1,t}, e_{2,t}]}{VAR[e_{1,t}] + VAR[e_{2,t}] - 2COV[e_{1,t}, e_{2,t}]}$$

	V[E1]	V[E2}	C[E1,E2]	**alpha**
Reg	658174971.8	6.72E+08	5.35E+08	0.52718394

Regression Forecast Error

Date	Sales E1	Volume E2
May-02	471.8261795	304.7553704
Jun-02	72656.12122	84420.92819
Jul-02	-18847.37952	-4156.562484
Aug-02	-35217.09746	-29767.42559
Sep-02	17615.47273	49979.90853
Oct-02	-33800.99589	-23275.26959
Nov-02	38135.85623	26348.96267
Dec-02	6669.85772	42606.2211
Jan-03	3326.13787	-8943.364325
Feb-03	-23051.22373	-652.1707219
Mar-03	-6626.002422	41593.71047
Apr-03	-13820.19693	-14013.54129
May-03	-37217.71298	-38538.99823
Jun-03	-8344.149013	-425.3541439
Jul-03	4715.592272	7126.36141
Aug-03	9486.643782	-3909.194058
Sep-03	-14362.16377	-11458.07417
Oct-03	-13439.77408	2318.353634
Nov-03	30317.61491	23025.77692
Dec-03	14014.60162	17777.95672
Jan-04	-2819.814859	-14551.9327
Feb-04	23434.54573	43968.0631
Mar-04	-78275.13901	-47042.06389
Apr-04	4524.688704	358.1773137
May-04	-5207.705506	1787.358241
Jun-04	-5859.237122	-6446.390775
Jul-04	-18618.52613	-12818.53088
Aug-04	16895.13317	9433.240845
Sep-04	-11671.20191	-7901.048189
Oct-04	-6544.254348	-6190.837336
Nov-04	-18054.91878	-12466.56598

Regression Forecast Error

Date	Sales E1	Volume E2
Dec-04	-3631.511196	8135.942128
Jan-05	8670.705406	-5452.451414
Feb-05	-24596.39754	-30717.94322
Mar-05	-15568.76302	14815.19666
Apr-05	-2358.601058	-5499.542454
May-05	-4428.535078	-38082.87662
Jun-05	-38848.03342	-37090.02958
Jul-05	-14022.59437	-6753.958465
Aug-05	39779.53491	30980.26896
Sep-05	36425.53878	14969.4162
Oct-05	-13612.61713	-7325.819495
Nov-05	3396.759145	11585.5707
Dec-05	-35082.8998	-17273.12991
Jan-06	20276.46225	5385.178575
Feb-06	-10514.21377	-9221.876756
Mar-06	20659.90934	21904.16372
Apr-06	9886.91631	8223.45397
May-06	14979.71329	1062.910192
Jun-06	-31788.19564	-37740.15974
Jul-06	3438.022394	6966.057862
Aug-06	-2522.336802	4053.81616
Sep-06	-15617.44532	-32220.93418
Oct-06	9520.648184	24352.81377
Nov-06	62248.92307	45250.64499
Dec-06	49806.8418	34224.84771
Jan-07	-10802.83244	-27077.0547
Feb-07	-14576.50437	-9155.566568
Mar-07	-17337.69179	33892.43575
Apr-07	-22998.49076	-26134.75495
May-07	-19232.49404	-27058.80877
Jun-07	10771.91503	-5513.720816
Jul-07	6873.557602	-3848.572871
Aug-07	3466.703129	623.702497
Sep-07	-17305.3816	-10861.52922
Oct-07	2736.122129	8156.922883
Nov-07	-15622.78669	-37159.16681
Dec-07	-11475.33418	-13192.97346
Jan-08	20823.86031	25007.10348
Feb-08	38945.39485	19391.30675
Mar-08	-18716.13422	12802.52648
Apr-08	-3436.230318	5229.490216
May-08	18861.80221	16831.74222
Jun-08	28012.6046	7388.943418
Jul-08	13851.05221	15699.65943
Aug-08	-18313.07874	-16110.70641
Sep-08	-27186.62247	-31889.6382
Oct-08	-22413.89225	-1115.276362

Regression Forecast Error

Date	Sales E1	Volume E2
Nov-08	4022.729888	3658.862146
Dec-08	-28086.8927	-19129.86838
Jan-09	39522.13166	19339.64527
Feb-09	-8792.681305	-2233.876197
Mar-09	-28891.20737	-7778.256302
Apr-09	28125.55754	28521.82238
May-09	-80471.43682	-103766.89

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Non-Heat Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
May-02	78,223	77,751	77,918	77,830
Jun-02	162,567	89,911	78,146	84,348
Jul-02	36,742	55,589	40,899	48,643
Aug-02	15,593	50,810	45,360	48,233
Sep-02	129,033	111,418	79,053	96,115
Oct-02	13,960	47,761	37,236	42,785
Nov-02	105,850	67,714	79,501	73,287
Dec-02	122,285	115,615	79,679	98,624
Jan-03	102,640	99,314	111,583	105,115
Feb-03	147,078	170,129	147,730	159,538
Mar-03	121,768	128,394	80,174	105,595
Apr-03	85,033	98,854	99,047	98,945
May-03	42,096	79,313	80,635	79,938
Jun-03	80,619	88,963	81,045	85,219
Jul-03	51,238	46,523	44,112	45,383
Aug-03	45,011	35,524	48,920	41,858
Sep-03	71,415	85,777	82,873	84,404
Oct-03	43,496	56,935	41,177	49,485
Nov-03	106,525	76,208	83,499	79,655
Dec-03	101,575	87,560	83,797	85,781
Jan-04	101,421	104,241	115,973	109,788
Feb-04	196,448	173,014	152,480	163,305
Mar-04	38,298	116,573	85,340	101,805
Apr-04	104,937	100,412	104,579	102,382
May-04	88,123	93,331	86,336	90,023
Jun-04	55,232	61,092	61,679	61,369
Jul-04	38,219	56,838	51,038	54,095
Aug-04	72,682	55,787	63,249	59,315
Sep-04	65,357	77,028	73,258	75,246
Oct-04	47,375	53,919	53,566	53,752
Nov-04	68,794	86,849	81,260	84,207
Dec-04	84,888	88,520	76,752	82,956
Jan-05	118,599	109,928	124,051	116,605
Feb-05	126,894	151,491	157,612	154,385
Mar-05	92,097	107,666	77,282	93,300
Apr-05	107,146	109,505	112,646	110,990
May-05	63,369	67,797	101,452	83,709
Jun-05	53,266	92,114	90,356	91,283
Jul-05	44,250	58,273	51,004	54,836
Aug-05	89,904	50,124	58,924	54,285
Sep-05	109,926	73,500	94,956	83,645
Oct-05	41,672	55,284	48,998	52,312
Nov-05	96,649	93,252	85,064	89,381
Dec-05	69,703	104,786	86,976	96,365
Jan-06	134,377	114,101	128,992	121,142
Feb-06	138,967	149,481	148,189	148,870
Mar-06	130,245	109,585	108,341	108,997
Apr-06	121,550	111,663	113,326	112,449
May-06	95,592	80,612	94,529	87,192
Jun-06	66,934	98,722	104,674	101,536
Jul-06	68,256	64,818	61,290	63,149
Aug-06	60,710	63,232	56,656	60,123
Sep-06	70,309	85,926	102,530	93,777
Oct-06	77,990	68,470	53,637	61,457
Nov-06	147,458	85,209	102,207	93,246
Dec-06	131,848	82,041	97,623	89,409
Jan-07	101,736	112,539	128,813	120,234
Feb-07	163,910	178,486	173,066	175,923
Mar-07	129,455	146,793	95,562	122,570
Apr-07	89,453	112,452	115,588	113,935
May-07	77,768	97,001	104,827	100,701

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Non-Heat Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
Jun-07	102,842	92,070	108,356	99,770
Jul-07	59,000	52,126	62,848	57,196
Aug-07	55,690	52,223	55,066	53,567
Sep-07	81,895	99,200	92,757	96,154
Oct-07	66,752	64,016	58,595	61,453
Nov-07	59,657	75,279	96,816	85,462
Dec-07	91,809	103,284	105,002	104,097
Jan-08	152,309	131,485	127,302	129,507
Feb-08	192,589	153,644	173,198	162,889
Mar-08	101,206	119,922	88,403	105,020
Apr-08	120,923	124,359	115,693	120,262
May-08	116,380	97,519	99,549	98,478
Jun-08	115,883	87,871	108,494	97,622
Jul-08	75,523	61,672	59,824	60,798
Aug-08	51,761	70,074	67,872	69,033
Sep-08	76,662	103,849	108,552	106,072
Oct-08	50,324	72,738	51,439	62,668
Nov-08	88,567	84,544	84,908	84,716
Dec-08	69,948	98,035	89,078	93,800
Jan-09	158,211	118,689	138,872	128,232
Feb-09	164,507	173,299	166,741	170,198
Mar-09	81,003	109,895	88,782	99,912
Apr-09	153,269	125,144	124,747	124,956
May-09	-	80,471	103,767	91,486
Jun-09		76,552	96,172	85,829
Jul-09		73,165	60,527	67,189
Aug-09		54,360	66,979	60,327
Sep-09		86,638	102,626	94,197
Oct-09		70,684	52,593	62,131
Nov-09		83,533	109,420	95,773
Dec-09		98,954	99,927	99,414
Jan-10		121,634	123,246	122,396
Feb-10		156,947	158,171	157,525
Mar-10		118,525	97,768	108,711
Apr-10		109,375	116,414	112,703
May-10		85,901	93,807	89,639
Jun-10		93,153	94,295	93,693
Jul-10		58,485	58,000	58,256
Aug-10		55,375	70,879	62,705
Sep-10		91,931	107,149	99,126
Oct-10		65,127	60,627	62,999
Nov-10		83,889	104,017	93,406
Dec-10		101,191	109,771	105,247
Jan-11		120,129	124,865	122,368
Feb-11		158,250	169,992	163,802
Mar-11		120,606	107,287	114,308
Apr-11		110,087	110,273	110,175
May-11		87,388	101,121	93,881
Jun-11		94,940	103,734	99,098
Jul-11		59,400	66,022	62,531
Aug-11		56,649	69,896	62,912
Sep-11		93,780	103,054	98,164
Oct-11		66,592	63,824	65,283
Nov-11		85,857	101,936	93,460
Dec-11		103,526	105,249	104,341
Jan-12		122,850	139,983	130,951
Feb-12		161,696	176,759	168,818
Mar-12		123,499	107,348	115,863
Apr-12		112,870	126,550	119,338
May-12		89,859	109,568	99,178
Jun-12		97,581	109,949	103,429

National Grid New Hampshire
EnergyNorth Gas Inc.
Commercial and Industrial Non-Heat Demand Forecasting
Regression Models (Dth)

Date	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
Jul-12		61,511	72,594	66,751
Aug-12		58,756	74,684	66,287
Sep-12		96,518	107,770	101,838
Oct-12		68,914	67,596	68,291
Nov-12		88,493	109,814	98,574
Dec-12		106,444	108,665	107,494
Jan-13		126,075	145,949	135,472
Feb-13		165,515	179,743	172,243
Mar-13		126,682	111,101	119,315
Apr-13		115,862	135,046	124,932
May-13		92,463	114,098	102,693
Jun-13		100,271	113,885	106,708
Jul-13		63,617	76,982	69,936
Aug-13		60,798	81,783	70,721
Sep-13		99,089	115,812	106,996
Oct-13		71,043	73,469	72,190
Nov-13		90,864	117,276	103,352
Dec-13		109,026	116,881	112,740
Jan-14		128,918	148,340	138,101
Feb-14		168,902	184,677	176,361
Mar-14		129,466	118,082	124,083
Apr-14		118,475	137,210	127,334
May-14		94,712	118,619	106,016
Jun-14		102,597	119,084	110,392
Jul-14		65,375	82,087	73,277
Aug-14		62,483	87,435	74,281
Sep-14		101,287	121,499	110,844
Oct-14		72,815	79,455	75,954
Nov-14		92,892	122,050	106,678
Dec-14		111,287	122,998	116,824
Jan-15		131,478	153,699	141,984
Feb-15		172,035	190,925	180,967
Mar-15		132,006	124,106	128,271
Apr-15		120,858	141,833	130,775
May-15		96,743	124,448	109,843
Jun-15		104,726	125,114	114,366
Jul-15		66,947	88,006	76,904
Aug-15		64,002	92,566	77,507
Sep-15		103,359	126,369	114,239
Oct-15		74,468	84,994	79,445

Split-year Nov-Oct	Actual	Customers*Use Per	Volume Forecast	Combined Forecast
Nov. 2004- Oct. 2005	1,000,804	1,051,050	1,075,292	1,062,512
Nov. 2005- Oct. 2006	1,131,281	1,144,648	1,144,203	1,144,437
Nov. 2006- Oct. 2007	1,207,807	1,174,156	1,195,309	1,184,158
Nov. 2007- Oct. 2008	1,205,027	1,201,696	1,202,144	1,201,908
Nov. 2008- Oct. 2009		1,151,476	1,175,792	1,162,973
Nov. 2009- Oct. 2010		1,138,939	1,189,701	1,162,940
Nov. 2010- Oct. 2011		1,152,900	1,233,855	1,191,177
Nov. 2011- Oct. 2012		1,183,438	1,299,987	1,238,544
Nov. 2012- Oct. 2013		1,216,353	1,366,349	1,287,273
Nov. 2013- Oct. 2014		1,244,920	1,430,645	1,332,733
Nov. 2014- Oct. 2015		1,270,801	1,497,108	1,377,802

NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

ENERGYNORTH NATURAL GAS, INC.
D/B/A
NATIONAL GRID NH

ENERGY EFFICIENCY PLAN

May 1, 2009 through December 31, 2010

May 8, 2009

nationalgrid

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Exhibit A: Projected Program Expenses: presents detailed budgets by program and year.

Exhibit B: Benefit Cost Analysis: summarizes the two-year benefit cost (BC) ratios for the programs as well as each year's BC ratio by sector with and without shareholder incentive.

Exhibit C: Program Input Assumptions: shows the per participant savings, costs, and rebates for each program measure.

Exhibit D: Shareholder Incentive Calculation: estimates the Company's projected shareholder incentive for successful implementation of its energy efficiency programs.

I. FORWARD

This document presents to the New Hampshire Public Utilities Commission (NHPUC or the Commission) EnergyNorth Natural Gas, Inc.[1] d/b/a National Grid NH's (the Company) proposed Energy Efficiency (EE) plan for the twenty-month period May 1, 2009[2] through December 31, 2010. The Company's current programs, which were approved by Commission Order 24,636, were set to expire on April 30, 2009. By Secretarial Letter dated April 21, 2009, the Commission authorized the continuation of those programs until a new energy efficiency plan is approved. This proposed EE Plan provides updated program descriptions, benefit/cost analyses, program budgets and program goals for this twenty-month time period and is premised on the existing program structure. The Company is proposing a few additions to its current program offerings. On the residential side, the Company is including rebates for residential energy efficient storage water heaters and adding a program element to address individually metered gas multifamily facilities (five or more units) in both the Residential Weatherization program and Energy Audit and Home Performance program. The Residential Weatherization program provides insulation to customers in conjunction with air sealing. Energy Audit and Home Performance provides education to participants either through phone support or an in-home audit. The Low Income Program will also be expanded and will serve individually metered gas multifamily facilities within the Low Income Program. Low Income program budgets have been increased to account for these individually metered low income multifamily facilities and to accommodate the expiration of other funding sources. The increased budget will allow the Company to serve a similar volume of participants as in the past two years. New commercial and industrial initiatives include the steam savings initiative and enhanced commercial kitchens.

National Grid's Energy Efficiency Plan covers a twenty-month period rather than the traditional three-year plan in anticipation of a joint electric and gas Energy Efficiency multi-year plan beginning on January 1, 2011. The proposed budget for the Company's

[1] EnergyNorth Natural Gas, Inc. is one of four local distribution companies that do business as National Grid Energy Delivery New England. The other companies provide service in Massachusetts as Boston Gas Company, Colonial Gas Company and Essex Gas Company.
[2] The Company initially proposed that the Plan take effect on May 1, 2009. The Company will implement the proposed Plan upon approval by the Commission.

EE efforts for the eight months in 2009 is $2,815,786 and is $4,986,415 in calendar year 2010. Detailed budgets are set forth in Table I.

This energy efficiency plan incorporates several changes and enhancements compared to prior plans submitted by the Company. One change to this plan, as compared to previous gas energy efficiency filings, is the adoption of the cost categories currently in use in the electric energy efficiency plan filings when presenting the energy efficiency budget (Exhibit A). In addition, the current Plan covers a shorter time period than the three-year plans that have been submitted by the Company in prior years. After a CORE Electric meeting on February 9, 2009, National Grid discussed with PUC staff and OCA the potential of moving toward common planning elements between the gas and electric utilities. The discussion concluded with an agreement that the gas energy efficiency plan would consist of the twenty-month period May 2009 through December 2010 in anticipation of a joint electric and gas EE plan beginning January 1, 2011. At that meeting, National Grid also noted its intent to transition the previously used traditional gas cost categories to the electric cost categories so that efforts to better coordinate gas and electric energy efficiency efforts will be simplified. Appendix A defines the traditional gas and electric cost categories. The 2008 energy efficiency plan costs are mapped to both the prior gas cost categories and the electric costs categories that the Company proposes to adopt moving forward. In Exhibit A: Projected Program Expenses, costs are also presented in gas cost categories as well as electric cost categories for 2009 and 2010.

Exhibit B, the Benefit Cost Analysis, uses the same benefit cost model as the CORE electric utilities. Avoided energy costs are from the regional “Avoided Energy Supply Costs in New England: 2007 Final Report.” Both the costs and benefits are presented in 2009 dollars for the twenty-month period. Information for a specific program year is presented in that year’s dollars. Finally, Exhibit D, the Shareholder Incentive Calculation is presented in a similar manner as the electric Shareholder Incentive calculations. The target Benefit/Cost ratio is net of shareholder incentive. Target Incentive levels are 8% of utility costs or total resource costs minus participant costs and shareholder incentives.

Table-I: May 1, 2009 - December 31, 2010 Budget			
Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$272,602	$437,475	Company Administration
External Administration	$225,702	$381,323	Vendor Admin/Support
Rebates/Services	$1,862,548	$3,483,770	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$363,486	$519,636	
	$272,388	*$382,575*	*Communication*
	$91,098	*$137,061*	*Trade Ally*
Evaluation	$91,448	$164,211	Evaluation and Reporting
Total	$2,815,786	$4,986,415	

In an effort to begin to achieve some consistency between the gas and electric energy efficiency programs, the Company is presenting some aspects of this filing in a different format than its prior filings:

1. The electric utilities provide program budgets in different cost categories than have been used by the Company in its gas energy efficiency filings. In this filing, the Company is providing its proposed EE budgets using the budget categories in the electric energy efficiency filings.
2. The presentation of the performance-based shareholder incentive mechanism has been different in the gas and electric EE plans. The Company is adopting the presentation that can be found in the electric EE plans here (see Exhibit D) but maintaining the current methodology for calculation of the incentive.

The remainder of this EE Plan provides an overview of proposed programs, a more detailed discussion of EE efforts for residential customers, a more detailed discussion of EE efforts for commercial and industrial customers, proposed outreach and communication efforts, evaluation and reporting, and a discussion about proposed performance-based shareholder incentives.

Four exhibits are provided in support of this EE Plan:

1. Exhibit A: Projected Program Expenses presents detailed budgets by program and year.
2. Exhibit B: Benefit Cost Analysis summarize the two-year benefit cost (BC) ratios for the programs as well as each year's BC ratio by sector with and without shareholder incentive.
3. Exhibit C: Program Input Assumptions shows the per participant savings, costs, and rebates for each program measure.
4. Exhibit D: Shareholder Incentive Calculation estimates the Company's projected shareholder incentive for successful implementation of its energy efficiency programs.

II. OVERVIEW OF ENERGY EFFICIENCY PROGRAMS

This document presents the Company's twenty-month (May 1, 2009 through December 31, 2010) EE plan (the Plan). Regional initiatives and collaborative groups also have influenced the Plan. Many of the programs described are a continuation of programs currently offered and approved by the Commission. Overall, the Company has developed programs that address a wide variety of energy efficiency opportunities for natural gas customers. These programs are summarized in Table II. The Company has included recent rebate changes and program updates agreed to by the regional GasNetworks™ collaborative to ensure the same rebate levels are offered by Northern Utilities and gas companies throughout the region and to support coordinated program delivery with NH Saves (Core electric programs).

Table-II: Proposed Energy Efficiency Plan Offerings (Programs) of the Company

Table-II: Energy Efficiency Programs	
Residential Market	
High-Efficiency Heating, Water Heating, and Controls Program	$500 incentive for boilers (85% AFUE), $1000 incentive (90% AFUE) $200 incentive for steam boilers (with electronic ignition, 82% AFUE), $400 incentive for high-efficiency furnaces (92% AFUE) with ECM Motor and $100 incentive on furnaces (92% AFUE).
	$300 incentive for indirect water heating system connected to an ENERGY STAR® rated natural gas forced hot water boiler and $300 for on demand water heaters (EF .82 with an electronic ignition). $50 for ENERGY STAR® .62 EF storage water heaters.
	$25 incentive each for up to two ENERGY STAR® labeled programmable thermostats. $100 for boiler reset controls.
New Home Construction with ENERGY STAR®	Free building plans review and certification for new ENERGY STAR® residential construction.
Residential Weatherization Program: Residential Weatherization, ENERGY STAR® Replacement Windows, and <u>Energy Analysis: Internet Audit</u>	$10.00 each for qualifying ENERGY STAR® labeled windows (U-factor of .35 or less). $500 maximum. Incentive available in 2009 and no longer available in 2010.
	Incentive of 75% of installed cost of qualifying insulation and weatherization measures installed by participating contractors up to $4,000 for 1-4 unit homes, up to $750 for 5+ unit dwellings where each dwelling is individually metered. Air sealing on average up to $650.
	Free online energy analysis service that makes customized energy efficiency recommendations based on a customer's energy consumption profile.
Energy Audit and Home Performance	Tier One – Educational, technical, and audit assistance by phone. Tier Two – Home Energy Assessment and low-cost energy saving measures.
Residential Building Practices and Demonstration Program	Participate in funding for demonstration projects that apply to new or underutilized technologies.
Residential Low Income Program	Energy audit conducted and measures installed (up to $4,500 per residence) at no cost to income eligible customers (up to 200% of Federal Poverty Level Guidelines).
Commercial & Industrial Markets	
Commercial Energy Efficiency Program	Co-funding for Energy Auditing or Engineering Services; Prescriptive and custom incentives for more sophisticated systems and controls up to $100,000. New construction projects eligible for up to $250,000.
	Incentive of up to 50% of projects installed costs for eligible measures, cap of $100,000 per project. Multifamily projects include redesign of space heating or water heating systems, steam system upgrades, building insulation, high-efficiency windows, and related measures.
	Matching grants up to $100,000 for energy saving measures in commercial properties in designated Economic Redevelopment areas.
Commercial and Industrial High-Efficiency Heating Equipment Program	Incentives up to $6,000 for high-efficiency furnaces (90% AFUE), boilers (85% thermal efficiency) or steam boilers (82% thermal efficiency).
Building Practices & Demonstration Program	Participate in funding for demonstration projects that apply to new or underutilized technologies.
Business Energy Analyzer	Free online energy analysis service that makes customized energy efficiency recommendations based on a commercial customer's energy consumption profile.
Codes Training Outreach etc.	
Building Operator Certification	Energy management training sessions targeted to individuals responsible for the maintenance and operation of equipment and systems in commercial buildings, industrial plants, and public facilities. Provide information and training on energy efficiency issues to plumbing & heating contractors, builders, architects, engineers, realtors, appraisers and others.

During the 2009 – 2010 program years, the Company will build upon the existing portfolio of programs by:

- Continuing to manage existing programs cost-effectively;
- Coordinating closely with the NH Saves Core Electric Energy Efficiency programs and Northern Utilities;
- Identifying and developing new, cost-effective programs; and,
- Integrating discrete initiatives to more comprehensively address all energy uses and markets and barriers to energy efficiency.

The energy efficiency programs provide incentives to customers to choose energy efficient products. These products may be purchased from and installed by any qualified contractor selected by the customer. The Company's programs are designed to encourage contractor participation. The Company generally does not perform direct product installations. Customers are afforded the opportunity to use the contractor of their choice for some programs. All contractors are permitted to compete for the customer's business on an equal basis, though weatherization contractors will need to be trained in proper air sealing techniques to participate in program rebates.. Through its trade ally program, the Company provides training and encourages contractors to recommend and provide bids for qualifying energy efficient products.

In designing the proposed energy efficiency programs, wherever practical, the Company has established efficiency standards consistent with the ENERGY STAR® labeling program standards of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). ENERGY STAR® is a collaborative effort of the DOE and EPA to prevent pollution and encourage conservation by helping consumers buy products that use less energy. The ENERGY STAR® label and promotional activities raise awareness of the environmental and economic benefits of energy efficient products and help consumers easily identify them.

In other instances the Company has established program criteria consistent with the specifications adopted by Consortium for Energy Efficiency (CEE) on products including furnaces, boilers and windows.

III. RESIDENTIAL PROGRAMS

A. *Residential High-Efficiency Heating, Water Heating and Controls Program*

The foundation for this program is incentives for customers to purchase high-efficiency gas heating equipment and controls. The program goals include:

- Making customers aware of high-efficiency gas heating equipment, controls, and the energy savings achievable;
- Increasing market sector awareness and demand for high-efficiency gas heating equipment and controls;
- Facilitating the purchase of high efficiency gas heating equipment and controls;
- Providing training to Trade Allies such as plumbing and heating contractors and increasing trade ally awareness of the benefits of high-efficiency gas heating equipment and controls.

The program is jointly operated with GasNetworks™ and will be promoted through a variety of marketing and educational awareness campaigns including, but not limited to: direct mail campaigns, bill inserts, trade ally events, sponsorships, and program brochures. The program will also be promoted via the Company's website, www.nationalgrid.com and the GasNetworks™ website, www.gasnetworks.com, where consumers and contractors will have the opportunity to download program incentive applications, as well as learn about program announcements and updates. The Company's products website, www.thinksmartthinkgreen.com, will also be used to promote this program.

In addition, the Company will continue its retailer outreach program with national home improvement chains, local hardware stores, suppliers, and distributors. This outreach effort provides training for sales personnel regarding the rebate programs and coordinates the ongoing distribution of program brochures and rebate applications.

A strong emphasis will be placed on working with builders and contractors who install gas heating equipment and controls. Target markets for the program include both new construction and existing residences. Incentives are available to residential customers (builders and/or homeowners).

The Company encourages customers to choose high-efficiency by offsetting a portion of the high efficiency price premium. Information collected from the Company's field services contractors suggests that installation contractors have a large impact on the choice of heating equipment to be installed. The Company will also offer an incentive to installation contractors to further stimulate the installation of high-efficiency heating equipment. The Company may make changes to incentive levels for eligible heating, water heating, and control equipment during the program year. Additional cost effective measures may also be added if there is reliable evidence of cost effectiveness. See Table II for a list of eligible measures and the associated incentive level.

The Advanced Residential Controls category includes programmable thermostats and boiler reset controls. The ENERGY STAR® Programmable Thermostat initiative has been a mainstay of National Grid's residential energy efficiency offerings. National Grid plans to continue to offer its customers incentives for high performance programmable thermostats, which the Company views as an excellent means of controlling and reducing energy use. The following describes National Grid's ongoing commitment to the highly-successful thermostat program and incentives for boiler reset controls.

National Grid's residential heating customers are eligible for a $25 mail-in incentive for the installation of up to two ENERGY STAR® qualified programmable thermostats, for a maximum of $50 per household. When applying for a thermostat incentive, customers are required to submit proof-of-purchase for the unit. Eligible thermostats may be installed by homeowners and HVAC contractors.

Earning the ENERGY STAR® label means products meet strict energy efficiency guidelines. ENERGY STAR® thermostats are more accurate than manual models and contain no mercury. When used properly, they can save a notable amount of energy, and are better for the environment. Because older model thermostats are a common source of mercury, these thermostats should be properly recycled. On the Company's website and incentive forms, National Grid directs its customers to recycle mercury thermostats through municipal hazardous waste collection programs.

The U.S. Environmental Protection Agency (EPA) modified its thermostat program from a performance specification to consumer education on May 1, 2007. The EPA's action is based partly on studies weighted toward regions of the country where central cooling is the major energy load and, as a result, use of programmable thermostats result in minimal savings. However, in New England, where a major energy load is heating, there is ample evidence that ENERGY STAR® thermostats can significantly reduce energy consumption. A 2007 RLW Analytics study, commissioned by GasNetworks™, estimated an average savings of 75 ccf of natural gas per heating season per thermostat installed. While there will be changes to this EPA designation, National Grid continues to see merit in promoting programmable thermostats and thus intends to continue offering incentives to customers.

National Grid is offering incentives for the installation of boiler reset controls. This technology works by monitoring the outdoor temperature and adjusting the frequency that the boiler responds to heat demand. For example, on a relatively mild winter day, a thermostat won't call for heat as often, so the boiler will not need to work as hard. The reset control adjusts the water supply temperature allowing it to drop to lower temperatures before firing.

Boiler reset controls have been available for residential heating systems for more than 30 years. However, due to relatively high installation costs, lack of promotion by manufacturers, and the lack of incentives in energy efficiency programs, there has been little market penetration. The Company offers an incentive of $100 per reset control installed. This incentive is only available for newer boilers without built-in controls.

Table-III: Residential High-Efficiency Heating, Water Heating and Controls Program

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$24,585	$36,695	Company Administration
External Administration	$8,825	$13,170	Vendor Admin/Support
Rebates/Services	$226,373	$361,300	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$142,922	$190,680	
	$112,922	*$160,680*	*Communication*
	$30,000	*$30,000*	*Trade Ally*
Evaluation	$16,630	$24,555	Evaluation and Reporting
Total	$419,335	$626,400	
Goals			
High Efficiency Heating	**404 participants**	**551 participants**	
High Efficiency Water Heating	**131 participants**	**257 participants**	
Advanced Controls	**212 participants**	**704 participants**	
Total	**747 participants**	**1,512 participants**	

B. New Home Construction with ENERGY STAR®

National Grid will continue its support of energy efficient new home construction through the New Hampshire New Home Construction with ENERGY STAR® Program. This Program is designed to encourage builders to construct their homes to a higher level of energy efficiency beyond standard code requirements. The New Home Construction With ENERGY STAR® Program offers a combination of utility incentives geared specifically to home buyers and builders, incentives which promote the construction of homes that meet national ENERGY STAR® Home efficiency standards. The program's objective is to transform the residential new construction market to build homes that are designed beyond code expectations and meet stricter guidelines for energy efficiency.

ENERGY STAR® Homes are recognized nationally for lower operating costs and energy consumption, increased durability, comfort, safety and greater resale value. ENERGY STAR® Homes feature the best in efficient building practices and technologies, including: increased insulation levels, high-efficiency heating and air conditioning equipment, superior duct systems, and high performance windows. Most segments of the housing market are eligible to participate in the New Homes with ENERGY STAR® Program, including new and existing residential single family and low-rise multifamily dwellings, townhouses and condominium developments.

All participants in the program receive design and technical support services, testing and inspection of energy efficiency measures, and an ENERGY STAR® certification following the passing of the ENERGY STAR® Homes rating test by qualified home raters. Each participating home receives a complete plan evaluation, computer energy model, and inspections during construction, and ongoing builder consultation, and on-site training as the home is being built. In order to earn an ENERGY STAR® Homes certificate, each house, or sampling of model units within a larger development, is performance tested to verify the quality of installed energy features. This involves conducting a blower-door test once the home is completed to measure the building's overall air leakage, and a ventilation test to verify airflow rates.

This program is jointly sponsored through a consortium of participating New Hampshire utilities that meet on a regular basis to plan and implement the program. The natural gas and electric utility provider in the specific territory of an ENERGY STAR® Home being developed will share the costs of providing technical support and certification testing services, from "sign-up" through certification testing for each qualifying home. This sharing of administrative and implementation fees between gas and electric sponsors are replicated with other gas utility sponsors of the New Hampshire ENERGY STAR® Homes program. In certain cases, the Company may pay the entire cost of an ENERGY STAR® Home's participation fee if the home is constructed in a community served by a municipal electric utility that does not participate in the Program.

Since the Company began its support of the New Hampshire ENERGY STAR® Homes program, Conservation Services Group, Inc. (CSG) has been the Company's sole rater for the ENERGY STAR® Homes program in New Hampshire. CSG is a third-party energy conservation consulting group responsible for the review and certification of each participating house in the Company's territory to ensure it meets strict ENERGY STAR® criteria. In the coming year, the Company may explore the opportunity to further align both gas and electric ENERGY STAR® Homes programs.

Marketing activities for the ENERGY STAR® Homes program consist primarily of direct outreach to builders by qualified home raters and home inspectors throughout the state's most active building regions. The ENERGY STAR® Homes toll-free phone number and website are essential resources for prospective builders that link home construction projects to participating home raters in the region. In addition to outreach, participating utilities may sponsor ENERGY STAR® training sessions specifically for builders and homebuyers throughout the year.

During the coming year, National Grid anticipates that participation in this program could be impacted by certain barriers, including the downturn in the New Hampshire new construction market. In an effort to combat this, National Grid will look to increase builder trainings as well as program marketing.

Table-IV: New Home Construction with ENERGY STAR®			
Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$1,260	$1,680	Company Administration
External Administration	$1,980	$2,640	Vendor Admin/Support
Rebates/Services	$10,800	$14,400	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$3,060	$4,080	
	$2,700	*$3,600*	*Communication*
	$360	*$480*	*Trade Ally*
Evaluation	$1,415	$2,044	Evaluation and Reporting
Total	$18,515	$24,844	
Goal	**20 participants**	**30 participants**	

C. Energy Audit and Home Performance

The Energy Audit and Home Performance program, formerly known as Residential Conservation Services, is designed to help customers who either live in 1 to 4 unit homes or in individually metered multifamily dwellings with 5 or more units to optimize their home's energy use. The program provides a free assessment of a customer's energy usage and recommends various ways customers can improve their home's energy efficiency. Customers are provided with a detailed report containing recommendations for action and how to utilize the Company's other energy efficiency programs.

National Grid has become an active participant in the New Hampshire Residential Energy Performance Association (REPA), a New Hampshire organization whose goals are to provide training and promote consistency in the delivery of energy efficiency services. The auditor who performs the majority of the Company's audits in New Hampshire, as well as the vendor's supervisory staff, participates in REPA. The Company has also established www.energyfederation.org/nationalgrid. This website assists customers in purchasing materials to make their homes more energy efficient. Selections include all non-major measures that are recommended during the audit. The Company plans to promote the Energy Audit and Home Performance program through advertising, including bill inserts, direct mail, the National Grid website www.thinksmartthinkgreen.com, and its product website www.energyfederation.org/nationalgrid, online Home Energy Analyzer and *e-fficiency news* electronic newsletters. Customers can also call the toll-free number to learn more about the Energy Audit and Home Performance program and all of the Company's residential energy efficiency programs.

1. One to Four Unit Homes

For customers living in 1 to 4 unit homes, there are two levels of service provided by the program. Tier One screening offers referrals to educational web sites and information about energy efficiency programs, and captures requests for literature such as the DOE "Energy Savers" booklet. Technical assistance regarding installation of energy savings measures is also available by phone. The Company has adopted a customized version of the online audit tool to guide the customer through Tier One. The tool provides the customer service representatives with discussion points that allow a dialogue to better understand the customer's needs. Ultimately, the information collected by Tier One staff may result in a referral to Tier Two services.

Tier Two services consist of two audits. The first, the walk through audit, provides a home energy assessment and includes the installation of low-cost energy efficiency Instant Savings Measures (ISMs) that have an average total value of $30. These measures are installed by the energy auditors at no charge to the customer as a way of educating the customer to the value of do-it-yourself measures. The customer is also provided a computer generated report describing the results of the home energy assessment which includes recommendations for energy saving measures. If the customer is willing to implement additional energy efficient measures, a combustion safety test will be performed at the walk through. The primary goal of the home energy assessment is to give customers an opportunity to understand the impact of energy efficiency measures and to motivate them to implement the recommendations.

The second audit National Grid is proposing is a two person energy audit team for customers who will proceed with energy efficiency upgrades. The two person team would provide a comprehensive home assessment in conjunction with whole house air sealing. This added value service averages $650 and would be provided at no cost to the customer. To address health and safety concerns, pre-and post-blower door and CO testing is required. The procedures described in Tier 1 and Tier 2 above will be performed through a single implementation coordinator (IC) Selected by the Company. The cost, participation and benefits of customers who continue to this second audit will be accounted for in the Residential Weatherization program.

2. Five or More Unit Homes - Individually Metered Units

For customers living in individually metered units in a facility with five or more dwelling units, this program provides a free, comprehensive assessment of energy use in the individual unit. Customers will be given a detailed report containing the recommendations of the audit including information about improving the efficiency of their home which may lead to participation in other energy efficiency programs.

Incentives will be provided to encourage participation and overcome the split incentive that often exists between landlords owning buildings but not paying utility bills and tenants paying utility bills but not owning the properties and therefore not having an incentive to invest in energy efficiency.

Tenants and landlords will benefit from improvements made by their utility in their facilities. Insulation, air sealing, and domestic hot water measures will improve tenant health and comfort and reduce tenant heating bills.

National Grid will administer the Energy Audit and Home Performance Program through a single implementation coordinator (IC). This IC will be responsible for the day to day administration of the Program. This IC will perform all site visits to determine which measures can be installed. Eligible building owners, and/or facility managers or associations will receive a comprehensive energy audit, energy education, and the installation of no-cost efficiency measures. The implementation coordinator will be responsible for all air sealing and DHW measures. All insulation measures for properties with greater than 20 units will be put out to competitive bid. Insulation contractors that have been previously approved by the Company will be eligible to bid on these jobs.

The Company plans to promote the Energy Audit and Home Performance Program through advertising, including bill inserts, direct mail, and the National Grid website. Customers interested in learning more about the program will be able to call a toll-free number where they will also be able to learn about all of the Company's residential energy efficiency programs. The program will be coordinated with the New Hampshire electric utilities' multifamily building programs.

Major measures will include attic insulation, wall insulation, basement/crawl space insulation, rim joist insulation, duct insulation, heating system pipe insulation, attic ventilation (in conjunction with attic insulation), ductwork leakage testing, ductwork leakage sealing, air infiltration testing, and air infiltration sealing. In addition, this Program will be coordinated with the New Hampshire electric utilities. Other measures may be added to the program menu, upon demonstration of cost-effectiveness and subject to available funding.

The Company will pay 50% of the cost of installed insulation measures, duct insulation and duct sealing up to a maximum of $750 per dwelling unit. The Company will pay 100% of the cost of air sealing and installed domestic hot water measures such as showerheads, aerators, pipe wrap and tank wraps installed by the IC. The customer will be responsible for paying 100% of the cost of installing attic ventilation.

Customers will apply for incentives for residential-sized heating and hot water heating equipment, thermostats and window rebates through the Residential High Efficiency Heating, Water Heating and Controls Program, and the ENERGY STAR® Replacement Windows Program. Facilities with central heating plants and domestic hot water systems that are interested in natural gas savings measures will be served through the Commercial High-Efficiency Heating and Commercial Energy Efficiency Programs

Table-V: Energy Audit and Home Performance

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$2,009	$3,789	Company Administration
External Administration	$3,158	$5,955	Vendor Admin/Support
Rebates/Services	$30,333	$57,020	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$8,772	$16,543	
	$8,198	*$15,460*	*Communication*
	$574	*$1,083*	*Trade Ally*
Evaluation	$3,028	$5,893	Evaluation and Reporting
Total	$47,300	$89,200	
Goal	**450 participants**	**900 participants**	

D. Residential Weatherization Program[3]

1. Residential Weatherization

The Residential Weatherization program currently provides an incentive covering 75% of the cost of installing weatherization measures in residential heating customers' homes. The maximum incentive offered through this program currently is $4,000 in homes with 1-4 units and $750 per dwelling unit in homes with five or more units where each unit is individually metered. In order to be eligible for the weatherization incentive, the residential customer must first have a site visit performed by the Energy Audit and Home Performance program as a pre-requisite to the following measures: attic insulation, attic stairs insulators, wall insulation, basement/crawl space insulation, rim joist insulation, duct insulation, heating system pipe insulation, attic ventilation (only in conjunction with attic insulation), ductwork leakage testing, ductwork leakage sealing, and air infiltration testing. Air sealing is required to be performed prior to installing any insulation measures. Other measures may be added to the program menu upon demonstration of cost effectiveness.

To be eligible for an incentive, a National Grid pre-qualified contractor must install program measures. Do-it-yourself work is not permitted. Contractors wishing to become a pre-qualified contractor eligible to offer this program to the Company's heating customers must meet Company contractor requirements. This includes providing evidence of Building Performance Institute (BPI) certification and carrying insurance in amounts and coverage at the Company's contractor partner specified levels.

The Company will continue to reach out to the contractor community in order to increase the number of pre-qualified contractors participating in the program. For quality control purposes, at least twenty percent (20%) of completed jobs will be inspected. The inspection process will consist of a visual review of all work reported to be performed at the job site. Infrared scanning may be selectively employed to inspect wall insulation and air sealing work that cannot be observed with the naked eye. Infrared scanning not only provides a quality control tool, but also serves to raise insulation installation standards.

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[3] This program is available to residential customers living in homes with 1 – 4 units and to residential customers with individually metered dwelling units where the facility has 5 or more units.

Ongoing annual training will be conducted to familiarize contractors with industry building science best practices.

It is the responsibility of the installation contractor to complete and submit incentive applications with proper supporting documentation to verify that the work was performed. Work completed through the program must meet all applicable state and local code requirements. It is anticipated that all measures installed will meet ENERGY STAR® OR Building Performance Institute (BPI) guidelines, where applicable.

The program is promoted to residential heating customers through National Grid's contractor allies, home shows, direct mail promotions, and bill inserts. The program is also marketed through the Company's *e-fficiency news* electronic newsletter, the Home Energy Analyzer on-line audit, and the corporate website.

Potential participants are also made aware of the Residential Weatherization program through their participation in the Residential Energy Audit and Home Performance program. Energy Audit and Home Performance program energy auditors receive supplemental training for the purpose of seamlessly integrating the Weatherization program and the Energy Audit and Home Performance program.

Utilizing a Building Performance Institute (BPI) certified installation contractor is required to be eligible for the maximum incentive. To address health and safety concerns, pre- and post-blower door and CO testing is required.

In conjunction with the enhanced incentive, National Grid will require BPI certification of installers. BPI is a recognized global leader in setting building science based standards. BPI certification ensures that knowledge and competency are demonstrated by means of written and field testing.

National Grid will require BPI certification and will provide contractors with a percentage of reimbursement incentives for training and the purchase of required diagnostic tools. In this manner, National Grid will assist in building an infrastructure of trained and certified contractors to deliver the highest quality workmanship to customers, and the public at large.

The Company will continue to seek out opportunities to better serve National Grid customers by integrating the offerings of all of its energy efficiency programs, and by utilizing programs administered by other utilities.

Table–VI: Residential Weatherization

Electric Cost Categories	2009 Budget	2010 Budget	Gas Cost Categories
Internal Administration	$17,571	$34,464	Company Administration
External Administration	$27,307	$61,372	Vendor Admin/Support
Rebates/Services	$462,090	$901,484	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$82,480	$131,365	
	$56,549	*$88,436*	*Communication*
	$25,931	*$42,929*	*Trade Ally*
Evaluation	$5,408	$3,380	Evaluation and Reporting
Total	$594,856	$1,132,065	
Goal	**550 participants**	**1,100 participants**	

2.

ENERGY STAR® Replacement Windows

The Company will continue to promote the installation of ENERGY STAR® Replacement Windows in the Residential Weatherization program, and will provide a $10 mail-in incentive for each high-efficiency window installed in existing residential customers' homes. Eligible participants must be residential heating customers who have installed ENERGY STAR® labeled replacement windows with a U-factor of .35 or less*[4] during the program year as specified on the incentive form. Windows installed in new construction or home additions will not qualify for the per window incentive. Each customer will be subject to a $500 maximum incentive per account. National Grid will continue working with contractors for multi-family or other large residential renovation projects on a case- by-case basis.

When applying for this incentive, residential customers are required to submit proof-of-purchase, as well as proof of the windows' U-factor. Efficiency ratings can be confirmed by the customer using either a copy of the National Fenestration Rating Council (NFRC) label from the window, or by providing detailed specifications from the window manufacturer confirming the window's U-Factor. The Company recommends inspections of the first two installations per new participating installation contractor. In addition, random inspections of self-installations may be administered to verify that the windows noted on the incentive forms were, in fact, installed.

The Company will promote ENERGY STAR® Replacement Windows through The Residential GasNetworks™ program using various methods, including the Company website: www.thinksmartthinkgreen.com and its product website: www.efi.org/nationalgrid/, the *e-fficiency news* electronic newsletter, as well as through bill inserts. In addition, the Company has established an outreach program with retailers Home Depot® and Lowe's®, and regional hardware stores. This outreach includes training of the retailer's sales personnel regarding the Company's replacement window incentive, and supplying those stores within the Company's territory with incentive applications.

[4] The U-Factor is a measurement of thermal conductivity. A lower U-factor indicates a higher level of window insulation.

National Grid recognizes that an efficient window is only as good as its installation. As such, the Company will expand its contractor training and outreach efforts, and promote best practices guidelines among "do-it-yourselfers" as well as professional window installers.

The Company and GasNetworks™ plan to discontinue this incentive in 2010.

Table-VII: ENERGY STAR® Replacement Windows

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$4,026	$0	Company Administration
External Administration	$6,327	$0	Vendor Admin/Support
Rebates/Services	$30,000	$0	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$19,778	$0	
	$18,628	*$0*	*Communication*
	$1,150	*$0*	*Trade Ally*
Evaluation	$0	$0	Evaluation and Reporting
Total	$60,132	$0	
Goal	**300 participants**	**0 participants**	

3. <u>Energy Analysis: Internet Audit</u>

This self-service audit tool allows customers to complete an electronic survey about their home, including age, size, appliances and average use patterns. The process starts with twelve basic questions to produce a report that compares the participant's home with similar homes and generates their "Top Ways to Save," including estimated annual cost savings if recommended measures are taken.

Subsequent steps require more detailed information from the customer, resulting in more personalized tips to improve the home's efficiency. The analyzer is fuel blind and lists opportunities to save in heating/cooling, lighting, water use, etc. The customer also receives information about any relevant energy efficiency opportunities such as incentive programs.

There are several levels of service the customer can receive through the analyzer, all of which can be accessed through the Company's website. A continued analysis consists of more in-depth questions about the numbers and types of appliances, the current state of the home's weatherization and mechanical equipment, and offers additional advice on how to improve the energy efficiency and comfort of the home. Users are invited to sign up to receive the Company's seasonal electronic newsletter, which includes seasonal tips to save energy, information about new energy saving technologies and the Company's other energy efficiency programs, and a link to continue the analysis of their homes.

Table-VIII: Energy Analysis - Internet Audit

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration			Company Administration
External Administration			Vendor Admin/Support
Rebates/Services	$8,404	$16,007	Services
Internal Implementation			Other
Marketing (sum of communication and trade ally)			
			Communication
			Trade Ally
Evaluation			Evaluation and Reporting
Other	$8,404	$16,007	
Goal	**660 participants**	**1,053 participants**	

E. Residential Building Practices and Demonstration Program

The purpose of the Residential Building Practices and Demonstration Program is to explore and demonstrate new and/or underutilized energy efficiency practices and equipment that can enhance a home's overall energy saving potential. This unique program allows the Company to support new and/or advanced energy saving technologies installed by residential customers.

The Company plans to explore renewable energy for water heating, advanced home heating systems, insulation and building envelope techniques, and new home construction practices. Ideas will be drawn from experience in the Company's Commercial & Industrial Building Practices and Demonstration Program, as well as from other utilities, program vendors, and interested business partners. Eligible participants in this program will include home owners, landlords, and new home builders. Each participant may be asked to allow monitoring of the installation and publication of the results in case study format.

Marketing of the program will rely on networking with industry, developing or offering new or underutilized natural gas energy efficiency technologies, as well as other interested organizations, such as the Office of Energy and Planning Renewable Energy Program, Massachusetts Technology Collaborative (MTC), the Northeast Sustainable Energy Association (NESEA), and the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED).

Table-IX: Building Practices and Demonstration Program

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$1,750	$3,500	Company Administration
External Administration	$2,750	$5,500	Vendor Admin/Support
Rebates/Services	$14,999	$30,000	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$4,250	$8,500	
	$3,750	*$7,500*	*Communication*
	$500	*$1,000*	*Trade Ally*
Evaluation	$2,394	$3,112	Evaluation and Reporting
Total	$26,144	$50,612	
Goal	**15 participants**	**20 participants**	

F. Residential Low Income Program

The Residential Low Income Program offers weatherization services to income eligible customers at up to 200% of the Federal Poverty Level Guidelines. The Residential Low-Income program currently allows eligible customers to receive up to $4,500 in qualifying measures at no cost to the customer. Whenever possible, program funds are leveraged with Department of Energy (DOE) weatherization and participating electric utility funding. The Company continues to seek out opportunities to strengthen its relationships with the State administered weatherization program, and other utility administered programs, in order to leverage funds and better serve National Grid customers.

Eligible measures provided through the program include an energy audit, attic insulation, wall insulation, air sealing, heating system repair/replacement (on a qualifying basis) and safety inspections. Small energy-related repairs for eligible heating units can also be performed. The Company will continue to install water saving measures (low-flow showerheads and aerators) and to fund the installation of carbon monoxide detectors when DOE is unable to fund this measure.

New Hampshire Community Action Program (CAP) agencies are responsible for ensuring that customers meet the eligibility requirements for program participation, and for providing weatherization services to customers. CAP agencies work with installation contractors to ensure that program requirements are met.

The CAP agencies provide Action Energy, Inc. (Action), the Company's administrative vendor for the program, detailed documentation demonstrating the work that was performed. Action also conducts quality control oversight of the work performed through the program.

The Company holds quarterly meetings with Action, the CAP agencies, and the Office of Energy and Planning to improve program implementation, address questions or emerging concerns, and to ensure that program goals are being met.

The Low Income Weatherization internet website, www.weatherize.net, continues to be a valuable tool. This website serves as a central information source for all of the CAP agencies and for Company personnel associated with the program. Weatherize.net has the capability to search data and determine whether a particular applicant is eligible for assistance. The site can also be used to communicate with the CAP agencies and provide timely information and updates.

The Company solicits direct feedback from program participants through its post-installation comment cards. The card, mailed directly to those customers where weatherization work was performed, allows customers to share their input and impressions of the program directly with the Company. The Company then shares the customers' responses with the corresponding CAP agency. This direct link from customer to CAP allows the Company to monitor program performance and customer perception of the program. The Company markets the program via Company brochures, bill inserts, and the National Grid website.

The Company continues to work with the CAP agencies to identify and enlist additional contractors to participate in the program. The Company is committed to train its existing contractors and market to new, eligible contractors in order to expand the contractor base. Efforts may also include outreach to technical/trade schools, and providing assistance to potential contractors for technical training.

The primary focus of the program will continue to be servicing income eligible customers in the 1-4 unit housing stock, as well as income eligible customers living in individually metered multifamily dwellings with five or more units. The Company will continue to explore energy saving opportunities, on a case-by-case basis, to provide weatherization services to organizations that provide critical services to the program's target audience, e.g. housing authorities, food banks, homeless shelters, and organizations whose mission is to work with low income citizens.

Table-X: Residential Low Income Program

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$57,744	$90,847	Company Administration
External Administration	$79,060	$124,376	Vendor Admin/Support
Rebates/Services	$252,536	$397,977	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$8,223	$12,959	
	$5,641	*$8,890*	*Communication*
	$2,583	*$4,070*	*Trade Ally*
Evaluation	$6,976	$9,838	Evaluation and Reporting
Total	$404,540	$635,997	
Goal	**180 participants**	**260 participants**	

IV. COMMERCIAL AND INDUSTRIAL PROGRAMS

A. The Commercial Energy Efficiency Program

1. Commercial Energy Efficiency

The Commercial Energy Efficiency Program “CEEP” is designed to provide support services and financial incentives that encourage the Company’s Commercial, Industrial and Multifamily customers to install energy efficient natural gas related equipment. Energy efficient technologies or system designs that exceed the minimum requirements of the local energy code and are not covered by another utility company program offering may be eligible for an incentive under this program. This program is open to all firm gas rate customers on any of the Company’s commercial tariffs. Incentives provided through this program must be pre-approved by the Company and/or the administrative vendor prior to delivery and installation of product(s) and/or service(s).

Customers may apply for program services or incentives via a variety of channels including contacting Company representatives, plumbing and heating contractors, engineering firms, energy service companies, or equipment vendors. Customers will be able to take advantage of audit services that range in scope from a prescriptive level to custom review to technical assistance and new construction design assistance. After reviewing the customer’s energy efficiency needs, the customer will be offered the appropriate program services. Customers will then be able to take advantage of either prescriptive or custom incentives. Services and incentives structures are described in the following sections.

Audit services

Energy Assessment

Regardless of market segment, all qualifying customers contacting the Company will be provided with an opportunity for an energy efficiency assessment. This assessment will educate small to medium sized customers on basic gas energy efficiency measures and practices. This assessment will determine which prescriptive incentives a customer may be eligible to receive. Where applicable, the assessment will provide industry-specific recommendations. As part of the assessment process, customers will receive a report that includes all of the information associated with service delivery, including costs and estimated savings and identifies next steps for implementing energy efficiency measures and information and instruction for receiving energy efficiency incentives. This energy efficiency assessment is currently delivered to the customer as a walk through audit. The Company works with the vendors to determine the most cost-effective way to deliver this assessment, which may include remote delivery mechanisms.

Custom Assessment

National Grid recognizes the diverse needs of its customers when identifying energy efficiency opportunities. In that regard, the custom assessment will be made available to customers who require more energy analysis than is provided through the energy efficiency assessment. The custom assessment will also be made available for specific applications such as combustion controls, solar DHW, and heat recovery from combined heat and power (CHP). As part of a custom assessment, a site visit will be conducted at multifamily, commercial and industrial facilities in the Company's service area to identify gas energy efficiency opportunities for National Grid customers.

The assessment may also take place as a review of energy efficiency proposals presented by customers or third party vendors for inclusion in the program. Based on the assessment, a customer will receive recommendations on energy efficiency measures eligible for custom gas energy efficiency incentives. Customers will receive a report that includes all of the information associated with service delivery, identifies next steps for implementing energy efficiency measures, and information and instruction on next steps for receiving energy efficiency incentives.

Technical assistance

Customers requiring energy efficiency assistance beyond the scope of a custom audit will be provided with technical assistance. This may include, but is not limited to, thermal oxidizers in manufacturing, infrared process heat applications, central plant system redesigns, and other complex energy efficiency technologies. Technical assistance studies must be completed by either a Professional Engineer or Certified Energy

Manager. Customers who receive this service will receive a detailed report, including recommended measures, estimated costs, energy saving potential, custom incentives and simple paybacks. Technical assistance will be provided at the discretion of National Grid program management staff. The Company may provide these services at no cost to the customer up to an amount equal to the cost of a custom audit. If the project exceeds the cost of a custom audit, the Company will provide up to 50 percent of the cost of assessment but not more than $10,000. The Company has under retainer engineering firms that have been selected through a competitive solicitation and qualified to offer customers technical services. Additionally, when appropriate, these firms will identify electric savings as well as gas savings opportunities particularly when working in conjunction with electric energy efficiency programs.

New Construction Services

National Grid proposes to provide New Construction Services, a service in which customers will be guided through a review of the design or design process to increase the energy efficiency of a new building by identifying appropriate energy saving measures for new construction. The intent of these services is to better address the special considerations needed to address energy efficiency at the time of new construction. This process will involve working on the project design with the customer and members of their construction team including, but not limited to, building committees, architects, engineers, and contractors. This service goes beyond engaging customers at the front end of the new construction process. It continues through project completion. New construction resources will be provided through a variety of means including, but not limited to, design team assistance, matched funds for study costs and potential assistance for system commissioning at project completion. Customers will be eligible for up to $25,000 in total design assistance funding. Customers taking advantage of design assistance must be willing to move forward with the installation of energy efficiency measures with acceptable payback periods. Customers will receive a report about energy efficiency recommendations that include recommended measures, estimated costs, energy savings potential, custom incentives and simple paybacks.

Incentives

Energy efficiency incentives will be made available to customers through the individual programs. Currently both prescriptive and custom incentives are available to National Grid customers. Prescriptive measures include but are not limited to high efficiency heating and water heating, windows, insulation, thermostats, boiler reset control and steam traps. Custom incentives will be developed through the analysis conducted in the Custom Assessment, Technical Assistance and New Construction services. Information regarding incentive structure by program service follows.

Prescriptive Incentives

Prescriptive incentives will be available for common energy efficiency measures including programmable thermostats, boiler reset controls, steam trap replacements, pipe and duct insulation, building shell (wall, roof, floor, and crawlspace) insulation, and high-efficiency windows. Other prescriptive measures include high efficiency commercial kitchen equipment, such as high efficiency fryers, steamers, and combination ovens. The company proposes to incorporate high efficiency dishwashers, broilers, woks, combination ovens, and griddles into the commercial kitchen equipment program after evaluation. Prescriptive incentives will be targeted primarily toward the small and medium sized Commercial & Industrial customers. The Company will rely primarily upon contractors and engineers to locate qualified facilities and to install the eligible prescriptive measures. This effort will be supported by the extensive outreach and education effort to contractors and engineers, as well as promotions directed to customers themselves. Energy audits will not be required for participation and no pre-approval will be required for applications at a single customer site. As outlined in the program terms and conditions, the Company reserves the right to negotiate incentives for multiple installations at a single site and/or multiple installations within a portfolio of properties. The Company also reserves the right to inspect the property for the installation of the measures prior to issuing the rebate. The Company plans to evaluate the prescriptive rebate incentives during the 2009 program year. Results of the evaluation will be used in the next available planning cycle.

Table-XI: Prescriptive Incentives for Installed Measures

Measure	Available Incentive
Programmable Thermostat	$25.00 each, up to 5 units
Digital Boiler Reset Control	$150.00 single stage; $250.00 multi-stage
Steam Trap Replacements	$25.00/replaced trap
Pipe or Duct Insulation; duct sealing	$1.50/lf up to 500lf
Building shell insulation (roof, wall, or floor)	Up to 20% of project cost with a maximum of $10,000.00
Premium efficiency windows	$1.00/ft^2 of rough window opening with a maximum of $2,500.00
High Efficiency Gas Fryers	$1,000.00/each
ENERGY STAR® Gas Steamers	$1,000.00/each
ENERGY STAR® Gas Convection Oven	$1,000.00/each

Custom Incentives

Custom incentives will be available for projects that demonstrate the use of natural gas more efficiently than typical industry practices, or more efficiently than the minimum building code requirements. Incentives will be limited to no more than 50 percent of the eligible installed project costs, and the Company’s contribution will be capped at $100,000 per site and/or project for existing buildings and $250,000 for buildings under the new construction program.

Custom incentives will be based upon $2.25 per first year of estimated therm savings for cost-effective projects. Examples of custom projects are redesigned HVAC systems, energy recovery applications, combustion controls, building automation/energy management systems, and advanced technology burners and/or burner controls. Incentives may not be applied toward normal maintenance costs, or for disabling or abandoning equipment without an energy efficiency replacement.

Steam Savings Initiative

The Company plans to implement a new initiative designed to help customers with steam systems to save natural gas. The Steam Savings Initiative includes steam trap surveys, steam system surveys, and focuses on identifying gas savings measures which qualify for prescriptive and custom incentives. Examples of such measures are steam traps, economizers, combustion controls, blow down recovery, water treatment, and condensate control. New construction projects are not eligible.

The Company will pay 25 percent of a steam trap survey, up to $2,500. Once the survey is completed, and at least 50 percent of the recommended repairs have been installed and paid for, the Company will pay an additional 25 percent of the survey cost, up to $2,500. In return for funding from the Company, the customer agrees to start a comprehensive steam trap management plan, following the Department of Energy's recommended steam trap management procedures. The customer pays for the other 50 percent of the survey.

Solar Incentives

The Company will continue to offer solar thermal incentives to encourage the installation of highly efficient solar thermal technologies by customers. Examples of these technologies include solar domestic hot water (DHW) heating, solar pool heating, and solar space heating. Solar thermal incentives will be provided at a special incentive of $5.00 per therm.

Table-XII: Commercial Energy Efficiency Program

Electric Cost Categories	2009 Budget	2010 Budget	Gas Cost Categories
Internal Administration	$45,000	$98,000	Company Administration
External Administration	$28,095	$71,415	Vendor Admin/Support
Rebates/Services	$481,640	$930,061	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$35,000	$60,000	
	$25,000	*$35,000*	*Communication*
	$10,000	*$25,000*	*Trade Ally*
Evaluation	$28,549	$46,169	Evaluation and Reporting
Total	$618,284	$1,205,645	
[redacted]			
Goal	**109 participants**	**227 participants**	

2. Multifamily Housing

The Multifamily Housing offering provides energy audits and financial incentives for energy saving measures to multifamily facilities that receive gas service on a qualifying commercial rate. The program includes existing retrofit situations as well as new construction. Examples of measures that qualify for funding through this program include the redesign of space heating or water heating systems, steam system upgrades, building insulation and premium efficiency windows and doors. Programmable thermostats, heat recovery ventilation systems, digital energy management systems, and sophisticated burners and/or controls for boilers are also energy saving measures the Company may recommend or support through this program. The program serves both privately owned properties as well as public housing authorities.

Through the new service delivery model being developed collaboratively with other gas and electric providers, customers can participate in the multifamily program by accessing incentives, Energy Efficiency Assessment, a custom audit, New Construction Assistance, or Technical Assistance. An increased need for affordable housing in the Company's service territory has brought several new construction projects through the program. The enhanced level of support for new construction ensures that energy efficiency becomes a focus of the project during the design phase, to avoid lost opportunities or the burden of incorporating them later in costly redesigns. Through a customer intake process, the Company will determine the level of energy efficiency advice and oversight needed by the customer. Gas consumption history, building type and size, plans for renovation or expansion and known energy efficiency measures already in place should determine the level of audit necessary for the site. Delivery of energy efficiency services and incentives will also be coordinated with electric services and programs.

Multifamily customers will be eligible for prescriptive and custom incentives. Prescriptive incentives will include high efficiency heating and water equipment, controls, envelope, and restaurant equipment. In addition, custom incentives will be made available to customers who enter the program through the custom audit, new construction assistance or technical assistance services. Savings for this program have been low in recent years so the Company plans to focus on custom projects with controls and steam system enhancements to support higher energy savings for the multifamily segment. The Company also plans to work with customers on benchmarking properties to determine the buildings with the greatest need for energy efficiency upgrades. Custom audits will identify measures for energy efficient installations. These installed measures are eligible to receive an incentive of $2.25 per first year estimated therm savings for cost-effective energy efficiency installations. Customers will be eligible for up to 50 percent of the eligible installed project costs with a cap of $100,000 for existing buildings. Customers participating through the new construction program will be eligible for up to 50 percent of the installed project costs with a cap of $250,000 for new buildings.

The program is promoted through the Company's internal departments such as Sales and Marketing, as well as Customer Service. The Company also promotes the program through industry partners such as the National Association of Housing and Redevelopment Officials, local housing authorities, local chambers of commerce events and through conference attendance and contractor outreach. The Company will seek out partnerships to leverage the use of energy efficiency funding.

National Grid is beginning coordination efforts between its electric and gas multifamily programs. Gas incentives and services may be adjusted if it is determined that a specific customer may receive a more comprehensive service through coordinated delivery of the two programs.

Table-XIII: Multifamily Housing

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$17,000	$30,000	Company Administration
External Administration	$14,960	$23,895	Vendor Admin/Support
Rebates/Services	$26,490	$83,342	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$13,000	$25,000	
	$8,000	*$15,000*	*Communication*
	$5,000	*$10,000*	*Trade Ally*
Evaluation	$2,210	$5,018	Evaluation and Reporting
Total	$73,660	$167,255	
Goal	**10 participants**	**20 participants**	

3. <u>Economic Redevelopment</u>

The Economic Redevelopment Program leverages energy efficiency funds to revitalize buildings in our service territory with the aim of rejuvenating the local area. The Company has found that energy saving measures can be the first project design features cut due to the higher incremental costs of installation, and lack of education and technical expertise. This can be particularly true in blighted communities where money is tight and community development corporations (CDC's) and other non-profits are responsible for much of the development.

Funding through the Economic Redevelopment Program ensures energy efficiency measures become part of a viable project. Beyond additional incentive dollars, National Grid works to partner, whenever possible, with other government entities and other energy efficiency programs, serving as a link between various funding sources and providing technical expertise. National Grid's long term commitment to its Economic Redevelopment Program creates opportunities for energy efficient technologies, increases the standard for efficiency in economically-disadvantaged communities, and works to revitalize neighborhoods.

The Economic Redevelopment Program is available to all multifamily, commercial and industrial customers. Maximum funding per project is 50 percent of the project cost up to $100,000 with a minimum of 50 percent matching funds required from the customer. Qualifying customers entering the program through new construction assistance will be eligible for up to $250,000 in incentives with a minimum of 50 percent of matching funds required from the customer. Applications for funding must include a description of the redevelopment project, information on the sponsoring organization, identification of additional funding sources, types of energy conserving measures to be installed, project schedule and the community and local economic impacts. Each application for funding is evaluated on these criteria.

An analysis is performed to identify cost-effective opportunities for reducing a customer's energy usage. The analysis performed leads to a report that summarizes recommendations and provides a detailed description of the alternatives evaluated, including: total installation costs, annual energy costs, annual savings and simple payback periods. The analysis establishes projected first year therm savings and the associated incentives available to the customer through the standard Multi-family, Commercial and Industrial Programs based on the therm savings.

The total award amount through the Economic Redevelopment Program uses the standard incentive amount as a baseline, but takes into consideration community and economic impacts in determining a total award amount. All award amounts are paid out as an incentive after the project is completed and all recommended gas saving measures that formed the basis for the award have must be installed in order to receive total funding. Community impacts include, but are not limited to, the overall environmental impact of a development beyond the gas savings, the creation of low income or affordable housing, aesthetic impact of the development on the surrounding community, recreational and educational services and job creation.

With the new program delivery model for Commercial & Industrial and Multifamily customers, the Company can identify potential participants as candidates for the Economic Redevelopment program through their involvement in custom assessment, technical assistance or new construction assistance. The Company will simultaneously work to increase program awareness and identify candidates through partnerships with other development organizations, business organizations, government agencies, and other energy efficiency groups. This year the Company plans to work with cities and towns to identify projects, which include schools, low-income housing, and public libraries, that are good candidates for this program.

Table-XIV: Economic Redevelopment

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$30,000	$45,000	Company Administration
External Administration	$12,620	$17,000	Vendor Admin/Support
Rebates/Services	$124,296	$261,334	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$13,000	$17,510	
	$8,000	*$10,010*	*Communication*
	$5,000	*$7,500*	*Trade Ally*
Evaluation	$5,564	$20,851	Evaluation and Reporting
Total	$185,480	$361,695	
Goal	**4 participants**	**10 participants**	

B. Commercial High-Efficiency Heating Program

The Commercial High-Efficiency Heating Program is designed to overcome supply side and demand side market barriers to the purchase and installation of high-efficiency heating equipment and water heating equipment. The program is available to National Grid's commercial, industrial, governmental, institutional, non-profit and multifamily facilities. The equipment under the high-efficiency heating program includes a range of innovative technologies in heating systems that are applicable across National Grid's diverse commercial customer base. The incentive schedule is set to reduce the incremental cost between the standard options and high-efficiency equipment in each product category and size range. The Commercial High-Efficiency Heating program will continue to be promoted primarily to engineers, equipment vendors, contractors and other trade allies.

In the small commercial business segment and the smaller multifamily segment, the application of heating and water heating technology is analogous, as is the size range of equipment. Efficiency ratings for smaller furnace and boiler equipment (up to 300,000 Bbtu input) are measured using AFUE ratings. Efficiency ratings for larger boiler equipment, which exceeds the size ranges for AFUE, are measured using thermal efficiency which has been confirmed by a third party.

Since many of the trade allies serving the residential market also serve the smaller multifamily and commercial markets, the program will often be promoted together with the Residential High-Efficiency Heating, Water Heating and Controls Program and the GasNetworks™ program activities. Trade ally training activities will also be leveraged with the residential activities and GasNetworks™ trade ally programs. Trade ally training in the larger equipment markets will continue through product training workshops, participation in industry working groups and trade associations, outreach to engineering firms, advertisements in trade publications, trade shows/seminars, and field calls and site visits.

The program's incentive schedule applies to a variety of product types and a broad range of equipment sizes that are appropriate for the commercial market segments. This range provides equal opportunity for participation among National Grid's small and large commercial customers. There are also incentives for natural gas fired, low intensity infrared heaters, high-efficiency condensing unit heaters and direct fired make-up air systems that are appropriate for the larger commercial and industrial segments. Boiler incentives are available in a two-tiered matrix: Tier One for high-efficiency non-condensing boilers and Tier Two for high-efficiency fully condensing boilers.

As outlined in the program's terms and conditions, National Grid reserves the right to negotiate a lower incentive amount per-unit for multiple installations at a single site. In large multifamily complexes and facilities, customers and/or contractors making bulk equipment purchases have a lower incremental cost per unit. Negotiating incentives helps to keep the program within budget and maintains the cost effectiveness of installed measures. The incentives are also set to help participants reduce the true incremental costs, considering the bulk purchase cost of installing multiple pieces of high-efficiency heating equipment.

Table-XV: Commercial High-Efficiency Heating Program

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$20,000	$30,000	Company Administration
External Administration	$15,620	$20,000	Vendor Admin/Support
Rebates/Services	$124,296	$260,844	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$20,000	$30,000	
	$10,000	*$15,000*	*Communication*
	$10,000	*$15,000*	*Trade Ally*
Evaluation	$5,564	$20,851	Evaluation and Reporting
Total	$185,480	$361,695	
Goal	**90 Incentives**	**160 Incentives**	

Table-XVI: Commercial High-Efficiency Heating Program Incentive Qualifications

Product	Rating	Incentive
Furnaces (up to 150 MBtuh)	> 92% AFUE or greater	$100
Furnaces with ECM	> 92% AFUE or greater	$400
Condensing unit heaters (151 to 400 MBtuh)	> 90% Thermal Efficiency	$500
Direct fired heaters / direct fired makeup air (up to 1500 MBtuh)		$1,000
Direct fired heaters / direct fired makeup air (1501 to 3000 Mbtuh)		$1,500
Direct fired heaters / direct fired makeup air (3001 and above)		$2,000
Infrared heaters (all sizes)	low intensity	$500
Steam Boilers (up to 300 MBtuh)	> 82% AFUE	$200
Hydronic Boilers (under 300 MBtuh)	> 85% AFUE	$500
Hydronic Boilers (301 to 499 MBtuh)	> 85% Thermal Efficiency	$1,000
Hydronic Boilers (500 to 999 MBtuh)	> 85% Thermal Efficiency	$2,000
Hydronic Boilers (1000 to 1700 MBtuh)	> 85% Thermal Efficiency	$3,000
Hydronic Boilers (1701 MBtuh and larger)	> 85% Thermal Efficiency	$4,000
Condensing Boilers (under 300 Mbtuh)	> 90% AFUE	$1,000
Condensing Boilers (301 to 499 Mbtuh)	> 90% Thermal Efficiency	$1,500
Condensing Boilers (500 to 999 Mbtuh)	> 90% Thermal Efficiency	$3,000
Condensing Boilers (1000 to 1700 Mbtuh)	> 90% Thermal Efficiency	$4,500
Condensing Boilers (1701 Mbtuh and larger)>	90% Thermal Efficiency	$6,000
Indirect fired water heaters (up to 50 gallon storage)		$100
Indirect fired water heaters (over 50 gallon storage)		$300
On-Demand Tankless Water Heaters with and Energy Factor of 0.82 or higher and electronic ignition		$300

C. Building Practices and Demonstration Program

The purpose of the Building Practices and Technology Demonstration Program is to establish successful applications of new or underutilized energy efficient procedures, processes, or technologies. Participants in the program may be identified through the Company's other program offerings. Customers interested in presenting a project for consideration may request financial and technical assistance from the Company. Applicants must include a description of the scope of work and an estimate of the savings and benefits to be realized. Participants are required to allow monitoring of the installation and/or results, tours on the installation by potential users or other interested stakeholders, and publication of the results in case study form. To market the program, the Company will rely on the industry vendors and industry organizations such as Gas Technology Institute, Energy Solutions Center, and Consortium for Energy Efficiency developing and/or offering new or underutilized natural gas energy efficiency technologies. The program will also be promoted through the Company's sales force.

Throughout the program's history, National Grid has encountered resistance from customers to install new technologies that often require significant investment on their behalf. In order to overcome market barriers associated with the installation new technologies, National Grid is proposing to develop technologies in two program phases. The first phase would be a direct install by National Grid at one or two customer sites. These initial test sites would allow for increased monitoring and evaluation. The second program phase would be for multiple installations at National Grid customer facilities. This second phase would provide installations with cost-sharing between National Grid and the customer at fifty percent each and again allow for significant monitoring. The increased focus on monitoring and evaluation will require additional resources and funding. As a result, the Company is proposing to limit participation in the Building Practices and Demonstration Program to no more than three participants each year.

National Grid is currently working to identify a superboiler project, commercial kitchen equipment, and a high efficiency HVAC rooftop unit that the Company could include in the Building Practices and Demonstration Program.

Table-XVII: Building Practices and Technology Demonstration

Electric Cost Categories	2009 Budget	2010 Budget	Gas Cost Categories
Internal Administration	$31,656	$40,000	Company Administration
External Administration	$15,000	$22,500	Vendor Admin/Support
Rebates/Services	$58,290	$150,000	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$5,000	$15,000	
	$5,000	*$15,000*	*Communication*
	$0	*$0*	*Trade Ally*
Evaluation	$13,710	$22,500	Evaluation and Reporting
Total	$123,656	$250,000	
Goal	**2 participants**	**3 participants**	

D. Business Energy Analyzer Program

The Business Energy Analyzer is a convenient online self-directed audit tool that provides customers with customized and practical recommendations for saving energy. This user-friendly tool, developed by Aclara Software, provides business customers: (1) an opportunity to learn about energy savings as it relates both to their facility and their industry; (2) the flexibility of addressing energy concerns at their leisure; and (3) the ability to return to the site and review the recommendations. The tool also allows customers to identify the energy-saving incentives for which they may be eligible.

Customers complete a Level I profile that includes their location, business type, size of facility and hours of operation. Based on this information, the system generates energy saving recommendations or "Ways to Save”. At this point, the customer can opt to move on to Level II and enter in more specific information about their facility. This information includes actual energy use from utility bills or they can choose to have the system estimate usage. Based on the additional information, the system generates an analysis of the business's energy usage that provides more accurate energy saving suggestions and targeted "Ways to Save”. The customer can view these tips either showing those with the greatest savings or the shortest payback. The recommended measures have been customized to reflect information on incentives for which the customer may be eligible. Customers can also create a plan for energy efficiency from these measures that can be retrieved any time they log on. Additionally, the tool offers the customer the ability to compare their energy usage to similar businesses and view industry-specific case studies.

In the past program year, the Company had great success marketing the tool through direct calling campaigns. The Company found that using direct calling to contact customers and then assisting each customer in using the energy analyzer was the best way to increase awareness and utilization of this online program. Once a customer completes the online audit with the help of a call center representative, a comprehensive report is e-mailed to the customer highlighting the results and the best ways to save. A profile is set up so that the customer can return to the site at any time to review their results, work on an energy plan, and learn more about the Company’s other energy efficiency offerings. The Company will continue to market the energy analyzer in this way. Additionally, the energy analyzer is being marketed through the Company’s sales force, energy efficiency staff, trade organizations and outreach events.

The Company will continue to provide energy efficiency information to businesses though the business version of the *e-fficiency news*. *E-fficiency news* is an e-mail based, quarterly newsletter that customers can opt to receive while at the Business Energy Analyzer website. The first issue of the *e-fficiency news* was e-mailed to customers in September of 2005 and continues to be sent on a quarterly basis.

With the goal of continuing to improve the products and services provided to our customers, the Company may evaluate other online energy analyzers. Evaluation of other online energy analyzer will include, but not be limited to, quality of energy efficiency information, ease of use and cost. If it is determined that another energy analyzer provides more value for our customers, appropriate changes will be made.

Table-XVIII: Business Energy Analyzer Program

Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$10,000	$12,500	Company Administration
External Administration	$5,000	$7,500	Vendor Admin/Support
Rebates/Services	$0	$0	Services
Internal Implementation	$0	$0	Other
Marketing (sum of communication and trade ally)	$5,000	$5,000	
	$5,000	*$5,000*	*Communication*
	$0	*$0*	*Trade Ally*
Evaluation	$0	$0	Evaluation and Reporting
Total	$20,000	$25,000	
Goal	**40 level 1 users**	**60 level 1 users**	

V. OUTREACH AND COMMUNICATION

A. Energy Efficiency Communication and Education

Communication to and education of customers and trade allies is critical to the success of the Company's energy efficiency efforts. One of the most common barriers to the increased use of energy efficient equipment or practices is a lack of awareness by customers of the potential energy and financial savings. Another common barrier is the lack of customer awareness as to how their utility can help reduce their energy costs. To overcome these barriers and help customers make informed energy decisions, the Company plans to maintain a consistent and high level of program outreach to its customers and trade allies.

One component of program outreach will be the ongoing development and refinement of brochures, direct mail pieces, bill inserts, and educational literature for the Company's initiatives.

The Energy Efficiency staff will continue to take advantage of every opportunity to disseminate energy efficiency information through personal contact at home shows, trade shows, community events, landlord events, new homeowner workshops, energy information fairs, and energy awareness events at major employers. The Company also will continue to use its website as a tool to promote energy efficiency. National Grid also offers regular training to its call center representatives about the Company's energy efficiency programs and how to direct customers to participate in energy efficiency programs.

In addition, the Company plans to partner with technical schools, community colleges, contractors, and trade organizations to promote energy efficiency and opportunities in the energy efficiency industry.

B. Trade Ally Training and Codes & Standards Program

Energy efficiency awareness by the Company's trade allies and customers is crucial to reducing market barriers to energy efficiency and increasing acceptance of new technologies. Educational activities will be a critical piece of the Company's promotion efforts.

The Company will support and undertake a wide range of training events in collaboration with GasNetworks™ and the manufacturing representatives and other trade allies. GasNetworks™ was recently authorized to award continuing education credits for the Plumbing, Heating and Cooling Contractors (PHCC) of New Hampshire. The PHCC requires training and education credits as a part of membership.

Additional outreach will extend to engineers, architects, builders, landlords, facility managers, housing authorities and other customers. The objective of all training activities will be to increase trade ally awareness of the benefits of energy efficiency and the technology options in high-efficiency equipment. Trade ally training also works to provide trade allies with the technical tools to properly size, install and maintain energy efficient products and provide customers with the knowledge to select energy efficient products. Training activities will be promoted via site visits, direct mail and newsletters. The Company works with the PHCC local chapters and attends the regional shows.

The GasNetworks™ website (www.gasnetworks.com) will also be used as a vehicle for promotion, offering trade allies a central source of information on special event training efforts, in addition to joint energy efficiency programs.

The budget for the Trade ally training program is included within each program's budget.

C. Building Operators Certification Program

The Company plans to offer the Building Operator Certification (BOC) program. The BOC program provides curriculum selection, instructors, testing, certifications, as well as administrative functions. The target audience for the BOC program is individuals responsible for the maintenance and operation of equipment and systems in commercial buildings, industrial plants and public facilities. A BOC certificate is awarded to students who complete eight full days of classroom instruction, homework projects and testing.

In 2009, the BOC program will offer two to four sessions throughout the New England region. Each session will enroll approximately 40 students. The gas program will coordinate with the electric programs to reach out to a greater number of building operator population. Each student is scheduled for two days of classroom instruction per month over a four month training cycle.

Table-XIX: Building Operator Certification			
Electric Cost Categories	**2009 Budget**	**2010 Budget**	**Gas Cost Categories**
Internal Administration	$10,000	$11,000	Company Administration
External Administration	$5,000	$6,000	Vendor Admin/Support
Rebates/Services	$12,000	$20,000	Services
Internal Implementation	$0	$0	Other
Marketing	$3,000	$3,000	
	$3,000	*$3,000*	*Communication*
	$0	*$0*	*Trade Ally*
Evaluation	$0	$0	Evaluation and Reporting
Total	$30,000	$40,000	
Goal	**20 participants**	**60 participants**	

VI. EVALUATION AND REPORTING

1. Evaluation

National Grid anticipates expanding its focus on evaluation during 2009. The Company is conducting a review of how initial savings are calculated in support of the development of a new program tracking system.

Planned evaluation studies include the following:

- Completing an impact evaluation of the Low Income Program.

- With GasNetworks™, completing an impact evaluation of advanced heating and water heating equipment promoted through the Residential High-Efficiency Heating and Water Heating Program[5].
- Process evaluations to determine customer satisfaction with program services and to identify potential program implementation improvements.
- Ongoing review of measure and program cost-effectiveness, informed by evaluation findings.

National Grid and Northern Utilities plan to go out to bid for a qualified contractor to conduct an impact evaluation of their 2007-2008 Low Income Weatherization Programs. The impact evaluation's primary objective is to re-examine and update impacts across the range of measures offered through the programs. The methodology for the evaluation will most likely be an econometric/statistical billing analysis that will result in savings estimates by measure category and/or a realization rate.

In January of 2009 the Company sent out a Request for Qualifications (RFQ) to 40 consultants to determine what methodologies are currently used in the evaluation of Residential High-Efficiency Heating and Water Heating Programs. The Company is using the responses to that RFQ to develop an RFP for a process and impact evaluation of the program and hopes to work jointly on the study with members of GasNetworks™ including Northern Utilities. The methodology will likely focus on billing analysis, either to determine hours of use which will be used in conjunction with equipment capacity and the difference in rated efficiencies to calculate savings or to do a direct comparison of the usage of customers with standard efficiency units versus high efficiency units. Other methodologies suggested included using various time of use meters to determine equipment runtimes.

[5] The Company recently conducted an assessment of the gas savings associated with the equipment promoted through the Commercial High-Efficiency Heating program. This assessment suggests that savings for eligible equipment will be lower than previously assumed. In spite of reduced savings per installed piece of equipment, the Company projects that this program will continue to be cost-effective. The per unit decrease in energy savings affects the overall Commercial & Industrial portfolio savings. As noted above, the Company plans to initiate an advanced heating and water heating equipment impact evaluation this next year in collaboration with GasNetworks™.

As part of that RFP, the Company also plans to conduct a process evaluation to evaluate overall program performance and suggest areas for improvement. Key components of that evaluation include an assessment of:

- Level of customer satisfaction
- Trade ally satisfaction
- Company staff and trade ally training
- Effectiveness of the program delivery mechanism
- Effectiveness of program promotion
- Remaining barriers to program participation including an assessment of why some customers choose to not participate in the program
- Review of measures offered through the program, i.e., are they acceptable, appealing, and valued by the customers
- Identification of lessons learned and specific actionable recommendations for program improvement
- A review of program tracking databases to ensure that data that will likely be required to support future program evaluation efforts, including impact evaluations, are being collected

As with the impact evaluation, the Company anticipates conducting this evaluation with members of GasNetworks™ including Northern Utilities.

The Company continually updates its estimates of measure and program savings in its analysis of program cost effectiveness. Results of these evaluations will be used to screen programs for future filings.

Additional impact evaluations may be conducted during this 20-month period.

The budget for evaluation is included within each program's budget. Wherever possible, the Company will explore opportunities to decrease the cost of planned evaluation efforts by performing research in collaboration with industry partners GasNetworks™, GTI, NEEP, AESP, JMC, CEE and other utilities.

2. Reporting

National Grid NH proposes to provide the Commission with the following reports:

Quarterly Reports:

The Company, consistent with the practice adopted by the electric utilities in the state, will provide the Commission with quarterly reports about ongoing program efforts. These reports will provide information about program costs and savings compared to annual budgets and savings goals by month. These reports will be filed with the Commission no later than 45 days following the end of each quarter in the year.

Updated Program Plans for 2010:

By August 31, 2009, the Company will file an update to its calendar year 2010 energy efficiency plans. The update will include updated program descriptions, benefit/cost analyses, program budgets, and program goals.

Shareholder Incentive Report:

By April 15, 2010, the Company will file a report with the Commission to document its performance for the May 1, 2009 – December 31, 2009 time period under the proposed shareholder incentive mechanism. The Company will also file a report with the Commission to document its performance for 2010 by April 15, 2011.

Next Multi-Year Energy Efficiency Plan:

National Grid anticipates filing its next multi-year gas energy efficiency plan by October 15, 2010. The Plan will likely be filed jointly with the other gas and electric utilities in the state.

VII. SHAREHOLDER INCENTIVE

For the current EE Plan, the Company's Shareholder Incentive has been designed in accordance with Commission Orders 24,109, 24,636 and the guidelines set forth for electric utilities in NH PUC 23,850. In Order 23,850, the Commission approved a Utility

Performance Incentive designed to encourage utilities to achieve superior program cost-effectiveness while maximizing program savings. It is a sliding scale incentive with a design level equal to 8% of the Company's program budgets (before incentives) and a maximum of 12% of the budgets. There are also threshold performance criteria, explained below, which the Company must achieve before any incentive is earned.

The Company's proposed Performance Incentive has two components. The cost-effectiveness component is based on the relationship between the projected TRC Test and the actual program-year-end TRC Test, and the energy savings component is based on the relationship between the projected lifetime installed MMBTU savings and actual lifetime installed MMBTU savings. Each of these ratios are calculated at the sector level, one for the combined residential programs and one for the combined C&I programs, and then applied to each sector's program budgets.

The Company must achieve minimum "threshold" performance before being eligible to earn an incentive. For the cost-effectiveness component, the Company must achieve sector level actual year-end TRC of 1.0 before any incentive can be earned on this component. Likewise, for the energy savings component, the Company must achieve a minimum of 65% of projected lifetime MMBTU savings before being eligible to earn an incentive on this component. Once the threshold is achieved, the earned incentive will be on a sliding scale from 0% to 12%, with a design target incentive of 8%.

Appendix A

Explanation of Budget Categories – Traditional Gas Cost Categories

Services

Costs associated with rebates paid to customers for implementing energy efficiency. Additionally, this includes services provided to customers such as energy audits, technical assessments, engineering studies, plans reviews, blower door tests and infrared scans.

Vendor Administration and Support

Costs associated with vendors and contractors administering programs on the Company's behalf. Tasks associated with this budget category include but are not limited to; lead intake, customer service, rebate application processing, rebate application problem resolution, equipment installation inspections, rebate processing and individual program reporting.

Company Administration

Costs to administer energy efficiency programs that include but are not limited to; staff salaries (management personnel, program managers, accounting personnel, evaluation staff, regulatory staff, and administrative support staff), and company overhead (i.e., office space, supplies, computer and communication equipment, staff training, industry related sponsorships and memberships).

Communication

Promotion of energy efficiency programs which includes but is not limited to; production of all energy efficiency program literature, advertising, promotion, displays, events, promotional items, bill inserts, internal and external communications. Advertising encompasses all forms of media such as direct mail, print, radio, television, and internet.

Trade Ally Training

Trade Ally Training includes all activity associated with energy efficiency training/education of the trade ally community which includes but is not limited to; heating contractors, weatherization contractors, efficiency equipment/products installers, residential and C&I auditors, residential and C&I builders and developers.

Evaluation and Reporting

All activities associated with the evaluation of current and potential energy efficiency programs. These activities include but are not be limited to; benefit cost ratio analysis, program logic models, cost per therm analysis, efficiency product saturation analysis, customer research and all ad hoc analyses that are necessary for program evaluation. In addition any activities that pertain to regulatory compliance or reporting conducted by energy efficiency group personnel or contractors would fall under this category. Expenses associated with evaluation include all internal and external costs (i.e., consultant contracts including legal services).

Other

Database administration costs associated with the Low Income program. When mapped to the Electric Cost Categories, this expense is divided 50% between internal administration and 50% between external administration.

Explanation of Budget Categories – Traditional Electric Cost Categories

Internal Administration = Company Administration from gas categories

Internal utility costs associated with program design, development, regulatory support, and quality assurance of energy efficiency programs. Costs include but are not limited to; staff salaries (management personnel, program managers, accounting personnel, evaluation staff, regulatory staff, and administrative support staff), and company overhead (i.e., office space, supplies, computer and communication equipment, staff training, industry related sponsorships and memberships).

External Administration = Vendor Administration from gas categories

Costs associated with vendors and contractors administering programs on the Company's behalf. Tasks associated with this budget category include but are not limited to; lead intake, customer service, rebate application processing, rebate application problem resolution, equipment installation inspections, rebate processing and individual program reporting.

Rebates/Services = Services from above

Costs associated with rebates paid to customers for implementing energy efficiency. Additionally, this includes services provided to customers such as energy audits, technical assessments, engineering studies, plans reviews, blower door tests and infrared scans.

Internal Implementation = Gas accounting does not differentiate this from internal administration

Internal utility costs associated with delivering program services to customers. Costs to implement energy efficiency programs include but are not limited to; staff salaries (management personnel, program managers, accounting personnel, evaluation staff, regulatory staff, and administrative support staff), and company overhead (i.e., office space, supplies, computer and communication equipment, staff training, industry related sponsorships and memberships). There are no gas internal implementation expenses tracked by the Company's accounting system.

Marketing – Combines Communication and Trade Ally gas categories

Promotion of energy efficiency programs which includes but is not limited to; production of all energy efficiency program literature, advertising, promotion, displays, events, promotional items, bill inserts, internal and external communications. Advertising encompasses all forms of media such as direct mail, print, radio, television, and internet. The marketing category also includes trade ally training associated with energy efficiency training/education of the trade ally community which includes but is not limited to; heating contractors, weatherization contractors, efficiency equipment/products installers, residential and C&I auditors, residential and C&I builders and developers.

Evaluation = Evaluation and Reporting from gas categories

All activities associated with the evaluation of current and potential energy efficiency programs. These activities include but are not be limited to; benefit cost ratio analysis, program logic models, cost per therm analysis, efficiency product saturation analysis, customer research and all ad hoc analyses that are necessary for program evaluation. In addition any activities that pertain to regulatory compliance or reporting conducted by energy efficiency group personnel or contractors would fall under this category. Expenses associated with evaluation include all internal and external costs (i.e., consultant contracts including legal services).

Appendix A: Explanation of Budget Categories **National Grid NH Gas Energy Efficiency Preliminary Budget Traditional Gas Cost Categories**
New Hampshire Program Year THREE (5/1/08-4/30/09)

Program	Services	Vendor Admin/Sup	Company Admin	Communication	Trade Ally Training	Evaluation & Reporting	Other	Budget Total	Participant Goal
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	= Sum (a-g)	
Residential									
Low Income	$ 278,598	$ 77,837	$ 54,494	$ 6,223	$ 2,849	$ 4,672	$ 18,191	$ 442,864	160
Residential Weatherization	$ 42,344	$ 7,763	$ 4,940	$ 20,586	$ 10,395	$ 3,529	$ -	$ 89,557	45
Residential High Efficiency Heating	$ 172,500	$ 7,500	$ 21,043	$ 45,093	$ 10,012	$ 15,031	$ -	$ 271,179	500
Residential Water Heating	$ 45,000	$ 3,864	$ 5,031	$ 20,781	$ 1,438	$ 5,594	$ -	$ 81,708	150
ENERGY STAR® Windows	$ 30,000	$ 6,327	$ 4,026	$ 18,628	$ 1,150	$ 2,876	$ -	$ 63,008	300
Advanced Residential Controls	$ 10,000	$ 7,185	$ 1,942	$ 14,162	$ 555	$ 1,387	$ -	$ 35,231	325
New Home Construction with ENERGY STAR®	$ 39,337	$ 7,212	$ 4,589	$ 9,834	$ 1,311	$ 3,278	$ -	$ 65,561	55
Energy Analysis: Internet Audit	$ 18,837	$ 2,416	$ 2,868	$ 16,146	$ 820	$ 2,049	$ -	$ 43,136	600
Energy Audit and Home Performance (RCS)	$ 58,356	$ 5,772	$ 3,673	$ 14,985	$ 1,049	$ 2,623	$ -	$ 86,459	200
Building Practices and Demo	$ 27,775	$ 5,092	$ 3,240	$ 6,944	$ 926	$ 2,315	$ -	$ 46,291	12
Residential Total	**$ 722,746**	**$ 130,968**	**$ 105,848**	**$ 173,381**	**$ 30,505**	**$ 43,354**	**$ 18,191**	**$ 1,224,992**	**2,347**
Commercial & Industrial									
Comm Energy Efficiency Program	$ 267,856	$ 81,904	$ 30,049	$ 117,824	$ 5,710	$ 39,275	$ -	$ 542,617	150
Multifamily Housing Program	$ 74,520	$ 35,000	$ 20,820	$ 44,613	$ 5,948	$ 14,871	$ -	$ 195,773	60
Comm High Efficiency Heating	$ 99,600	$ 1,500	$ 161	$ 345	$ 5,642	$ 14,556	$ -	$ 121,803	50
Economic Redevelopment	$ 240,405	$ 7,950	$ 19,751	$ 42,324	$ 5,643	$ 14,108	$ -	$ 330,182	3
Building Practices and Demo	$ 160,150	$ 24,000	$ 7,519	$ 16,113	$ 2,148	$ 5,371	$ -	$ 215,301	6
Energy Analysis: Internet Audit	$ 12,673	$ 2,323	$ 1,479	$ 3,168	$ 422	$ 1,056	$ -	$ 21,122	50
Commercial Total	**$ 855,204**	**$ 152,677**	**$ 79,779**	**$ 224,387**	**$ 25,515**	**$ 89,237**	**$ -**	**$ 1,426,799**	**319**
GRAND TOTAL	**$ 1,577,951**	**$ 283,645**	**$ 185,627**	**$ 397,768**	**$ 56,019**	**$ 132,590**	**$ 18,191**	**$ 2,651,791**	**2,666**

Appendix A: Explanation of Budget Categories

National Grid NH Gas Energy Efficiency Preliminary Budget Traditional Electric Cost Categories
New Hampshire Program Year THREE (5/1/08-4/30/09)

Program	Internal Admin	External Admin	Rebates/ Services	Internal Impl	Marketing	Evaluation	Budget Total	Participant Goal
	= (c)	= (b)	= (a)	= (g)	= (d) + (e)	= (f)	= Sum (c,b,a,g,d,e,f)	
Residential								
Low Income	$ 54,494	$ 77,837	$ 278,598	$ 18,191	$ 9,072	$ 4,672	$ 442,864	160
Residential Weatherization	$ 4,940	$ 7,763	$ 42,344	$ -	$ 30,981	$ 3,529	$ 89,557	45
Residential High Efficiency Heating	$ 21,043	$ 7,500	$ 172,500	$ -	$ 55,105	$ 15,031	$ 271,179	500
Residential Water Heating	$ 5,031	$ 3,864	$ 45,000	$ -	$ 22,219	$ 5,594	$ 81,708	150
ENERGY STAR® Windows	$ 4,026	$ 6,327	$ 30,000	$ -	$ 19,778	$ 2,876	$ 63,008	300
Advanced Residential Controls	$ 1,942	$ 7,185	$ 10,000	$ -	$ 14,717	$ 1,387	$ 35,231	325
New Home Construction with ENERGY STAR®	$ 4,589	$ 7,212	$ 39,337	$ -	$ 11,145	$ 3,278	$ 65,561	55
Energy Analysis: Internet Audit	$ 2,868	$ 2,416	$ 18,837	$ -	$ 16,966	$ 2,049	$ 43,136	600
Energy Audit and Home Performance (RCS)	$ 3,673	$ 5,772	$ 58,356	$ -	$ 16,034	$ 2,623	$ 86,459	200
Building Practices and Demo	$ 3,240	$ 5,092	$ 27,775	$ -	$ 7,869	$ 2,315	$ 46,291	12
Residential Total	**$ 105,848**	**$ 130,968**	**$ 722,746**	**$ 18,191**	**$ 203,886**	**$ 43,354**	**$ 1,224,992**	**2,347**
Commercial & Industrial								
Comm Energy Efficiency Program	$ 30,049	$ 81,904	$ 267,856	$ -	$ 123,534	$ 39,275	$ 542,617	150
Multifamily Housing Program	$ 20,820	$ 35,000	$ 74,520	$ -	$ 50,562	$ 14,871	$ 195,773	60
Comm High Efficiency Heating	$ 161	$ 1,500	$ 99,600	$ -	$ 5,987	$ 14,556	$ 121,803	50
Economic Redevelopment	$ 19,751	$ 7,950	$ 240,405	$ -	$ 47,968	$ 14,108	$ 330,182	3
Building Practices and Demo	$ 7,519	$ 24,000	$ 160,150	$ -	$ 18,261	$ 5,371	$ 215,301	6
Energy Analysis: Internet Audit	$ 1,479	$ 2,323	$ 12,673	$ -	$ 3,591	$ 1,056	$ 21,122	50
Commercial Total	**$ 79,779**	**$ 152,677**	**$ 855,204**	**$ -**	**$ 249,901**	**$ 89,237**	**$ 1,426,799**	**319**
GRAND TOTAL	**$ 185,627**	**$ 283,645**	**$ 1,577,951**	**$ 18,191**	**$ 453,788**	**$ 132,590**	**$ 2,651,791**	**2,666**

Exhibit A: Projected Program Expenses

National Grid NH Gas Energy Efficiency Preliminary Budget with Gas Cost Categories
New Hampshire Program Year ONE (May 1, 2009 - December 31, 2009)

Program	Services	Vendor Admin/Support	Company Admin	Communication	Trade Ally Training	Evaluation & Reporting	Other	Total Program Budget	Participant Goal
Residential									
Low Income	$ 252,536	$ 79,060	$ 57,744	$ 5,641	$ 2,583	$ 6,976	$ -	$ 404,540	180
Residential Weatherization	$ 462,090	$ 27,307	$ 17,571	$ 56,549	$ 25,931	$ 5,408	$ -	$ 594,856	550
ES Windows	$ 30,000	$ 6,327	$ 4,026	$ 18,628	$ 1,150	$ 0	$ -	$ 60,132	300
Energy Audit and Home Performance	$ 30,333	$ 3,158	$ 2,009	$ 8,198	$ 574	$ 3,028	$ -	$ 47,300	450
Residential High-Efficiency Heating	$ 157,833	$ 6,781	$ 18,893	$ 100,215	$ 22,001	$ 13,463	$ -	$ 319,187	404
Residential Water Heating	$ 49,951	$ 1,377	$ 3,832	$ 8,560	$ 5,000	$ 1,839	$ -	$ 70,559	131
Advanced Residential Controls	$ 18,589	$ 667	$ 1,860	$ 4,147	$ 3,000	$ 1,327	$ -	$ 29,589	212
ES Homes	$ 10,800	$ 1,980	$ 1,260	$ 2,700	$ 360	$ 1,415	$ -	$ 18,515	20
Res Energy Analysis: Internet Audit	$ 8,404	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,404	660
Res Building Practices and Demo	$ 14,999	$ 2,750	$ 1,750	$ 3,750	$ 500	$ 2,394	$ -	$ 26,144	15
Residential Total	**$ 1,035,536**	**$ 129,407**	**$ 108,946**	**$ 208,388**	**$ 61,098**	**$ 35,851**	**$ -**	**$ 1,579,226**	**2,922**
Commercial & Industrial									
Com Energy Efficiency Program	$ 481,640	$ 28,095	$ 45,000	$ 25,000	$ 10,000	$ 28,549	$ -	$ 618,284	109
Economic Redevelopment	$ 124,296	$ 12,620	$ 30,000	$ 8,000	$ 5,000	$ 5,564	$ -	$ 185,480	4
Multifamily Housing Program	$ 26,490	$ 14,960	$ 17,000	$ 8,000	$ 5,000	$ 2,210	$ -	$ 73,660	10
Com High Efficiency Heating	$ 124,296	$ 15,620	$ 20,000	$ 10,000	$ 10,000	$ 5,564	$ -	$ 185,480	90
Com Building Practices and Demo	$ 58,290	$ 15,000	$ 31,656	$ 5,000	$ -	$ 13,710	$ -	$ 123,656	2
Com Energy Analysis: Internet Audit	$ -	$ 5,000	$ 10,000	$ 5,000	$ -	$ -	$ -	$ 20,000	40
Building Operator Certification	$ 12,000	$ 5,000	$ 10,000	$ 3,000	$ -	$ -	$ -	$ 30,000	20
Commercial & Industrial Total	**$ 827,012**	**$ 96,295**	**$ 163,656**	**$ 64,000**	**$ 30,000**	**$ 55,597**	**$ -**	**$ 1,236,560**	**275**
Grand Total	**$ 1,862,548**	**$ 225,702**	**$ 272,602**	**$ 272,388**	**$ 91,098**	**$ 91,448**	**$ -**	**$ 2,815,786**	**3,197**

Exhibit A: Projected Program Expenses

National Grid NH Gas Energy Efficiency Preliminary Budget with Gas Cost Categories
New Hampshire Program Year TWO (January 1, 2010 - December 31, 2010)

Program	Services	Vendor Admin/Support	Company Admin	Communication	Trade Ally Training	Evaluation & Reporting	Other	Total Program Budget	Participant Goal
Residential									
Low Income	$ 397,977	$ 124,376	$ 90,847	$ 8,890	$ 4,070	$ 9,838	$ -	$ 635,997	$ 260
Residential Weatherization	$ 901,484	$ 61,372	$ 34,464	$ 88,436	$ 42,929	$ 3,380	$ -	$ 1,132,065	$ 1,100
ES Windows	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Energy Audit and Home Performance	$ 57,020	$ 5,955	$ 3,789	$ 15,460	$ 1,083	$ 5,893	$ -	$ 89,200	$ 900
Residential High-Efficiency Heating	$ 254,000	$ 10,120	$ 28,200	$ 142,600	$ 22,000	$ 19,880	$ -	$ 476,800	$ 551
Residential Water Heating	$ 77,730	$ 2,055	$ 5,720	$ 12,180	$ 5,000	$ 2,715	$ -	$ 105,400	$ 257
Advanced Residential Controls	$ 29,570	$ 995	$ 2,775	$ 5,900	$ 3,000	$ 1,960	$ -	$ 44,200	$ 704
ES Homes	$ 14,400	$ 2,640	$ 1,680	$ 3,600	$ 480	$ 2,044	$ -	$ 24,844	$ 30
Res Energy Analysis: Internet Audit	$ 16,007	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,007	$ 1,053
Res Building Practices and Demo	$ 30,000	$ 5,500	$ 3,500	$ 7,500	$ 1,000	$ 3,112	$ -	$ 50,612	$ 20
Residential Total	**$ 1,778,189**	**$ 213,013**	**$ 170,975**	**$ 284,565**	**$ 79,561**	**$ 48,822**	**$ -**	**$ 2,575,126**	**$ 4,875**
Commercial & Industrial									
Com Energy Efficiency Program	$ 930,061	$ 71,415	$ 98,000	$ 35,000	$ 25,000	$ 46,169	$ -	$ 1,205,645	227
Economic Redevelopment	$ 261,334	$ 17,000	$ 45,000	$ 10,010	$ 7,500	$ 20,851	$ -	$ 361,695	10
Multifamily Housing Program	$ 83,342	$ 23,895	$ 30,000	$ 15,000	$ 10,000	$ 5,018	$ -	$ 167,255	20
Com High Efficiency Heating	$ 260,844	$ 20,000	$ 30,000	$ 15,000	$ 15,000	$ 20,851	$ -	$ 361,695	160
Com Building Practices and Demo	$ 150,000	$ 22,500	$ 40,000	$ 15,000	$ -	$ 22,500	$ -	$ 250,000	3
Com Energy Analysis: Internet Audit	$ -	$ 7,500	$ 12,500	$ 5,000	$ -	$ -	$ -	$ 25,000	60
Building Operator Certification	$ 20,000	$ 6,000	$ 11,000	$ 3,000	$ -	$ -	$ -	$ 40,000	60
Commercial & Industrial Total	**$ 1,705,581**	**$ 168,310**	**$ 266,500**	**$ 98,010**	**$ 57,500**	**$ 115,389**	**$ -**	**$ 2,411,290**	**540**
Grand Total	**$ 3,483,770**	**$ 381,323**	**$ 437,475**	**$ 382,575**	**$ 137,061**	**$ 164,211**	**$ -**	**$ 4,986,415**	**5,415**

Exhibit A: Projected Program Expenses

National Grid NH Gas Energy Efficiency Preliminary Budget with Electric Cost Categories
New Hampshire Program Year ONE (May 1, 2009 - December 31, 2009)

BCR Activity	Program	Internal Admin	External Admin	Rebates/ Services	Internal Impl	Marketing	Evaluation	Budget Total	Participant Goal
Residential									
Low Income	Low Income	$ 57,744	$ 79,060	$ 252,536	$ -	$ 8,223	$ 6,976	$ 404,540	180
Residential Weatherization	Residential Weatherization	$ 17,571	$ 27,307	$ 462,090	$ -	$ 82,480	$ 5,408	$ 594,856	550
Residential Weatherization	ES Windows	$ 4,026	$ 6,327	$ 30,000	$ -	$ 19,778	$ 0	$ 60,132	300
Energy Audit and Home Performance	Energy Audit and Home Performance	$ 2,009	$ 3,158	$ 30,333	$ -	$ 8,772	$ 3,028	$ 47,300	450
Residential High-Efficiency Heating, Water-Heating, Controls Program	Residential High-Efficiency Heating	$ 18,893	$ 6,781	$ 157,833	$ -	$ 122,216	$ 13,463	$ 319,187	404
Residential High-Efficiency Heating, Water-Heating, Controls Program	Residential Water Heating	$ 3,832	$ 1,377	$ 49,951	$ -	$ 13,560	$ 1,839	$ 70,559	131
Residential High-Efficiency Heating, Water-Heating, Controls Program	Advanced Residential Controls	$ 1,860	$ 667	$ 18,589	$ -	$ 7,146	$ 1,327	$ 29,589	212
New Home Construction with Energy Star	ES Homes	$ 1,260	$ 1,980	$ 10,800	$ -	$ 3,060	$ 1,415	$ 18,515	20
Residential Weatherization	Res Energy Analysis: Internet Audit	$ -	$ -	$ 8,404	$ -	$ -	$ -	$ 8,404	660
Res Building Practices and Demo	Res Building Practices and Demo	$ 1,750	$ 2,750	$ 14,999	$ -	$ 4,250	$ 2,394	$ 26,144	15
Residential Total	**Residential Total**	**$ 108,946**	**$ 129,407**	**$ 1,035,536**	**$ -**	**$ 269,486**	**$ 35,851**	**$ 1,579,226**	**2,922**
Commercial & Industrial									
Commercial Energy Efficiency	Com Energy Efficiency Program	$ 45,000	$ 28,095	$ 481,640	$ -	$ 35,000	$ 28,549	$ 618,284	109
Commercial Energy Efficiency	Economic Redevelopment	$ 30,000	$ 12,620	$ 124,296	$ -	$ 13,000	$ 5,564	$ 185,480	4
Commercial Energy Efficiency	Multifamily Housing Program	$ 17,000	$ 14,960	$ 26,490	$ -	$ 13,000	$ 2,210	$ 73,660	10
Comm High Efficiency Heating	Com High Efficiency Heating	$ 20,000	$ 15,620	$ 124,296	$ -	$ 20,000	$ 5,564	$ 185,480	90
Comm Building Practices and Demo	Com Building Practices and Demo	$ 31,656	$ 15,000	$ 58,290	$ -	$ 5,000	$ 13,710	$ 123,656	2
Com Energy Analysis: Internet Audit	Com Energy Analysis: Internet Audit	$ 10,000	$ 5,000	$ -	$ -	$ 5,000	$ -	$ 20,000	40
Building Operator Certification	Building Operator Certification	$ 10,000	$ 5,000	$ 12,000	$ -	$ 3,000	$ -	$ 30,000	20
Commercial & Industrial Total	**Commercial & Industrial Total**	**$ 163,656**	**$ 96,295**	**$ 827,012**	**$ -**	**$ 94,000**	**$ 55,597**	**$ 1,236,560**	**275**
Grand Total		**$ 272,602**	**$ 225,702**	**$ 1,862,548**	**$ -**	**$ 363,486**	**$ 91,448**	**$ 2,815,786**	**3,197**

Exhibit A: Projected Program Expenses

National Grid NH Gas Energy Efficiency Preliminary Budget with Electric Cost Categories
New Hampshire Program Year TWO (January 1, 2010 - December 31, 2010)

BCR Activity	Program	Internal Admin	External Admin	Rebates/ Services	Internal Impl	Marketing	Evaluation	Budget Total	Participant Goal
Residential									
Low Income	Low Income	$ 90,847	$ 124,376	$ 397,977	$ -	$ 12,959	$ 9,838	$ 635,997	260
Residential Weatherization	Residential Weatherization	$ 34,464	$ 61,372	$ 901,484	$ -	$ 131,365	$ 3,380	$ 1,132,065	1,100
Residential Weatherization	ES Windows	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0
Energy Audit and Home Performance	Energy Audit and Home Performance	$ 3,789	$ 5,955	$ 57,020	$ -	$ 16,543	$ 5,893	$ 89,200	900
Residential High-Efficiency Heating, Water-Heating, Controls Program	Residential High-Efficiency Heating	$ 28,200	$ 10,120	$ 254,000	$ -	$ 164,600	$ 19,880	$ 476,800	551
Residential High-Efficiency Heating, Water-Heating, Controls Program	Residential Water Heating	$ 5,720	$ 2,055	$ 77,730	$ -	$ 17,180	$ 2,715	$ 105,400	257
Residential High-Efficiency Heating, Water-Heating, Controls Program	Advanced Residential Controls	$ 2,775	$ 995	$ 29,570	$ -	$ 8,900	$ 1,960	$ 44,200	704
New Home Construction with Energy Star	ES Homes	$ 1,680	$ 2,640	$ 14,400	$ -	$ 4,080	$ 2,044	$ 24,844	30
Residential Weatherization	Res Energy Analysis: Internet Audit	$ -	$ -	$ 16,007	$ -	$ -	$ -	$ 16,007	1,053
Res Building Practices and Demo	Res Building Practices and Demo	$ 3,500	$ 5,500	$ 30,000	$ -	$ 8,500	$ 3,112	$ 50,612	20
Residential Total	**Residential Total**	**$ 170,975**	**$ 213,013**	**$ 1,778,189**	**$ -**	**$ 364,127**	**$ 48,822**	**$ 2,575,126**	**4,875**
Commercial & Industrial									
Commercial Energy Efficiency	Com Energy Efficiency Program	$ 98,000	$ 71,415	$ 930,061	$ -	$ 60,000	$ 46,169	$ 1,205,645	227
Commercial Energy Efficiency	Economic Redevelopment	$ 45,000	$ 17,000	$ 261,334	$ -	$ 17,510	$ 20,851	$ 361,695	10
Commercial Energy Efficiency	Multifamily Housing Program	$ 30,000	$ 23,895	$ 83,342	$ -	$ 25,000	$ 5,018	$ 167,255	20
Comm High Efficiency Heating	Com High Efficiency Heating	$ 30,000	$ 20,000	$ 260,844	$ -	$ 30,000	$ 20,851	$ 361,695	160
Comm Building Practices and Demo	Com Building Practices and Demo	$ 40,000	$ 22,500	$ 150,000	$ -	$ 15,000	$ 22,500	$ 250,000	3
Com Energy Analysis: Internet Audit	Com Energy Analysis: Internet Audit	$ 12,500	$ 7,500	$ -	$ -	$ 5,000	$ -	$ 25,000	60
Building Operator Certification	Building Operator Certification	$ 11,000	$ 6,000	$ 20,000	$ -	$ 3,000	$ -	$ 40,000	60
Commercial & Industrial Total	**Commercial & Industrial Total**	**$ 266,500**	**$ 168,310**	**$ 1,705,581**	**$ -**	**$ 155,510**	**$ 115,389**	**$ 2,411,290**	**540**
Grand Total		**$ 437,475**	**$ 381,323**	**$ 3,483,770**	**$ -**	**$ 519,637**	**$ 164,211**	**$ 4,986,415**	**5,415**

Exhibit B: Benefit Cost Analysis

National Grid NH Gas Energy Efficiency Preliminary Benefit Cost Analysis New Hampshire Program Year ONE and TWO (May 1, 2009 - December 31, 2010)

		NPV of COSTS					
Sector	**BCR Activity**	**Administration**	**Rebates/ Services**	**Evaluation**	**Participant Cost**	**Incentive**	**Total Cost**
Residential		**$ 1,234,437**	**$ 2,762,580**	**$ 83,269**	**$ 1,926,943**	**$ 326,423**	**$ 6,333,652**
	Low Income	$ 366,648	$ 639,066	$ 16,531	$ -	$ -	$ 1,022,245
	Residential Weatherization	$ 378,156	$ 1,391,597	$ 8,691	$ 1,021,543	$ -	$ 2,799,986
	Residential High-Efficiency Heating, Water-Heating, Controls Program	$ 409,958	$ 577,282	$ 40,479	$ 828,746	$ -	$ 1,856,465
	New Home Construction with Energy Star	$ 14,459	$ 24,786	$ 3,400	$ 76,654	$ -	$ 119,298
	Energy Audit and Home Performance	$ 39,470	$ 85,713	$ 8,751	$ -	$ -	$ 133,934
	Res Building Practices and Demo	$ 25,747	$ 44,137	$ 5,416	$ -	$ -	$ 75,300
Commercial & Industrial		**$ 927,292**	**$ 2,483,537**	**$ 167,667**	**$ 4,178,317**	**$ 286,280**	**$ 8,043,093**
	Commercial Energy Efficiency	$ 585,341	$ 1,870,499	$ 106,289	$ 3,510,257	$ -	$ 6,072,385
	Comm High Efficiency Heating	$ 133,319	$ 377,638	$ 25,816	$ 488,833	$ -	$ 1,025,605
	Comm Building Practices and Demo	$ 126,927	$ 203,976	$ 35,563	$ 179,228	$ -	$ 545,693
	Com Energy Analysis: Internet Audit	$ 44,281	$ -	$ -	$ -	$ -	$ 44,281
	Building Operator Certification	$ 37,425	$ 31,425	$ -	$ -	$ -	$ 68,850
Grand Total		**$ 2,161,729**	**$ 5,246,118**	**$ 250,936**	**$ 6,105,260**	**$ 612,703**	**$ 14,376,745**

		NPV of Benefits			
Sector	**BCR Activity**	**Electric**	**Non-Electric**	**Total Benefits**	**TRC BCR**
Residential		**$ 250,472**	**$ 13,564,159**	**$ 13,814,631**	**2.18**
	Low Income	$ -	$ 2,675,401	$ 2,675,401	**2.62**
	Residential Weatherization	$ 96,848	$ 6,185,442	$ 6,282,290	**2.24**
	Residential High-Efficiency Heating, Water-Heating, Controls Program	$ 153,624	$ 4,455,528	$ 4,609,151	**2.48**
	New Home Construction with Energy Star	$ -	$ 247,789	$ 247,789	**2.08**
	Energy Audit and Home Performance	$ -	$ -	$ -	**NA**
	Res Building Practices and Demo	$ -	$ -	$ -	**NA**
Commercial & Industrial		**$ -**	**$ 16,618,306**	**$ 16,618,306**	**2.07**
	Commercial Energy Efficiency	$ -	$ 10,872,177	$ 10,872,177	**1.79**
	Comm High Efficiency Heating	$ -	$ 4,549,265	$ 4,549,265	**4.44**
	Comm Building Practices and Demo	$ -	$ 1,196,863	$ 1,196,863	**2.19**
	Com Energy Analysis: Internet Audit	$ -	$ -	$ -	**NA**
	Building Operator Certification	$ -	$ -	$ -	**NA**
Grand Total		**$ 250,472**	**$ 30,182,465**	**$ 30,432,937**	**2.12**

Exhibit B: Benefit Cost Analysis

National Grid NH Gas Energy Efficiency Benefit Cost Analysis New Hampshire Program Year ONE (May 1, 2009 - December 31, 2009)

		Program Year 2009					
Sector	**BCR Activity**	**Administration**	**Rebates/ Services**	**Evaluation**	**Participant Cost**	**Incentive**	**Total Cost**
Residential		**$ 507,839**	**$ 1,035,536**	**$ 35,851**	**$ 714,822**	**$ 126,338**	**$ 2,420,386**
	Low Income	$ 145,028	$ 252,536	$ 6,976	$ -	$ -	$ 404,540
	Residential Weatherization	$ 157,489	$ 500,494	$ 5,408	$ 364,500	$ -	$ 1,027,892
	Residential High-Efficiency Heating, Water-Heating, Controls Program	$ 176,332	$ 226,373	$ 16,630	$ 319,122	$ -	$ 738,457
	New Home Construction with Energy Star	$ 6,300	$ 10,800	$ 1,415	$ 31,200	$ -	$ 49,715
	Energy Audit and Home Performance	$ 13,939	$ 30,333	$ 3,028	$ -	$ -	$ 47,300
	Res Building Practices and Demo	$ 8,751	$ 14,999	$ 2,394	$ -	$ -	$ 26,144
Commercial & Industrial		**$ 353,951**	**$ 827,012**	**$ 55,597**	**$ 1,367,677**	**$ 98,925**	**$ 2,703,162**
	Commercial Energy Efficiency	$ 208,675	$ 632,426	$ 36,323	$ 1,115,447	$ -	$ 1,992,871
	Comm High Efficiency Heating	$ 55,620	$ 124,296	$ 5,564	$ 179,280	$ -	$ 364,760
	Comm Building Practices and Demo	$ 51,656	$ 58,290	$ 13,710	$ 72,950	$ -	$ 196,606
	Com Energy Analysis: Internet Audit	$ 20,000	$ -	$ -	$ -	$ -	$ 20,000
	Building Operator Certification	$ 18,000	$ 12,000	$ -	$ -	$ -	$ 30,000
Grand Total		**$ 861,790**	**$ 1,862,548**	**$ 91,448**	**$ 2,082,499**	**$ 225,263**	**$ 5,123,548**

Sector	**BCR Activity**	**Total Benefits**	**Sector Benefit/Cost**	**Participants**	**Annual MMBTU Savings**	**Lifetime MMBTU Savings**
Residential		**$ 5,170,171**	**2.14**	**2,922**	**27,540**	**527,748**
	Low Income	$ 1,084,948		180	5,728	114,562
	Residential Weatherization	$ 2,242,416		1,510	11,198	227,413
	Residential High-Efficiency Heating, Water-Heating, Controls Program	$ 1,744,704		747	10,171	174,711
	New Home Construction with Energy Star	$ 98,103		20	443	11,063
	Energy Audit and Home Performance	$ -		450	0	0
	Res Building Practices and Demo	$ -		15	0	0
Commercial & Industrial		**$ 5,580,244**	**2.06**	**275**	**38,998**	**632,832**
	Commercial Energy Efficiency	$ 3,481,100		123	25,887	388,298
	Comm High Efficiency Heating	$ 1,623,201		90	9,572	191,446
	Comm Building Practices and Demo	$ 475,943		2	3,539	53,089
	Com Energy Analysis: Internet Audit	$ -		40	0	0
	Building Operator Certification	$ -		20	0	0
Grand Total		**$ 10,750,415**	**2.10**	**3,197**	**66,538**	**1,160,581**

Exhibit B: Benefit Cost Analysis

National Grid NH Gas Energy Efficiency Benefit Cost Analysis New Hampshire Program Year TWO (January 1, 2010 - December 31, 2010)

		Program Year 2010					
Sector	**BCR Activity**	**Administration**	**Rebates/ Services**	**Evaluation**	**Participant Cost**	**Incentive**	**Total Cost**
Residential		**$ 748,115**	**$ 1,778,189**	**$ 48,822**	**$ 1,248,016**	**$ 206,010**	**$ 4,029,152**
	Low Income	$ 228,182	$ 397,977	$ 9,838	$ -	$ -	$ 635,997
	Residential Weatherization	$ 227,201	$ 917,491	$ 3,380	$ 676,500	$ -	$ 1,824,572
	Residential High-Efficiency Heating, Water-Heating, Controls Program	$ 240,545	$ 361,300	$ 24,555	$ 524,716	$ -	$ 1,151,116
	New Home Construction with Energy Star	$ 8,400	$ 14,400	$ 2,044	$ 46,800	$ -	$ 71,644
	Energy Audit and Home Performance	$ 26,287	$ 57,020	$ 5,893	$ -	$ -	$ 89,200
	Res Building Practices and Demo	$ 17,500	$ 30,000	$ 3,112	$ -	$ -	$ 50,612
Commercial & Industrial		**$ 590,320**	**$ 1,705,581**	**$ 115,389**	**$ 2,893,873**	**$ 192,903**	**$ 5,498,066**
	Commercial Energy Efficiency	$ 387,820	$ 1,274,737	$ 72,038	$ 2,465,728	$ -	$ 4,200,323
	Comm High Efficiency Heating	$ 80,000	$ 260,844	$ 20,851	$ 318,720	$ -	$ 680,415
	Comm Building Practices and Demo	$ 77,500	$ 150,000	$ 22,500	$ 109,425	$ -	$ 359,425
	Com Energy Analysis: Internet Audit	$ 25,000	$ -	$ -	$ -	$ -	$ 25,000
	Building Operator Certification	$ 20,000	$ 20,000	$ -	$ -	$ -	$ 40,000
Grand Total		**$ 1,338,435**	**$ 3,483,770**	**$ 164,211**	**$ 4,141,890**	**$ 398,913**	**$ 9,527,218**

Sector	**BCR Activity**	**Total Benefits**	**Sector Benefit/Cost**	**Participants**	**Annual MMBTU Savings**	**Lifetime MMBTU Savings**
Residential		**$ 8,644,460**	**2.15**	**4,875**	**47,564**	**885,455**
	Low Income	$ 1,590,453		260	8,274	165,478
	Residential Weatherization	$ 4,039,873		2,153	21,016	420,327
	Residential High-Efficiency Heating, Water-Heating, Controls Program	$ 2,864,448		1,512	17,610	283,057
	New Home Construction with Energy Star	$ 149,686		30	664	16,594
	Energy Audit and Home Performance	$ -		900	0	0
	Res Building Practices and Demo	$ -		20	0	0
Commercial & Industrial		**$ 11,038,062**	**2.01**	**$ 540**	**76,754**	**1,236,404**
	Commercial Energy Efficiency	$ 7,391,077		257	54,428	816,422
	Comm High Efficiency Heating	$ 2,926,064		160	17,017	340,348
	Comm Building Practices and Demo	$ 720,920		3	5,309	79,633
	Com Energy Analysis: Internet Audit	$ -		60	0	0
	Building Operator Certification	$ -		60	0	0
Grand Total		**$ 19,682,522**	**2.07**	**5,415**	**124,319**	**2,121,859**

Exhibit C
2009 Master Database of Input Assumptions

RESIDENTIAL PROGRAM INPUT ASSUMPTIONS

Gas Energy Efficiency Programs - National Grid

Program	Measure Name	Measure Life	Source of Measure Life	Incremental Cost	Source of Incremental Cost	Annual Savings Per Participant or Per Unit of Installation	Source of Annual Savings
Residential High-Efficiency Heating	High Efficiency Gas Furnace (AFUE >= 92%)	18	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-2	$654	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.FURNACE-GAS/PROPANE.<100000._._._.N	21.1 MMBTUs	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.FURNACE-GAS/PROPANE.<100000._._._.N
Residential High-Efficiency Heating	High Efficiency Gas Furnace (AFUE >= 92%) with ECM	18	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-2	$679	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.FURNACE-GASw/ECM.<100000.RES._._.N	19.6 MMBTUs and 396 kWh	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.FURNACE-GASw/ECM.<100000.RES._._.N
Residential High-Efficiency Heating	Boilers, forced hot water 85%+ AFUE	20	EnergyStar	$984	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.BOILER-WATER.<100000. . . .N	8.9 MMBTUs	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.BOILER-WATER.<100000._._._.N
Residential High-Efficiency Heating	Boilers, forced hot water 90%+ AFUE	20	EnergyStar	$1,355	Appliances and Commercial Equipment Standards, http://www.eere.energy.gov/buildings/appliance_standards/residential/furnace_boiler_draft_analysis.html.	11.4 MMBTUs	91% AFUE data from Appliances and Commercial Equipment standards. http://www.eere.energy.gov/buildings/appliance_standards/residential/furnace_boiler_draft_analysis.html.
Residential High-Efficiency Heating	High Efficiency Gas Steam Boiler	20	EnergyStar	$2,186	NYSERDA Deemed Savings Database, Program Name: Loan Fund Program Measure Name: H.BOILER-STEAM-GAS.<100000. . . .N	12.9 MMBTUs	NYSERDA Deemed Savings Database, Program Name: Loan Fund Program; Measure Name: H.BOILER-STEAM-GAS.<100000._._._.N
Residential High-Efficiency Heating	Micro CHP	15	GDS August 25, 2006 report to KeySpan titled “GDS Analysis of Micro CHP Systems for KeySpan Energy Delivery”	$6,500	GDS August 25, 2006 report to KeySpan titled “GDS Analysis of Micro CHP Systems for KeySpan Energy Delivery”	71.6 mmbtu plus 5,502 kWh per year	GDS August 25, 2006 report to KeySpan titled “GDS Analysis of Micro CHP Systems for KeySpan Energy Delivery”
Residential High-Efficiency Water Heating	Indirect Water Heater	20	Gas Networks March 25, 2004 report titled "Benefit/Cost Screening Results for Regional Natural Gas Energy Efficiency Programs" Pg 15	$300	Teleconference with GasNetworks on 3/2/2004; documentation not available	7.9 MMBTUs	Annual energy savings are from a RemRATE model run Analysis prepared by Bruce Bennett of GDS. See MS Word documentation prepared by GDS, dated 2-13-2004. This document is not currently available.
Residential High-Efficiency Water Heating	Tankless Natural Gas Water Heater	20	ENERGY STAR® Residential Water Heaters: Final Criteria Analysis 4/1/08 Pg 10	$1,120	ENERGY STAR® Residential Water Heaters: Final Criteria Analysis 4/1/08 Pg 10. Average of the price premium.	7.8 MMBTUs	ENERGY STAR® Residential Water Heaters: Final Criteria Analysis 4/1/08 Pg 10

Exhibit C
2009 Master Database of Input Assumptions

RESIDENTIAL PROGRAM INPUT ASSUMPTIONS

Gas Energy Efficiency Programs - National Grid

Program	Measure Name	Measure Life	Source of Measure Life	Incremental Cost	Source of Incremental Cost	Annual Savings Per Participant or Per Unit of Installation	Source of Annual Savings
Residential High-Efficiency Water Heating	Stand Alone Water Heaters EF>.62	13	ENERGY STAR® Residential Water Heaters: Final Criteria Analysis 4/1/08 Pg 10	$70	ENERGY STAR® Residential Water Heaters: Final Criteria Analysis 4/1/08 Pg 10	1.9 MMBtus	ENERGY STAR® Residential Water Heaters: Final Criteria Analysis 4/1/08 Pg 10
Energy Star Homes	Single-Family	25	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-2	$2,352	Combining data from: Nexus Market Research, Inc., Dorothy Conant, Consultant "Evaluation of the Massachusetts New Homes with ENERGY STAR, Findings and Analysis", April 24, 2008 pg 24 and ICF Program Data on the average size of homes. The average Total Resource Cost is approximately $2,100 per unit.	24.5 MMBtus	Combining data from: Nexus Market Research, Inc., Dorothy Conant, Consultant "Evaluation of the Massachusetts New Homes with ENERGY STAR, Findings and Analysis", April 24, 2008 pg 24 and ICF Program Data on the average size of homes and the savings per 1000/Sq ft per the methodology described in Energy / Demand Savings Calculation and Reporting Methodology for the Massachusetts Energy Star Homes® Program. This estimate was reduced by 30% to account for the gas savings from homes built in the territory where National Grid is both the gas and electric provider. Savings for these homes are claimed in National Grid's electric ES
Energy Star Homes	Multi-Family	25		$964		15.0 MMBtus	
Residential Weatherization Program	Insulation & Air Sealing	20	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-2	$2,465	Average rebate in 2008 through August was $428 when the program paid 20% of the incremental cost. $428/.2=$2140 plus the $650 cost of Air Sealing approximately 50% of units.	19 MMBtus	Based on RemRATE Analysis for small, medium and large homes in New Hampshire, and using degree days in Concord, New Hampshire. The REM/rate analysis was completed on March 12, 2004 by GDS. Single family unit savings 36.8 mmbtu/unit. Multi-Family units (5+) assumed to be 1/3 the size and on average save 12.3 mmbtu.
ENERGY STAR Windows	Energy Star Windows	25	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-3	$19	Quantec LLC, Residential Market Assessment for ENERGY STAR Windows in the Northeast, January 2006 pg 28.	.23 MMBtu per 12.5 square ft. window	Quantec LLC, Residential Market Assessment for ENERGY STAR Windows in the Northeast, January 2006 pg 28.
Advanced Residential Controls	Programmable thermostats	10	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-2	$92	Energy Star Cost Calculator, Energy Star Website, www.energystar.gov. Based on Industry data for 2008.	7.5 MMBtus	RLW Analytics-Validating the Impacts of Programmable Thermostats, dated January 2007 pg 2.

Exhibit C
2009 Master Database of Input Assumptions

RESIDENTIAL PROGRAM INPUT ASSUMPTIONS

Gas Energy Efficiency Programs - National Grid

Program	Measure Name	Measure Life	Source of Measure Life	Incremental Cost	Source of Incremental Cost	Annual Savings Per Participant or Per Unit of Installation	Source of Annual Savings
Advanced Residential Controls	Boiler reset controls	15	ACEEE Emerging Technologies Report: Advanced Boiler Controls-2006	$758	Average cost of Boiler Reset Controls rebated through the program.	7.9 MMBTUs	ACEEE Emerging Technologies Report: Advanced Boiler Controls-September 2006
Residential Low Income	Weatherization	20	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-3	$2,668	Estimated cost based on previous year ($2320) adjusted to account for higher material costs in 2009.	GDS developed estimates of annual therm savings for each of the 55 measures provided by the program. For each measure, therm savings were estimated for single-family and multi-family housing units. Weighted average annual therm savings are 338.4 therms per participant (430.5 therms per year saved for single-family units; 231.6 therms saved per year for multi-family units). See Table 6-7 in the July 23, 2004 Report	GDS July 23, 2004 report to KeySpan titled “Update of the Cost Effectiveness of the KeySpan Energy Delivery Residential Low Income Program in Massachusetts, FINAL REPORT.”
Energy Audit and Home Performance	Energy Audit	15	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-2	$130	Cost of First Audit plus cost of $30 of instant savings measures and 2 screw in energy efficient light bulbs at the time of audit.		

Commercial & Industrial INPUT ASSUMPTIONS

Gas Energy Efficiency Programs - National Grid

Program	Measure Name	Measure Life	Source of Measure Life	Incremental Cost	Source of Incremental Cost	Annual Savings Per Participant or Per Unit of Installation	Source of Annual Savings
High-Efficiency Heating and Water-Heating	High Efficiency Gas Furnace (AFUE >= 92%)	18	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-2	$654	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.FURNACE-GAS/PROPANE.<100000._._._.N	21.1 MMBTUs	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.FURNACE-GAS/PROPANE.<100000._._._.N
High-Efficiency Heating and Water-Heating	High Efficiency Gas Furnace (AFUE >= 92%) w/ ECM	18	The New England State Program Working Group Residential and Commercial/Industrial Measure Life Report for the ISO forward capacity market, June 2007. Pg A-2	$679	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.FURNACE-GASw/ECM.<100000.RES._._.N	19.6 MMBTUs and 396 kWh	NYSERDA Deemed Savings Database; Program Name: Loan Fund Program; Measure Name: H.FURNACE-GASw/ECM.<100000.RES._._.N
High-Efficiency Heating and Water-Heating	Condensing Unit Heater 90% (151 to 400 MBH)	18	Natural Gas Efficiency and Conservation Measure Resource Assessment (ETO, 2003); NYSERDA Deemed Savings Database; Program Name: Smart Equipment Choices; Measure Name: A.UNIT-HEATER-COND.<300000.CI._._.N	$2,400	Assuming 200,000 Btuh; $12,000 per million Btuh: Baseline ($13,000 per million Btuh) and retrofit ($25,000 per million Btuh) unit costs from "Analysis of Standard Options for Unit Heaters and Duct Furnaces" (PG&E, 2004).; NYSERDA Deemed Savings Database; Program Name: Smart Equipment Choices; Measure Name: A.UNIT-HEATER-COND.<300000.CI._._.N	40.92	**Assuming input of 200,000 Bthu**: Nexant's "Gas Energy Efficiency Measure Analysis to Support NYSERDA's Con Edison Gas Efficiency Program" reported in August 2005; Savings of 204.6 Mmbtu's per million Btu/hr of heater input capacity. Savings based on efficiency improvement of the retrofit equipment compared to the baseline equipment. Baseline efficiency from ASHRAE 90.1-2001. (Assumes power vent and IID). Replacement efficiency based on PG&E Unit Heater Study. 80% comb. eff to 90%.; ; NYSERDA Deemed Savings Database; Program Name: Keep Cool; Measure Name: A.UNIT-HEATER-COND.<300000.CI._._.N
High-Efficiency Heating and Water-Heating	Direct Fired Heater (up to 1500 MBH)						
High-Efficiency Heating and Water-Heating	Direct Fired Heater (up to 3000 MBH)						
High-Efficiency Heating and Water-Heating	Direct Fired Heater (over 3000 MBH)						

Commercial & Industrial INPUT ASSUMPTIONS

Gas Energy Efficiency Programs - National Grid							
Program	**Measure Name**	**Measure Life**	**Source of Measure Life**	**Incremental Cost**	**Source of Incremental Cost**	**Annual Savings Per Participant or Per Unit of Installation**	**Source of Annual Savings**
High-Efficiency Heating and Water-Heating	Infrared Heaters (Low intensity)	17	Measure life based on GDS Gas Potential Study for Utah (2004); NYSERDA Deemed Savings Database; Program Name: Smart Equipment Choices; Measure Name: A.INFR-UNIT-HEATER._.CI._._.N	$632	Incremental unit cost based on GDS Gas Potential Study for Utah (2004), Cost is $6,320 per million Btuh.; NYSERDA Deemed Savings Database; Program Name: Smart Equipment Choices; Measure Name: A.INFR-UNIT-HEATER._.CI._._.N	40.8	**Assuming 100,000 Btuh**; Nexant's "Gas Energy Efficiency Measure Analysis to Support NYSERDA's Con Edison Gas Efficiency Program" reported in August 2005. Savings 408 MMBTUs per million Btu/hr of input capacity. Base efficiency from ASHRAE 90.1-2001 (Assumes standard gas unit heater 80% comb eff.); NYSERDA Deemed Savings Database; Program Name: Smart Equipment Choices; Measure Name: A.INFR-UNIT-HEATER._.CI._._.N
High-Efficiency Heating and Water-Heating	High Efficiency Gas Steam Boiler 82% AFUE (up to 300 MBH)	25	Efficiency Vermont Technical Reference Manual User; NYSERDA Deemed Savings Database; Program Name: Smart Equipment Choices; Measure Name: H.STEAM-BOILER-GAS.<300000.CI._._.N	$3,552	DEER; NYSERDA Deemed Savings Database; Program Name: Smart Equipment Choices; Measure Name: H.STEAM-BOILER-GAS.<300000.CI._._.N	36.5	Retrofit efficiency based on the program requirement. Annual full load equivalent hours, 2470, estimated by Nexant, based on monthly heating degree hours for all the counties in NY weighted by populations. 75% AFUE to 80%; NYSERDA Deemed Savings Database; Program Name: Smart Equipment Choices; Measure Name: H.STEAM-BOILER-GAS.<300000.CI._._.N
High-Efficiency Heating and Water-Heating	Hydronic Boilers, forced hot water 85%+ AFUE (up to 300 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$1,590	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	16.8	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 190 MBH, 1500 EFLH, baseline of 80%
High-Efficiency Heating and Water-Heating	Hydronic Boilers, forced hot water 85%+ AFUE (301-499 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$3,970	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	35.3	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 400 MBH, 1500 EFLH, baseline of 80%

Commercial & Industrial INPUT ASSUMPTIONS

Gas Energy Efficiency Programs - National Grid

Program	Measure Name	Measure Life	Source of Measure Life	Incremental Cost	Source of Incremental Cost	Annual Savings Per Participant or Per Unit of Installation	Source of Annual Savings
High-Efficiency Heating and Water-Heating	Hydronic Boilers, forced hot water 85%+ AFUE (500-999 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$3,530	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	66.2	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 750 MBH, 1500 EFLH, baseline of 80%
High-Efficiency Heating and Water-Heating	Hydronic Boilers, forced hot water 85%+ AFUE (1000-1700 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$5,740	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	119.1	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 1350 MBH, 1500 EFLH, baseline of 80%
High-Efficiency Heating and Water-Heating	Hydronic Boilers, forced hot water 85%+ AFUE (>1700 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$8,200	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	150.0	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 1700 MBH, 1500 EFLH, baseline of 80%
High-Efficiency Heating and Water-Heating	Condensing Boilers, forced hot water 92%+ AFUE (up to 300 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$2,675	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	32.3	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 165 MBH, 1500 EFLH, baseline of 80%
High-Efficiency Heating and Water-Heating	Condensing Boilers, forced hot water 92%+ AFUE (301-499 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$3,970	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	78.3	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 400 MBH, 1500 EFLH, baseline of 80%

Commercial & Industrial INPUT ASSUMPTIONS

Gas Energy Efficiency Programs - National Grid

Program	Measure Name	Measure Life	Source of Measure Life	Incremental Cost	Source of Incremental Cost	Annual Savings Per Participant or Per Unit of Installation	Source of Annual Savings
High-Efficiency Heating and Water-Heating	Condensing Boilers, forced hot water 92%+ AFUE (500-999 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$6,645	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	146.7	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 750 MBH, 1500 EFLH, baseline of 80%
High-Efficiency Heating and Water-Heating	Condensing Boilers, forced hot water 92%+ AFUE (1000-1700 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$13,290	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	264.1	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 1350 MBH, 1500 EFLH, baseline of 80%
High-Efficiency Heating and Water-Heating	Condensing Boilers, forced hot water 92%+ AFUE (>1701 MBH)	25	Efficiency Vermont Technical Reference Manual User ;TRM User Manual No. 2005-37 pg 161	$17,820	Based on 'Burnham Hydronics Trade Price Book #186', Dunkirk 2008 Price Book, Lochinvar trade price 2008 and Onyx -"Metro NY All Equip" database	332.6	Evaluation Study of Keyspan's Commercial and Industrial High Efficiency Heating Equipment Program - ODC Pg 40 Oct 2007; Gas savings = ((AFUEq-AFUEb)/AFUEq) x CAPY in therms/hour x EFLH; Assumed capacity of 1700 MBH, 1500 EFLH, baseline of 80%
High-Efficiency Heating and Water-Heating	Indirect Water Heater (up to 50 gallons)	20	Gas Networks March 25, 2004 report titled "Benefit/Cost Screening Results for Regional Natural Gas Energy Efficiency Programs"	$300	Teleconference with GasNetworks on 3/2/2004; Documentation not available	7.9	Annual energy savings are from a RemRATE model run Analysis prepared by Bruce Bennett of GDS. See MS Word documentation prepared by GDS, dated 2-13-2004. This document is not currently available.
High-Efficiency Heating and Water-Heating	Indirect Water Heater (>50 gallons)	20	Gas Networks March 25, 2004 report titled "Benefit/Cost Screening Results for Regional Natural Gas Energy Efficiency Programs"	$300	Teleconference with GasNetworks on 3/2/2004; Documentation not available	7.9	Annual energy savings are from a RemRATE model run Analysis prepared by Bruce Bennett of GDS. See MS Word documentation prepared by GDS, dated 2-13-2004. This document is not currently available.

Exhibit C
2009 Master Database of Input Assumptions

Commercial & Industrial INPUT ASSUMPTIONS

Gas Energy Efficiency Programs - National Grid

Program	Measure Name	Measure Life	Source of Measure Life	Incremental Cost	Source of Incremental Cost	Annual Savings Per Participant or Per Unit of Installation	Source of Annual Savings
High-Efficiency Heating, Water-Heating, Controls Program	Tankless Natural Gas Water Heater (EF >=.82)	20	Energy Star, High Efficiency Water Heaters Provide Hot Water for Less pg 2	$500	GDS Associates analysis for KeySpan Energy Delivery on tankless natural gas water heaters, December 22, 2004 (Excel worksheet documentation)	7.4	GDS Associates analysis for KeySpan Energy Delivery on tankless natural gas water heaters, December 22, 2004 (Excel worksheet documentation)
Commercial Energy Efficiency Program	Multifamily Housing Program	15	Staff estimate as the program consists primarily of controls and envelope measures which typically have lifetimes of 15-20 years.	$4,220	The projected rebate per participant is $1,266. The rebate is projected to cover 30% of the incremental cost. Thus the incremental cost is projected to be $4,220.	446.3	Average savings per participant for NH projects completed between Jan -Mar 2009.
Commercial Energy Efficiency Program	Commercial Energy Efficiency Program	15	Staff estimate as the program consists primarily of controls and envelope measures which typically have lifetimes of 15-20 years.	$11,283	The projected rebate per participant is $3,385. The rebate is projected to cover 30% of the incremental cost. Thus the incremental cost is projected to be $11,283.	177.1	Average savings per participant for NH projects completed between Jan -Mar 2009.
Commercial Energy Efficiency Program	Economic Redevelopment Program	15	Staff estimate as the program consists primarily of controls and envelope measures which typically have lifetimes of 15-20 years.	$117,600	Based on the measures included in Economic Redevelopment projects from May 2007 through October 2008, $117,600 is an anticipated average project cost for these projects	530.7	Average savings per participant for NH projects completed between Jan -Mar 2009.
Commercial Building Practices and Demonstration Program	Commercial Building Practices and Demonstration Program	15	Staff estimate	$65,620	Based on the measures included in Commercial Building Practices and Demonstration projects from May 2007 through October 2008, $65,620 is an anticipated average project cost for these projects	1,769.6	Average savings per participant for NH projects completed between Jan -Mar 2009.
Commercial High Efficiency Heating Equipment Program	High Efficiency Heating Equipment Program	20	Simple average of individual equipment lives which typically have lifetimes of 18-25 years.	$3,984	Simple average of individual equipment rebates offered.	106.4	Average savings per participant for NH projects completed between Jan -Mar 2009.

Exhibit D - Shareholder Incentive Page 1 of 4

National Grid Gas Energy Efficiency

Target Shareholder Incentive Year ONE- May 1, 2009 - December 31, 2009

Commercial/Industrial Incentive

1. Target Benefit/Cost Ratio	2.06
2. Threshold Benefit/Cost Ratio	1.00
3. Target lifetime MMBTU	632,832
4. Threshold MMBTU	411,341
5. Budget	$1,236,560
6. CE Percentage	4.00%
7. Lifetime kWh Percentage	4.00%
8. Target C/I Incentive	**$98,925**
9. Cap	**$148,387**

Residential Incentive

10. Target Benefit/Cost Ratio	2.14
11. Threshold Benefit/Cost Ratio	1.00
12. Target lifetime MMBTU	527,748
13. Threshold MMBTU	343,036
14. Budget	$1,579,226
15. CE Percentage	4.00%
16. Lifetime kWh Percentage	4.00%
17. Target Residential Incentive	**$126,338**
18. Cap	**$189,507**
19. TOTAL TARGET INCENTIVE	**$225,263**

Line No. Notes:
1, 3, 5, 10, 12, and 14. See Exhibit B
2, 6, 7, 11, 15, and 16. Report to the New Hampshire Public Utilities Commission on Ratepayer-Funded Energy Efficiency Issues in New Hampshire, Docket No. DR 96-150, page 21.
4. 65% of line 3.
8. 8% of line 5.
9. 12% of line 5.
13. 65% of line 12.
17. 8% of line 14.
18. 12% of line 14.
19. Line 8 plus line 17.

Exhibit D - Shareholder Incentive Page 2 of 4

National Grid Gas Energy Efficiency
Target Benefit-Cost Ratio by Sector
Year ONE- May 1, 2009 - December 31, 2009

	Planned
Commercial & Industrial:	
1. Benefits (Value) From Eligible Programs	$5,580,244
2. Implementation Expenses	$1,180,963
3. Customer Contribution	$1,367,677
4. Evaluation Expense	$55,597
5. Shareholder Incentive	$98,925
6. Total Costs Including Shareholder Incentive	**$2,703,162**
7. Benefit/Cost Ratio - C&I Sector	**2.06**
8. Implementation Plus Evaluation Expense - C&I Sector	**$1,236,560**
Residential:	
9. Benefits (Value) From Eligible Programs	$5,170,171
10. Implementation Expenses	$1,543,375
11. Customer Contribution	$714,822
12. Evaluation Expense	$35,851
13. Shareholder Incentive	$126,338
14. Total Costs Including Shareholder Incentive	**$2,420,386**
15. Benefit/Cost Ratio - Residential Sector	**2.14**
16. Implementation Plus Evaluation Expense - Residential Sector	**$1,579,226**

Line No. Notes:

1 - 5 and 9-13. See Exhibit B.

5. Sum of lines 2-5.

6. Line 1 divided by line 6. The shareholder incentive mechanism described by the New Hampshire Energy Efficiency Working Group and approved by the Commission in Order No. 23,574 includes a circular calculation. A portion of the earned shareholder incentive is related to the benefit/cost ratio (BCR). However, the shareholder incentive is supposed to be included as an EE cost in determining the BCR. For the purpose of calculating the shareholder incentive, the Company has calculated the planned BCR including the shareholder incentive for one iteration and will compare the actual BCR including the shareholder incentive to the planned BCR including shareholder incentives when determining the earned incentive.

7. Sum of lines 2 and 5. These are the C&I sector funds on which the Company may calculate its earned shareholder incentive.

14. Sum of lines 10 - 13.

15. Line 9 divided by line 14. The shareholder incentive mechanism described by the New Hampshire Energy Efficiency Working Group and approved by the Commission in Order No. 23,574 includes a circular calculation. A portion of the earned shareholder incentive is related to the benefit/cost ratio. However, the shareholder incentive is supposed to be included as an EE cost in determining the benefit/cost ratio. For the purpose of calculating the shareholder incentive, the Company has calculated the planned benefit/cost ratio including the shareholder incentive for one iteration and will compare the actual benefit/cost ratio including the shareholder incentive to the planned benefit/cost ratio including shareholder incentives when determining the earned shareholder incentive.

16. Sum of lines 10 and 13. These are the Residential sector funds on which the Company may calculate its earned shareholder incentive.

Exhibit D - Shareholder Incentive Page 3 of 4

National Grid Gas Energy Efficiency

Target Shareholder Incentive Year TWO- January 1, 2010 - December 31, 2010

Commercial/Industrial Incentive

1. Target Benefit/Cost Ratio	2.01
2. Threshold Benefit/Cost Ratio	1.00
3. Target lifetime MMBTU	1,236,404
4. Threshold MMBTU	803,663
5. Budget	$2,411,290
6. CE Percentage	4.00%
7. Lifetime kWh Percentage	4.00%
8. Target C/I Incentive	**$192,903**
9. Cap	**$289,355**

Residential Incentive

10. Target Benefit/Cost Ratio	2.15
11. Threshold Benefit/Cost Ratio	1.00
12. Target lifetime MMBTU	885,455
13. Threshold MMBTU	575,546
14. Budget	$2,575,126
15. CE Percentage	4.00%
16. Lifetime kWh Percentage	4.00%
17. Target Residential Incentive	**$206,010**
18. Cap	**$309,015**
19. TOTAL TARGET INCENTIVE	**$398,913**

Line No. Notes:
1, 3, 5, 10, 12, and 14. See Exhibit B
2, 6, 7, 11, 15, and 16. Report to the New Hampshire Public Utilities Commission on Ratepayer-Funded Energy Efficiency Issues in New Hampshire, Docket No. DR 96-150, page 21.
4. 65% of line 3.
8. 8% of line 5.
9. 12% of line 5.
13. 65% of line 12.
17. 8% of line 14.
18. 12% of line 14.
19. Line 8 plus line 17.

Exhibit D - Shareholder Incentive Page 4 of 4

National Grid Gas Energy Efficiency
Target Benefit-Cost Ratio by Sector
Year TWO- January 1, 2010 - December 31, 2010

Commercial & Industrial:	**Planned**
1. Benefits (Value) From Eligible Programs	$11,038,062
2. Implementation Expenses	$2,295,901
3. Customer Contribution	$2,893,873
4. Evaluation Expense	$115,389
5. Shareholder Incentive	$192,903
6. Total Costs Including Shareholder Incentive	**$5,498,066**
7. Benefit/Cost Ratio - C&I Sector	**2.01**
8. Implementation Plus Evaluation Expense - C&I Sector	**$2,411,290**
Residential:	
9. Benefits (Value) From Eligible Programs	$8,644,460
10. Implementation Expenses	$2,526,304
11. Customer Contribution	$1,248,016
12. Evaluation Expense	$48,822
13. Shareholder Incentive	$206,010
14. Total Costs Including Shareholder Incentive	**$4,029,152**
15. Benefit/Cost Ratio - Residential Sector	**2.15**
16. Implementation Plus Evaluation Expense - Residential Sector	**$2,575,126**

Line No. Notes:

1 - 5 and 9-13. See Exhibit B.

5. Sum of lines 2-5.

6. Line 1 divided by line 6. The shareholder incentive mechanism described by the New Hampshire Energy Efficiency Working Group and approved by the Commission in Order No. 23,574 includes a circular calculation. A portion of the earned shareholder incentive is related to the benefit/cost ratio (BCR). However, the shareholder incentive is supposed to be included as an EE cost in determining the BCR. For the purpose of calculating the shareholder incentive, the Company has calculated the planned BCR including the shareholder incentive for one iteration and will compare the actual BCR including the shareholder incentive to the planned BCR including shareholder incentives when determining the earned incentive.

7. Sum of lines 2 and 5. These are the C&I sector funds on which the Company may calculate its earned shareholder incentive.

14. Sum of lines 10 - 13.

15. Line 9 divided by line 14. The shareholder incentive mechanism described by the New Hampshire Energy Efficiency Working Group and approved by the Commission in Order No. 23,574 includes a circular calculation. A portion of the earned shareholder incentive is related to the benefit/cost ratio. However, the shareholder incentive is supposed to be included as an EE cost in determining the benefit/cost ratio. For the purpose of calculating the shareholder incentive, the Company has calculated the planned benefit/cost ratio including the shareholder incentive for one iteration and will compare the actual benefit/cost ratio including the shareholder incentive to the planned benefit/cost ratio including shareholder incentives when determining the earned shareholder incentive.

16. Sum of lines 10 and 13. These are the Residential sector funds on which the Company may calculate its earned shareholder incentive.

CHAIRMAN
Thomas B. Getz

COMMISSIONERS
Clifton C. Below
Amy L. Ignatius

EXECUTIVE DIRECTOR
AND SECRETARY
Debra A. Howland

THE STATE OF NEW HAMPSHIRE

PUBLIC UTILITIES COMMISSION
21 S. Fruit Street, Suite 10
Concord, N.H. 03301-2429

Tel. (603) 271-2431

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1-800-735-2964

Website:
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October 13, 2009

Debra A. Howland, Executive Director
N.H. Public Utilities Commission
21 S. Fruit Street, Suite 10
Concord, N.H. 03301-2429

Re: DG 09-049 - EnergyNorth Natural Gas, Inc. d/b/a National Grid
NH Energy Efficiency Plan for January 1, 2010 to December 31, 2010

Dear Ms. Howland:

On September 30, 2009, in accordance with Order No. 24,995 dated July 31, 2009, and Section II(I)(3) of the settlement agreement adopted and approved by that order, EnergyNorth Natural Gas, Inc. d/b/a National Grid NH filed updated program descriptions, cost benefit analyses, program budgets and program goals for Program Year Two.[1] Program Year Two covers the period January 1, 2010 to December 31, 2010. National Grid states that it has no changes to make to the programs it expects to provide between January 1, 2010 and December 31, 2010, which is Program Year Two. National Grid did, however, update the avoided cost data associated with these programs and provided that information as Exhibits B and D in its September 30, 2009 filing.

Staff has reviewed National Grid's filing and is of the opinion that the filing and the proposed updates of the avoided cost data associated with the programs falls within the guidelines of the settlement agreement approved by Order No. 24,995. Staff believes that no action on the proposed change is required by the Commission and submits this recommendation accordingly.

Sincerely,

James J. Cunningham, Jr.
Utility Analyst IV

cc: Service List

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[1] On August 27, 2009, the Executive Director granted the Company an extension from August 31, 2009 to September 30, 2009.

Additional Opportunities for Energy Efficiency in New Hampshire

Final Report – January 2009

Prepared for the

New Hampshire Public Utilities Commission

Prepared and Submitted by:

GDS Associates, Inc.
Engineers and Consultants

In partnership with

RLW Analytics and Research Into Action

With Telephone Survey Support Provided by

RKM Research and Communication

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Marietta, GA • Austin, TX • Auburn, AL • Manchester, NH • Madison, WI • Indianapolis, IN • Augusta, ME

ACKNOWLEDGEMENTS

This report was prepared for the New Hampshire Public Utilities Commission (NHPUC) by GDS Associates, Inc. with substantial data collection and analysis assistance provided by RLW Analytics, Research Into Action, and RKM Research and Communications (collectively, the GDS Team). The GDS Team would like to acknowledge the many helpful data sources and the technical input provided by the NHPUC, the New Hampshire electric and gas utility sponsors and the Office of the Consumer Advocate. GDS would like to give special recognition to Tom Frantz, Anne Ross and Commissioner Clifton Below all of the NHPUC, and Gil Gelineau and Tom Belair (PSNH), Derek Buchler (Northern Utilities), Lisa Glover (Unitil), David Jacobson (National Grid), Carol Woods (NHEC), Stephen Eckberg (NH OCA), and Tom Rooney and Eric Readdy of TRC Companies, Inc., all of whom were instrumental in providing insights and information and reviewing detailed plans, data collection instruments and inputs and results from analyses developed by the GDS Team including electric and gas load forecasts, energy efficiency measures, costs, energy savings, useful lives, saturation levels and remaining potential estimates.

This report provides valuable and up-to-date electric and natural gas (and associated propane and oil) energy efficiency potential savings information for New Hampshire's regulators and utility decision-makers. It will also be useful to electric and gas energy efficiency program designers and implementers and for others who may need a template for their own energy efficiency potential studies. This report includes a thorough and up-to-date assessment of the impacts that energy efficiency measures and programs can have on electricity and gas, propane and oil use in New Hampshire. Clearly there remains a significant amount of cost effective energy savings potential to be tapped within the state.

NOTICE

This report was prepared by GDS Associates, Inc., in the course of performing work contracted for and sponsored by the New Hampshire Public Utilities Commission, with review participation by National Grid (electric and gas), the New Hampshire Electric Cooperative, Northern Utilities, Public Service Company of New Hampshire, and Unitil Energy Services (hereinafter the "Sponsors"). The opinions expressed in this report do not necessarily reflect those of the Sponsors or the State of New Hampshire, and reference to any specific product, service, process, or method does not constitute an implied or expressed recommendation or endorsement of it. Further, the Sponsors, the State of New Hampshire, and the contractor make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report. The Sponsors, the State of New Hampshire, and the contractor make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information contained, described, disclosed, or referred to in this report.

Scott M. Albert, Principal & Northeast Region Manager
GDS Associates, Inc., January 2009

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Section 1: Executive Summary

This study presents results from an evaluation of additional opportunities for energy efficiency in New Hampshire. Estimates of technical potential, maximum achievable potential, and maximum achievable cost effective potential by the year 2018 (a 10-year period) are provided for electricity, natural gas and related propane and fuel oil savings at the state level and for each of the four New Hampshire retail electricity providers and two natural gas distribution companies. Results from a potentially obtainable savings scenario are also presented to estimate that portion of the cost effective potential that might be achievable after consideration of customer behavior. Finally, estimates are presented of the installed costs required to achieve resulting savings for each scenario (excluding costs for marketing, program design and administration)

All results were developed using customized residential, commercial and industrial sector-level energy efficiency potential assessment models and New Hampshire Public Utilities Commission (NHPUC)-specified cost-effectiveness criteria[1] including the region's most recent avoided energy cost projections.[2] To help inform these models, actual electric and gas utility customer information was collected through a combination of telephone surveys with residential and small commercial/industrial customers and site visits at larger commercial and industrial facilities. Work was conducted by GDS Associates, Inc. with important input and assistance provided by RLW Analytics, Research Into Action and RKM Research and Communications (the GDS Team).

Technical potential studies need to be understood and viewed as a highly theoretical construct/tool – therefore, the data used for this report was based on the best data available at the time the models were run – when better data was identified, it was used where possible, but given the demands and limits of time for this project, it is possible that some sources were overlooked.

1.1 Study Scope

The objective of this study was to evaluate additional opportunities for energy efficiency in New Hampshire to provide insights for continued electric and gas utility program filings and implementation plans and to inform expanded planning for energy efficiency programs that may rise from New Hampshire's participation in the Regional Greenhouse Gas Initiative and the recommendations of the NH Climate Change Policy Task Force. Following is a listing and a brief overview of the approach undertaken to complete each of the major tasks required for this study effort:

---

[1] The NHPUC's total resource cost effectiveness test (TRC) derives from the 7/6/99 report from the NH Energy Efficiency Working Group (pp. 14-18) in DR 96-150, available at: www.puc.nh.gov/Electric/96-150%20%20NH%20Energy%20Efficiency%20Working%20Group%20Final%20Report%20(1999).pdf, and was modified by Attachment C of the 2008 Core Energy Efficiency filing approved by Order No. 24,815 in DE 07-106 that provided that "[t]he use of the 15% adder to represent environmental and other benefits as recommended by the [NHEEWG] ...was discontinued because the 2007 AESC avoided costs include market-based price proxies for power plant emission of NOx, SO2, Mercury and CO2."

[2] *Avoided Energy Supply Costs in New England: 2007 Final Report*, August 10, 2007, prepared by Synapse Energy Economics, Inc., available at: www.synapse-energy.com/Downloads/SynapseReport.2007-08.AESC.Avoided-Energy-Supply-Costs-2007.07-019.pdf.

Analyze current saturations of energy using equipment and penetrations of energy efficiency equipment and practices in each end-use category. This task was completed through analysis of a combination of primary and secondary data sources including carefully designed questions and a statistically valid sample of telephone surveys and site visits.

Produce an up-to-date list of currently available and soon to be commercially available technologies which may play a part in future efficiency programs – This task was based initially on existing GDS databases of sector-specific electricity and natural gas end-use technologies and efficiency measures. It was extensively supplemented to include other technology areas of interest to the New Hampshire Public Utilities Commission, the New Hampshire Office of the Consumer Advocate, and the four electric and two natural gas utilities supporting this project.

Estimate customer participation rates/levels by program, based on different payback/incentive levels and define/analyze significant barriers that customers face when investing in additional energy efficiency – This task was based on results from the GDS Team's phone surveys and site visits. Where insufficient customer-specific data was available, these estimates were informed through the project sponsors' and Team's combined existing and extensive knowledge of not only NH's current electric/gas utility programs, but also best practices and barriers associated with programs being implemented elsewhere in the region and throughout the country.

Develop, by sector, a simplified end-use model of state electricity and natural gas consumption and peak demand – This task was completed using data provided directly by each participating New Hampshire electric and gas utility. Results were assessed against forecasts published through the New England Power Pool (NEPOOL) and ISO-New England, Inc. to ensure reasonableness.

Estimate, state-wide and for each of the four New Hampshire retail electricity providers and two natural gas distribution companies, the technical, maximum achievable, maximum achievable cost effective potential, and a potentially obtainable scenario, for electricity, natural gas and related propane and fuel oil savings over the next 10-year period, and the budgets (where appropriate) required to achieve that potential – These activities were based on the GDS Team's existing sector-level supply curve and potential analysis models, NHPUC cost-effectiveness criteria/methodologies and associated up-to-date assumptions[3] including the region's current avoided energy cost projections, elements of which were already in hand. Wherever possible, these models were customized based on state utility-specific data and the saturation and penetration survey results obtained through this project's primary data collection (telephone survey and site visit) activities. All results were analyzed and compared for reasonableness against overall state consumption and consideration of past New Hampshire utility energy efficiency program participation.

[3] The measure specific savings values used to develop the following estimates of technical potential vary considerably in the level of certainty. Some measures. such as commercial lighting. have a long history of implementation and have fairly well documented costs and savings while some measures which also show large potential, such as retro-commissioning, have had little large scale implementation to date and estimates of their savings and cost effectiveness are based on a limited number of real world installations. Other high potential measures, such as floating head pressure controls have tended to work well in the short term but are often overridden by on-site maintenance personnel who are not comfortable with running their systems at lower pressures. It is important for anyone using this study to set actual program budget and savings targets to further refine the less certain estimates before starting large scale implementation of such measures.

Evaluate extent to which past and current energy efficiency programs have achieved energy savings to date, provide sensitivity analysis of realized energy savings based on different resource levels (including absence of current SBC-funded model), and recommend modifications to program and measure offerings that would increase the likelihood of achieving identified potential – These activities were based on a combination of factual data comparisons, analysis of survey results associated with end-use customer sector barriers identification, the collective GDS Team's experience with looking at programs from a logic-modeling perspective, and the GDS Team's extensive knowledge of other local, regional and national programs and best practices.[4] Focus of these evaluations and sensitivities were at the statewide level (vs. utility-specific).

More information on each of these items is presented in the methodologies and subsequent sections of this report.

The definitions used in this study for energy efficiency potential estimates are as follows:

- **Technical potential** is defined in this study as the complete and immediate penetration of all measures analyzed in applications where they were deemed technically feasible from an engineering perspective. For the residential sector, two technical potential scenarios were developed: a technical potential (best) scenario, where "best" options are assumed to be installed in situations where "good/better/best" options exist; and a technical potential (traditional) scenario, where "good/better/best" options are allocated for model installation across applicable populations.

- **Maximum Achievable potential** is defined as the maximum penetration of an efficient measure that would be adopted absent consideration of cost or customer behavior. The term "achievable" refers to efficiency measure penetration, based on estimates of New Hampshire-specific building stock, energy using equipment saturations and realistic efficiency penetration levels that can be achieved by 2018 if all remaining standard efficiency equipment were to be replaced on burnout (at the end of its useful measure life) and where all new construction and major renovation activities in the state were done using energy efficient equipment and construction/installation practices. In certain circumstances, where early replacement of specific measures is becoming standard practice, maximum achievable potential includes the retrofit of measures before the end of their useful measure life (i.e., T8 lighting, thermostats, insulation and weatherization of existing homes).

- **Maximum Achievable Cost Effective (M.A.C.E.) potential** is defined as the portion of the maximum achievable potential that is cost effective according to the economic criteria currently used to determine energy efficiency program cost-effectiveness (New Hampshire Public Utility Commission's approved Total Resource Cost Test – NH TRC), before consideration of customer behavior. Application of the TRC test is based on the

[4] Assessments based on a logic-modeling perspective recognize current program resources (dollars, staffing, etc.) and activities (measure installations, promotional rebates/incentives, marketing/outreach, education/training, etc.) and seek to identify their causal links to anticipated outputs (measures installed, in-program energy and capacity savings, # of customers served, market actors trained, etc.), short-, intermediate- and long-term outcomes (changes in awareness and behavior, market-wide/sustainable energy, economic and environmental benefits, etc.). In addition, logic models recognize the existence and potential impacts of external influences (price of energy, state of the local and regional economy, federal tax incentives, other non-program sponsored activities, etc.).

latest values for avoided cost (electric, natural gas and other fuels) and excludes environmental externalities not already captured with avoided cost values, consistent with current utility and PUC procedures.

- **Potentially Obtainable scenario** is a new output developed for this study[5] and can be defined as an estimate of the potential for the realistic penetration over time of energy efficient measures that are cost effective according to the NH TRC, taking customer behavior into consideration (including consideration of priorities and price). To achieve this potential, a concerted, sustained campaign involving aggressive programs and market interventions would be required. As demonstrated later in this report, the State of New Hampshire and its electric and gas utilities would need to continue to undertake, and perhaps aggressively expand its efforts to achieve these levels of savings.

LIMITATIONS TO THE SCOPE OF STUDY As with any assessment of energy efficiency potential, this study necessarily builds on a large number of assumptions, from average measure lives, savings and costs, to the discount rate for determining the net present value of future savings. The RFP for this study also called for a simplifying assumption that new buildings are constructed to meet minimum energy codes, even though that may not actually be the case. While, as noted above, the authors have sought to use the best available data, there are many assumptions where there may be reasonable alternative assumptions that would yield somewhat different results. For example, the "good, better and best" scenarios for housing weatherization and retrofit, while constructed to be reasonable illustrations, are not necessarily typical of many homes because of the wide diversity in size, age, type, and quality of construction, renovation and maintenance of existing homes. Furthermore, while the measures lists are extensive and represent most, if not all, commercially available, and some emerging, energy efficient measures, they are not exhaustive, particularly for peak electric demand reduction measures and potential fuel oil and propane savings, as further noted in footnote 30 of this report. Also, there was no attempt to place a dollar value on some difficult to quantify benefits that may result from some measures, such as increased comfort or reduced maintenance, which may in turn support some personal choices to implement particular measures that may otherwise not be cost-effective or only marginally so.

Thus, the various potential estimates are specific to and limited by the detailed measures lists and assumptions described in this study. As new and improved energy efficiency products and strategies emerge and as regulatory, market, and behavioral barriers are reduced, the potentially obtainable estimate of energy efficiency might reasonably be expected to increase. In any case, we have provided here one well informed reasonable scenario of potentially obtainable increases in cost-effective energy efficiency for New Hampshire. Others are plausible. With this report we are providing the PUC with a complete copy of the spreadsheet model with all the measures and assumptions to facilitate further analysis by them, including revisions and updates to the assumptions and measures list.
The main outputs of this study are summary data tables and figures identifying the potential for additional energy efficiency opportunities in New Hampshire over the ten-year period, 2009 through 2018. Wherever possible, this study makes use of actual New Hampshire residential,

[5] There has been a recent trend to temper estimates of cost-effective potential by taking into consideration behavioral, market, regulatory, financing and/or political barriers. A just released study by the Electric Power Research Institute used a similar concept that they called the "Realistically Achievable Potential (RAP)." See: *Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S.: (2010–2030)*, EPRI, Palo Alto, CA: 2009. 1016987, p. xiv. See also National Action Plan for Energy Efficiency (2007), *Guide for Conducting Energy Efficiency Potential Studies*, prepared by Philip Mosenthal and Jeffrey Loiter, Optimal Energy, Inc., www.epa.gov/eeactionplan, p. 2-4.

commercial and industrial customer data collected through phone surveys and site visits. Given the magnitude of efficiency measures included for consideration in this study, in cases where New Hampshire customer-specific information was not available, data on measure savings, costs and penetration rates were compiled through a combination of secondary research (including reviews of other previous relevant studies), utility-provided data, manufacturer specifications, and direct calculation through energy calculators and building simulation modeling. Collectively, these data sources provided an important and extensive foundation for estimates of electric energy, natural gas and related oil and propane savings potential by measure type, end-use and customer sector.

1.2 Results Overview

Energy-efficiency opportunities typically are physical, long-lasting changes to buildings and equipment that result in decreased energy use while maintaining the same or improved levels of energy service. This study shows that there is still significant savings potential in New Hampshire for cost effective electric and natural gas energy-efficiency measures and practices (and associated oil and propane savings).

As shown in Table 1, the Technical potential savings (all sectors combined) for electric energy efficiency measures in New Hampshire is over 27 percent of projected 2018 kWh sales in the State, and similarly over 27 percent for non-electric (natural gas, oil and propane) efficiency measures. The Maximum Achievable Cost Effective potential (before consideration of customer behavior) is over 20 percent (nearly 2,700 gWh annually) of projected 2018 kWh sales (over 15 percent summer peak demand reduction), and over 16 percent of projected 2018 non-electric sales (more than 15,440,000 MMBTu).[6] It is important to note, in the industrial sector, that the Maximum Achievable and Maximum Achievable Cost Effective potentials are the same. As explained in more detail in Section 6 of this report, this is because all end uses assessed in the industrial sector were screened as cost effective during the modeling process. The Potentially Obtainable scenario (including consideration of customer behavior) shows savings from electric and non-electric efficiency measures of approximately nearly 11 percent of 2018 kWh sales and approximately eight percent of projected 2018 non-electric (natural gas, oil and propane) sales. The Potentially Obtainable electric savings is equal to approximately 78 percent of the projected growth in electricity consumption over the next decade.

Estimates of the associated potential reductions in CO_2 emissions are also shown in Table 1, along with estimated costs that would be required to achieve these potentials. Depending on the scenario considered, these emission reductions and costs to achieve can be quite substantial (i.e., over three million tons at nearly seven billion dollars, based on the combined electric and non-electric Technical potential scenarios; or more than one million tons and nearly nine hundred million dollars based on the Potentially Obtainable scenarios).[7] In developing these estimates, savings opportunities from market driven (replace on burnout and new construction) and retrofit (early retirement) energy efficiency program strategies were considered, where applicable.

The potential savings estimates, and costs to achieve those savings, are shown separately for electric, non-electric, and natural gas (a subset of non-electric) efficiency measures in Table 2,

[6] Based on cost-effectiveness screening using the NH PUC- approved Total Resource Cost Test methodology as specified and described in Footnote 1, excluding environmental externalities not already captured within avoided cost values, consistent with current utility and NHPUC procedures.
[7] This is equivalent to removing over 509,000 cars from New Hampshire's highways under the Technical Potential scenarios, or 178,000 cars under the Potentially Obtainable scenario.

Table 3, and Table 4 respectively. As shown in these tables, more electric savings can be obtained within the residential sector than in the commercial or industrial sectors. However, the cost to achieve that savings is substantially lower in the commercial and industrial sectors and highest in the residential sector. This implies that programs targeting the commercial and industrial sectors will yield the greatest electric energy savings per dollar spent, while substantial savings can also be obtained within the residential sector, but at nearly twice the cost per kWh saved. For instance, as shown in Table 2 under the commercial sector potentially obtainable scenario, 492 million kWh of annual savings is estimated by the year 2018 at an installed cost of just under $125 million (approximately 26 cents per kWh saved). In comparison, the residential sector yields approximately 698 million kWh of annual savings of estimated potential by the year 2018 at an installed cost of $383 million (55 cents/kWh saved). Similarly in the non-electric sectors, although there is more savings potential within the residential sector, the cost to achieve that savings is substantially greater than that required to save energy in the non-electric commercial and industrial sectors. For instance, per Table 3 under the commercial sector potentially obtainable scenario, nearly 3.3 million MMBTu of annual non-electric energy savings is estimated by the year 2018 at an installed cost of just over $102 million ($31/MMBTu). In comparison, approximately 3.6 million MMBTu of annual savings potential is estimated in the residential sector by the year 2018 at an installed cost of over $200 million. ($56/MMBTu).

Table 1. Summary of Energy Savings Potentials by 2018 – Combined Electric and Non-Electric Measures

	Estimated Annual Electric Savings by 2018 (MWh)	Savings in 2018 as % of Sector 2018 Electric Consumption	Estimated Annual Demand Savings by 2018 By Sector (MW)	Estimated Savings as % of Peak Sector Demand by 2018	Estimated Annual Non-Electric Savings by 2018 (MMBtu)	Savings in 2018 as % of Sector 2018 Non-Electric Fuel Consumption	Total Estimated Costs to Achieve 2018 Annual Savings ($2008 NPV)	Total Estimated CO2 Reductions (tons)*	Total Estimated Annual Benefits Associated W/Combined Savings in 2018 ($2008 NPV)	Simple Payback (NPV Total Costs / NPV Annual Savings)
RESIDENTIAL SECTOR										
Technical Potential (Best Only)	1,770,861	31.7%	66.7	5.5%	16,918,392	50.0%	$ 5,774,815,282	1,868,111	$ 537,038,623	10.8
Technical Potential (Traditional)	1,489,861	26.7%	56.1	4.7%	12,099,639	35.8%	$ 4,426,572,142	1,422,161	$ 431,607,466	10.3
Max. Achievable Potential	1,217,145	21.8%	45.9	3.8%	7,463,743	22.1%	$ 2,421,842,542	992,217	$ 329,670,655	7.3
Max. Achievable Cost Effective	1,170,398	20.9%	44.1	3.7%	6,313,954	18.7%	$ 1,088,457,430	893,638	$ 308,833,633	3.5
Potentially Obtainable	698,069	12.5%	26.3	2.2%	3,633,554	10.7%	$ 583,533,793	523,728	$ 182,946,598	3.2
COMMERCIAL SECTOR										
Technical Potential (Traditional)	1,598,032	29.8%	476.9	37.3%	11,981,017	26.4%	$ 2,193,294,132	1,455,559	$ 256,276,208	8.6
Max. Achievable Potential	1,298,063	24.2%	385.9	30.2%	10,075,678	22.2%	$ 1,887,366,888	1,206,409	$ 211,424,997	8.9
Max. Achievable Cost Effective	1,066,772	19.9%	317.1	24.8%	7,710,337	17.0%	$ 636,534,346	951,512	$ 168,353,689	3.8
Potentially Obtainable	492,023	9.2%	146.3	11.4%	3,252,204	7.2%	$ 227,057,997	417,563	$ 74,769,619	3.0
INDUSTRIAL SECTOR										
Technical Potential (Traditional)	515,486	24.5%	109.7	22.0%	1,755,089	11.2%	$ 153,382,708	321,722	$ 60,659,145	2.5
Max. Achievable Potential	442,671	21.1%	94.2	18.9%	1,415,809	9.0%	$ 130,703,312	269,877	$ 51,327,675	2.5
Max. Achievable Cost Effective	442,671	21.1%	94.2	18.9%	1,415,809	9.0%	$ 130,703,312	269,877	$ 51,327,675	2.5
Potentially Obtainable	213,810	10.2%	81.9	16.5%	683,836	4.4%	$ 63,129,699	130,350	$ 24,791,267	2.5
ALL SECTORS COMBINED										
Technical Potential (Traditional)	**3,603,379**	**27.6%**	**642.7**	**21.6%**	**25,835,745**	**27.2%**	**$ 6,773,248,982**	**3,199,443**	**$ 748,542,819**	**9.0**
Max. Achievable Potential	**2,957,879**	**22.7%**	**525.9**	**17.6%**	**18,955,230**	**20.0%**	**$ 4,439,912,741**	**2,468,502**	**$ 592,423,327**	**7.5**
Max. Achievable Cost Effective	**2,679,841**	**20.5%**	**455.3**	**15.3%**	**15,440,100**	**16.3%**	**$ 1,855,695,087**	**2,115,027**	**$ 528,514,996**	**3.5**
Potentially Obtainable	**1,403,902**	**10.8%**	**254.5**	**8.5%**	**7,569,594**	**8.0%**	**$ 873,721,489**	**1,071,642**	**$ 282,507,484**	**3.1**

*The average vehicle in the United States produces around 12,100 lbs of carbon dioxide per year. This means that realizing the full Technical Potential calculated here would be the carbon equivalent of taking over 509,000 cars off the road. Realizing the Potentially Obtainable figure would be the equivalent of removing 178,000 cars.

Table 2. Summary of Energy Savings Potentials by 2018 – Electric[8]

	Estimated Annual Sales by 2018 (kWh)	Estimated Annual Savings by 2018 (kWh)	Savings in 2018 as % of Sector 2018 Electric Consumption	Savings in 2018 as % of Total 2018 Electric Consumption	Estimated Annual Sales by 2018 (MW)	Estimated Annual Demand Savings by 2018 By Sector (MW)	Estimated Savings as % of Peak Sector Demand by 2018	Estimated Savings as % of Total Peak Demand by 2018	Estimated Costs to Achieve 2018 Annual Savings (10 Year Cumulative) ($2008 NPV)	Total Estimated Annual Benefits Associated W/Combined Savings in 2018 ($2008 NPV)	Simple Payback (NPV Total Costs / NPV Annual Savings)
RESIDENTIAL SECTOR											
Technical Potential (Best Only)	5,589,807,380	1,770,860,535	31.7%	13.6%	1206	66.7	5.5%	2.2%	$2,554,517,348	$ 376,791,837	6.8
Technical Potential (Traditional)		1,489,861,317	26.7%	11.4%		56.1	4.7%	1.9%	$2,149,167,880	$ 317,002,707	6.8
Max. Achievable Potential		1,217,144,947	21.8%	9.3%		45.9	3.8%	1.5%	$1,214,926,125	$ 258,975,945	4.7
Max. Achievable Cost Effective		1,170,397,964	20.9%	9.0%		44.1	3.7%	1.5%	$632,287,942	$ 249,029,435	2.5
Potentially Obtainable		698,069,156	12.5%	5.4%		26.3	2.2%	0.9%	$383,050,068	$ 148,530,477	2.6
COMMERCIAL SECTOR											
Technical Potential (Traditional)	5,353,798,946	1,598,032,244	29.8%	12.2%	1279	476.9	37.3%	16.0%	$971,216,931	$ 142,795,006	6.8
Max. Achievable Potential		1,298,062,604	24.2%	9.9%		385.9	30.2%	12.9%	$850,883,854	$ 115,990,687	7.3
Max. Achievable Cost Effective		1,066,771,952	19.9%	8.2%		317.1	24.8%	10.6%	$311,837,064	$ 95,323,300	3.3
Potentially Obtainable		492,022,609	9.2%	3.8%		146.3	11.4%	4.9%	$124,823,769	$ 43,965,553	2.8
INDUSTRIAL SECTOR											
Technical Potential (Traditional)	2,102,729,959	515,485,621	24.5%	4.0%	498	109.7	22.0%	3.7%	$133,914,929	$ 46,000,232	2.9
Max. Achievable Potential		442,671,155	21.1%	3.4%		94.2	18.9%	3.2%	$114,998,894	$ 39,502,510	2.9
Max. Achievable Cost Effective		442,671,155	21.1%	3.4%		94.2	18.9%	3.2%	$114,998,894	$ 39,502,510	2.9
Potentially Obtainable		213,810,168	10.2%	1.6%		81.9	16.5%	2.7%	$55,544,466	$ 19,079,712	2.9
ALL SECTORS COMBINED											
Technical Potential (Traditional)	**13,046,336,285**	**3,603,379,183**	**27.6%**	**27.6%**	**2982**	**642.7**	**21.6%**	**21.6%**	**$3,254,299,740**	**$505,797,945**	**6.4**
Max. Achievable Potential		**2,957,878,706**	**22.7%**	**22.7%**		**525.9**	**17.6%**	**17.6%**	**$2,180,808,873**	**$414,469,142**	**5.3**
Max. Achievable Cost Effective		**2,679,841,071**	**20.5%**	**20.5%**		**455.3**	**15.3%**	**15.3%**	**$1,059,123,900**	**$383,855,246**	**2.8**
Potentially Obtainable		**1,403,901,933**	**10.8%**	**10.8%**		**254.5**	**8.5%**	**8.5%**	**$563,418,303**	**$211,575,742**	**2.7**

Total Estimated CO2 Reductions (tons)	
Technical Potential (Traditional)	**1,389,391**
Max. Achievable Potential	**1,140,499**
Max. Achievable Cost Effective	**1,033,293**
Potentially Obtainable	**541,317**

0.322575231

Total NH 2018 Peak Demand	2982 MW

[8] For purposes of this study, a simplifying assumption was used to estimate peak demand savings. Percentage sector peak demand savings are calculated to show savings over the summer coincident peak demand period only and are not broken out separately for summer and winder peak periods.

Table 3. Summary of Energy Savings Potentials by 2018 – Non-Electric

	Estimated Annual Sales by 2018 (MMBtu)	Estimated Annual Savings by 2018 (MMBtu)	Savings in 2018 as % of Sector 2018 Non-Electric Fuel Consumption	Savings in 2018 as % of Total 2018 Non-Electric Fuel Consumption	Estimated Costs to Achieve 2018 Annual Savings (10 Year Cumulative) ($2008 NPV)	Total Estimated Annual Benefits Associated W/Combined Savings in 2018 ($2008 NPV)	Simple Payback (NPV Total Costs / NPV Annual Savings)
RESIDENTIAL SECTOR							
Technical Potential (Best Only)	33,838,195	16,918,392	50.0%	17.8%	$ 3,220,297,934	$ 160,246,785	20.1
Technical Potential (Traditional)		12,099,639	35.8%	12.8%	$ 2,277,404,262	$ 114,604,759	19.9
Max. Achievable Potential		7,463,743	22.1%	7.9%	$ 1,206,916,417	$ 70,694,710	17.1
Max. Achievable Cost Effective		6,313,954	18.7%	6.7%	$ 456,169,489	$ 59,804,197	7.6
Potentially Obtainable		3,633,554	10.7%	3.8%	$ 200,483,725	$ 34,416,121	5.8
COMMERCIAL SECTOR							
Technical Potential (Traditional)	45,329,915	11,981,017	26.4%	12.6%	$ 1,222,077,201	$ 113,481,202	10.8
Max. Achievable Potential		10,075,678	22.2%	10.6%	$ 1,036,483,035	$ 95,434,310	10.9
Max. Achievable Cost Effective		7,710,337	17.0%	8.1%	$ 324,697,281	$ 73,030,388	4.4
Potentially Obtainable		3,252,204	7.2%	3.4%	$ 102,234,228	$ 30,804,066	3.3
INDUSTRIAL SECTOR							
Technical Potential (Traditional)	15,673,818	1,755,089	11.2%	1.9%	$ 19,467,779	$ 16,623,765	1.2
Max. Achievable Potential		1,415,809	9.0%	1.5%	$ 15,704,417	$ 13,410,187	1.2
Max. Achievable Cost Effective		1,415,809	9.0%	1.5%	$ 15,704,417	$ 13,410,187	1.2
Potentially Obtainable		683,836	4.4%	0.7%	$ 7,585,234	$ 6,477,120	1.2
ALL SECTORS COMBINED							
Technical Potential (Traditional)	**94,841,928**	**25,835,745**	**27.2%**	**27.2%**	**$ 3,518,949,242**	**$ 244,709,726**	**14.4**
Max. Achievable Potential		**18,955,230**	**20.0%**	**20.0%**	**$ 2,259,103,869**	**$ 179,539,207**	**12.6**
Max. Achievable Cost Effective		**15,440,100**	**16.3%**	**16.3%**	**$ 796,571,187**	**$ 146,244,773**	**5.4**
Potentially Obtainable		**7,569,594**	**8.0%**	**8.0%**	**$ 310,303,186**	**$ 71,697,307**	**4.3**

Total Estimated CO2 Reductions (tons)	
Technical Potential (Traditional)	**1,679,847**
Max. Achievable Potential	**1,239,514**
Max. Achievable Cost Effective	**1,005,418**
Potentially Obtainable	**536,933**

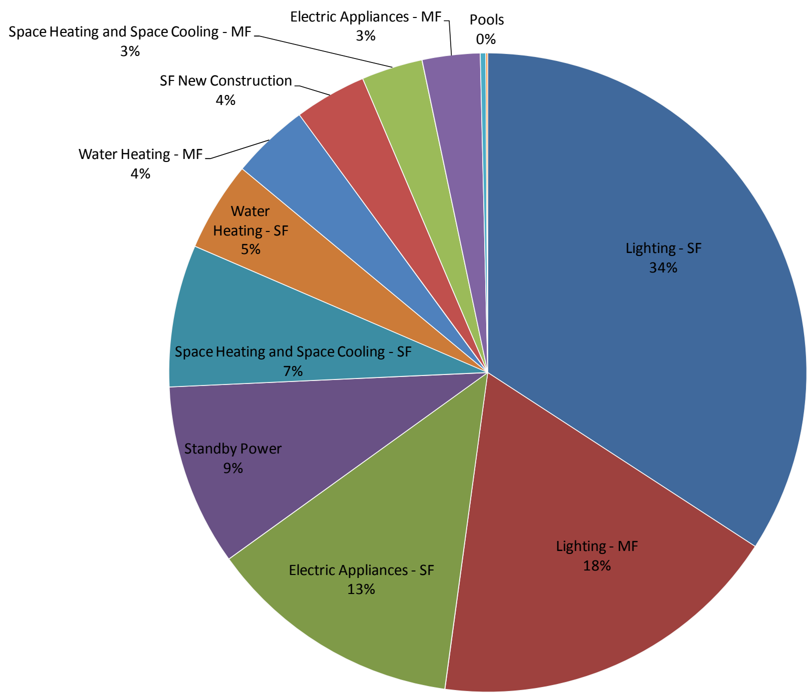
Table 4. Summary of Energy Savings Potentials by 2018 – Natural Gas

	Estimated Annual Sales by 2018 (MMBtu)	Estimated Annual Savings by 2018 (MMBtu)	Savings in 2018 as % of Sector 2018 Non-Electric Fuel Consumption	Savings in 2018 as % of Total 2018 Non-Electric Fuel Consumption	Estimated Cumulative Costs to Achieve 2018 Annual Savings (10 Year Cumulative) ($2008 NPV)	Total Estimated Annual Benefits Associated W/Combined Savings in 2018 ($2008 NPV)	Simple Payback (NPV Total Costs / NPV Annual Savings)
RESIDENTIAL SECTOR							
Technical Potential (Best Only)	8,189,374	5,250,770	64.1%	19.8%	$1,122,335,585	$ 55,849,078	20.1
Technical Potential (Traditional)		3,776,852	46.1%	14.2%	$807,290,166	$ 40,624,889	19.9
Max. Achievable Potential		2,262,674	27.6%	8.5%	$426,300,163	$ 24,970,384	17.1
Max. Achievable Cost Effective		1,807,030	22.1%	6.8%	$117,928,736	$ 15,460,555	7.6
Potentially Obtainable		1,057,239	12.9%	4.0%	$54,192,333	$ 9,302,949	5.8
COMMERCIAL SECTOR							
Technical Potential (Traditional)	12,665,712	3,347,637	26.4%	12.6%	$304,022,371	$ 28,231,297	10.8
Max. Achievable Potential		2,815,263	22.2%	10.6%	$261,039,375	$ 24,035,234	10.9
Max. Achievable Cost Effective		2,154,359	17.0%	8.1%	$88,161,415	$ 19,829,123	4.4
Potentially Obtainable		908,704	7.2%	3.4%	$27,607,959	$ 8,318,519	3.3
INDUSTRIAL SECTOR							
Technical Potential (Traditional)	5,699,570	638,214	11.2%	2.4%	$7,079,192	$ 6,045,006	1.2
Max. Achievable Potential		514,840	9.0%	1.9%	$5,710,697	$ 4,876,432	1.2
Max. Achievable Cost Effective		514,840	9.0%	1.9%	$5,710,697	$ 4,876,432	1.2
Potentially Obtainable		248,667	4.4%	0.9%	$2,758,267	$ 2,355,316	1.2
ALL SECTORS COMBINED							
Technical Potential (Traditional)	**26,554,656**	**7,762,703**	**29.2%**	**29.2%**	**$1,118,391,730**	**$ 77,773,595**	**14.4**
Max. Achievable Potential		**5,592,777**	**21.1%**	**21.1%**	**$693,050,235**	**$ 55,079,225**	**12.6**
Max. Achievable Cost Effective		**4,476,228**	**16.9%**	**16.9%**	**$211,800,848**	**$ 38,885,121**	**5.4**
Potentially Obtainable		**2,214,611**	**8.3%**	**8.3%**	**$84,558,558**	**$ 19,537,733**	**4.3**

Total Estimated CO2 Reductions (tons)	
Technical Potential (Traditional)	**427,919**
Max. Achievable Potential	**308,302**
Max. Achievable Cost Effective	**246,752**
Potentially Obtainable	**133,064**

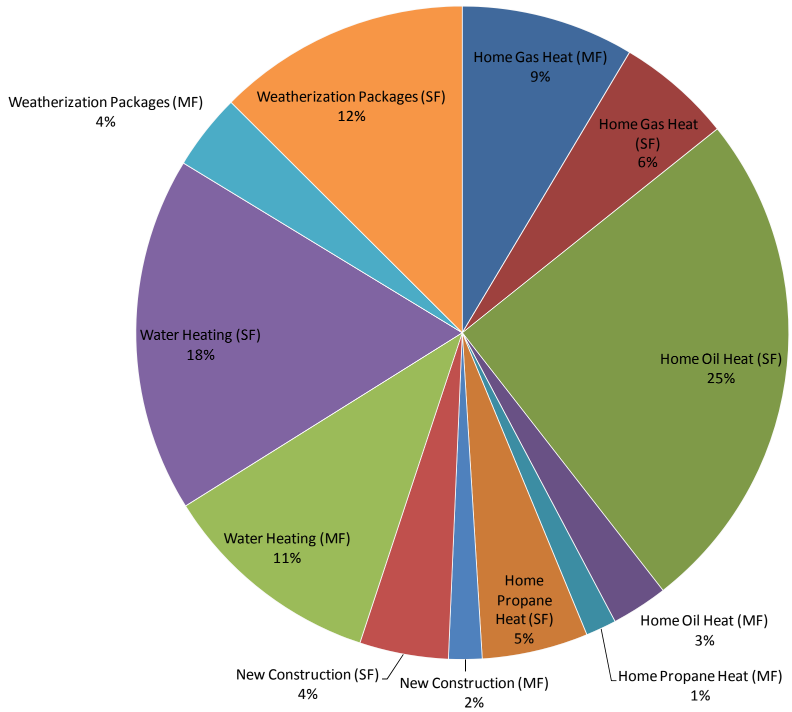
As shown in Figure 1, in the residential sector, New Hampshire's greatest areas for electric energy savings from the installation of cost-effective energy efficiency measures come from combined single family (SF) and multifamily lighting[9] (MF) (52% of the annual savings by the year 2018), electric appliances (16% by 2018, combined SF and MF), and space heating and cooling combined SF and MF (10% by 2018) followed by standby (phantom) power (9%) and water heating (9% – 5% SF and 4% MF) and new construction activities (4%). Figure 2 shows the greatest areas for non-electric savings come from space heating (oil-fueled) and water heating (all fuels), nearly 30% each when SF and MF potentials are combined, and weatherization packages (all fuels) in single family homes (16% SF and MF combined). The large potential for savings from oil-fueled space heating measures is not surprising since nearly 60 percent of all homes in New Hampshire heat with oil. The greatest potential for natural gas savings in the residential sector comes from replacement of inefficient gas furnaces and boilers in multifamily and single family homes (nearly 9% and 6% respectively).

Figure 1. Residential Electric Energy Efficiency Maximum Achievable Cost Effective – by End Use



[9] Lighting savings in the residential sector are largely being driven by savings from CFL bulbs and or CFL fixtures in single family and multi-family homes. It is very important to note, that these savings might be overstated for the post-2012 period for two main reasons. First, this study does not take into direct consideration future changes to energy codes as they relate to residential lighting applications, including improved federal efficiency standards for incandescent bulbs (the base technology from which current lighting savings are calculated) that are designated to become effective in 2012. This study was conducted based on the standards and energy savings differentials (e.g., between CFLs and incandescent bulbs) in existence as of 2009. Secondly, although this study includes emerging lighting technologies (i.e., LEDs), there is a high likelihood that as these new and emerging lighting technologies enter the market, the penetration of CFLs will be significant and new improved efficiency incandescent light bulbs will also be entering the market. Thus, the incremental savings going from a CFL to a new technology (such as LED or super high efficiency incandescent) will be dramatically lower than the current incremental savings going from standard incandescent to compact florescent (CFL). This consideration was addressed partially by the assumption that new technologies will always emerge, and savings will always be present as a result – however, it is true, that those savings, as stated previously, will be lower, and as a result, may be somewhat overstated during the second half of the study's 2009 through 2012 forecast horizon.

Figure 2. Residential Non-Electric Efficiency Maximum Achievable Cost Effective – by End Use



Savings within the commercial sector were assessed separately for existing buildings and for potential new construction. As shown in Figure 3 (existing buildings) and Figure 4 (new construction), New Hampshire's greatest areas for electric savings from the installation of cost-effective energy efficiency measures come from lighting and/or lighting controls – i.e., 39% by 2018 from existing buildings, including retrofit of existing lighting systems; and 42% from new construction activities, mainly from lighting design. The next significant area for electric savings is from refrigeration – i.e., 19% by 2018 from existing buildings and 18% from new construction activities. HVAC systems and controls (in existing buildings) and building envelope improvement packages (in new construction) also provide substantial savings.

Figure 3. Max Achievable Cost Effective Electric Savings by End Use for Commercial Existing Buildings

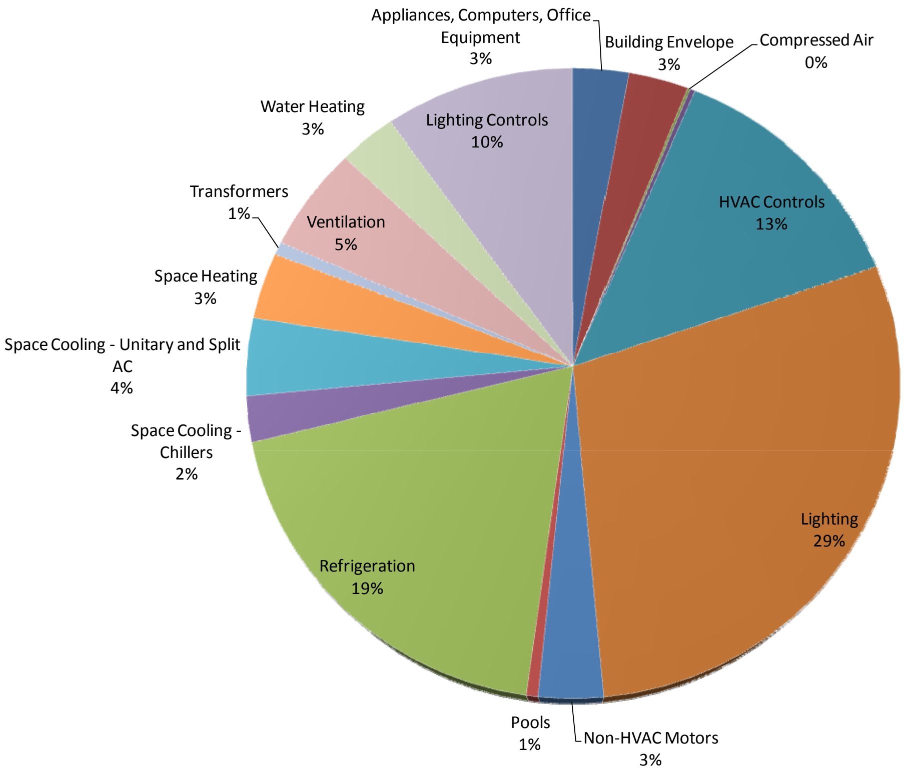
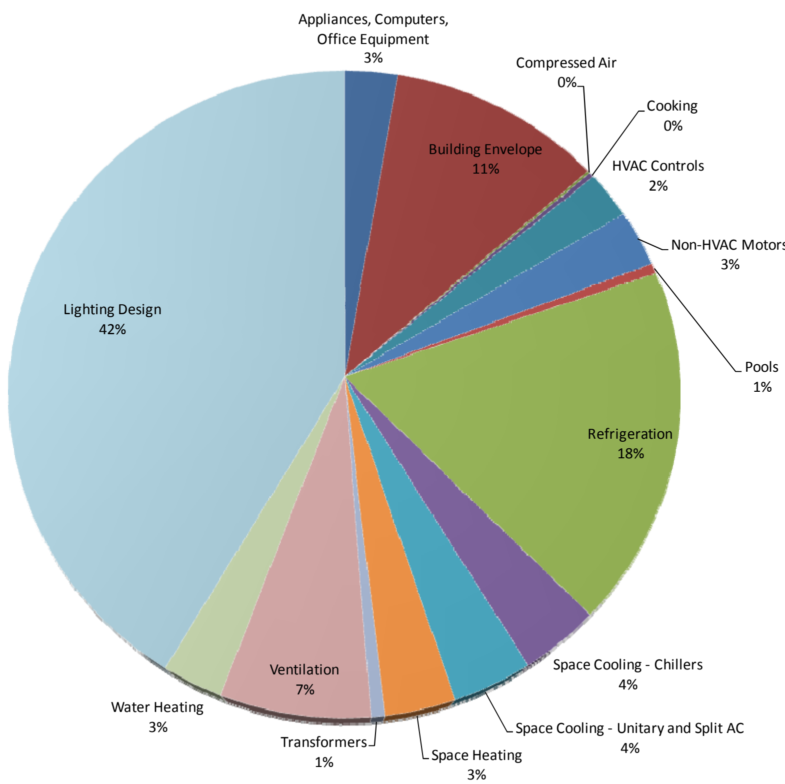


Figure 4. Max Achievable Cost Effective Electric Savings by End Use for Commercial New Construction



New Hampshire's greatest areas for non-electric energy savings in the commercial sector come from the installation of cost-effective space heating (44%), water heating and HVAC controls (17% each) and building envelope (13%) in existing buildings, as shown in Figure 5. Space heating measures also provide the greatest potential for non-electric savings in the commercial new construction area (44%) as shown in Figure 6, followed by building envelope and water heating (16%), and HVAC controls (15%).

Figure 5. Max Achievable Cost Effective Non-Electric Savings by End Use - Commercial Existing Buildings

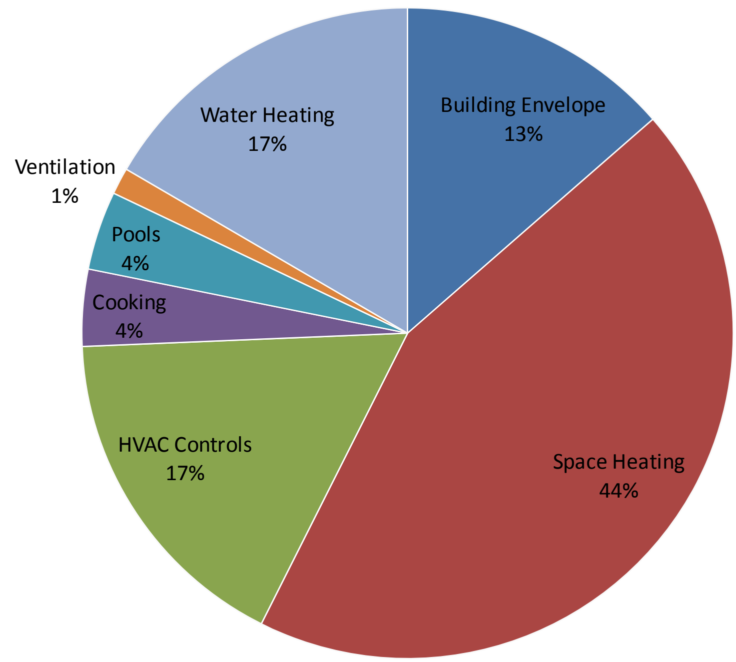
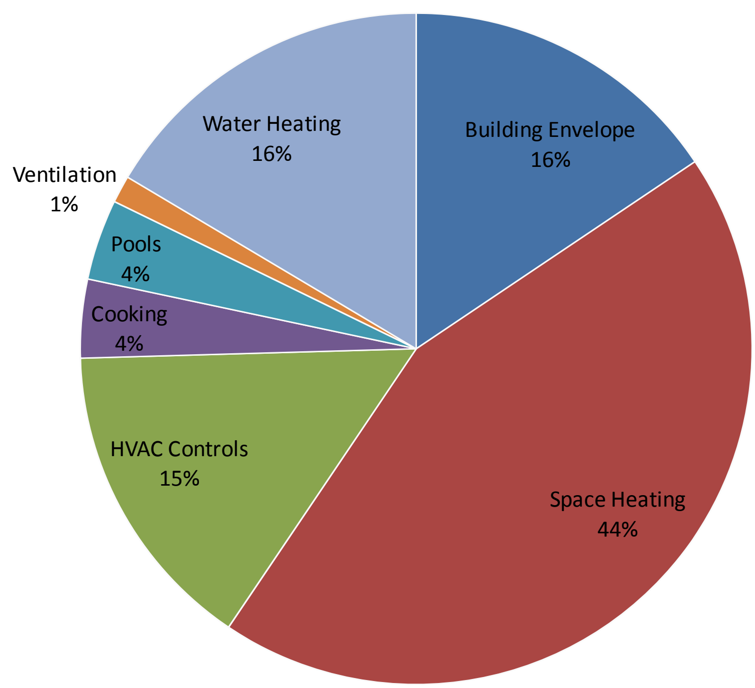


Figure 6. Max Achievable Cost Effective Non-Electric Savings by End Use - Commercial New Construction



Within the Industrial sector, Figure 7 shows that the greatest areas for electric energy savings come from machine drives (40%), sensors and controls (16%), lighting (15%), process heating measures (13%), and facility HVAC (11%). As shown in Figure 8, the greatest areas for non-electric savings in the industrial sector come from process heating, conventional boiler use and facility HVAC measures (52%, 33% and 13% respectively).

Figure 7. Max Achievable Cost Effective <u>Electric</u> Savings by End Use for NH Industrial Sector

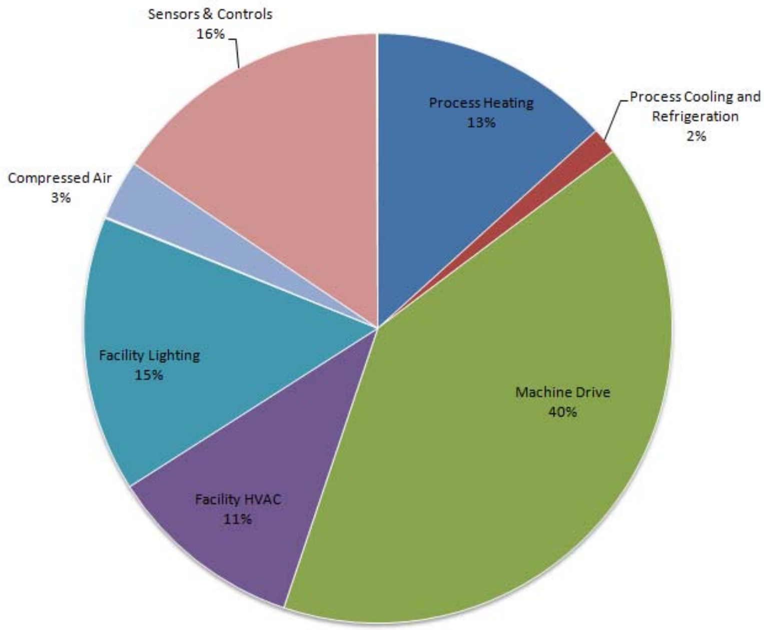


Figure 8. Max Achievable Cost Effective Non-Electric Savings by End Use for NH Industrial Sector

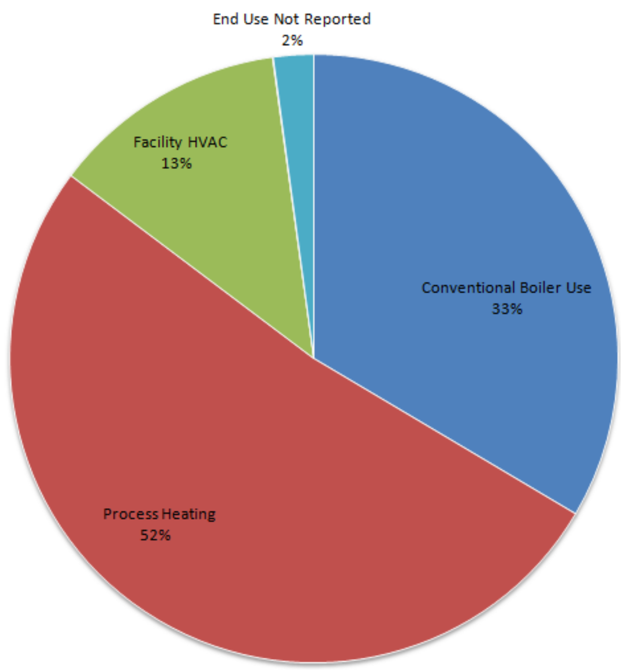


Table 5 and Table 6 present the estimated 2018 Technical, Maximum Achievable, Maximum Achievable Cost Effective potentials and results from the Potentially Obtainable scenario for each of the four New Hampshire retail electricity providers and two natural gas distribution companies. As can be seen from these tables, the greatest potential for electric savings exists within PSNH's service territory (approximately 73% of the state's projected kWh and MW savings), followed by Unitil (nearly 12%), National Grid (over 8%) and the NH Electric Cooperative (just under 7%). Seventy-seven percent of the natural gas savings potential exists within National Grid's service territory, with the remaining 23% coming from Northern Utilities territory. It is important to note that a majority of the non-electric savings potential comes from measures installed in oil and propane-fueled homes and businesses.

Table 5. Additional Energy Efficiency Opportunities Potential by 2018 - Breakdown by Utility – Electric

All Sectors	Estimated Annual Savings by 2018 (kWh)	Estimated Utility Max. Achievable Cost Effective Savings in 2018 as a Percent of Total Estimated Savings	Estimated Annual Sales by 2018 (kWh)	Estimated Annual Demand Savings by 2018 (MW)	Estimated Utility Max. Achievable Cost Effective Demand Savings in 2018 as a Percent of Total Estimated Savings	Estimated Annual Sales by 2018 (MW)
PSNH						
Technical Potential (Traditional)	2,641,281,301	73.0%	9,535,258,276	466.2	72.5%	2,139
Max. Achievable Potential	2,166,873,873			381.4		
Max. Achievable Cost Effective	1,956,745,201			329.9		
Potentially Obtainable	1,022,507,558			183.9		
NH Electric Co-op						
Technical Potential (Traditional)	240,590,220	6.8%	880,356,308	43.3	6.6%	206
Max. Achievable Potential	197,148,030			35.2		
Max. Achievable Cost Effective	181,927,003			29.9		
Potentially Obtainable	99,640,017			15.3		
Unitil						
Technical Potential (Traditional)	410,156,541	11.8%	1,524,047,235	75.7	12.2%	406
Max. Achievable Potential	339,044,561			62.4		
Max. Achievable Cost Effective	315,351,394			55.5		
Potentially Obtainable	166,137,024			33.9		
National Grid-Electric						
Technical Potential (Traditional)	311,351,120	8.4%	1,106,674,467	57.6	8.8%	231
Max. Achievable Potential	254,812,243			47.0		
Max. Achievable Cost Effective	225,817,473			40.1		
Potentially Obtainable	115,617,334			21.4		
All Electric Utilities - Totals						
Technical Potential (Traditional)	3,603,379,183	100.0%	13,046,336,285	642.7	100.0%	2,982
Max. Achievable Potential	2,957,878,706			525.9		
Max. Achievable Cost Effective	2,679,841,071			455.3		
Potentially Obtainable	1,403,901,933			254.5		

Table 6. Additional Energy Efficiency Opportunities Potential by 2018 - Breakdown by Utility – Natural Gas

All Sectors	Estimated Annual Savings by 2018 (MMBtu)	Estimated Utility Max. Achievable Cost Effective Savings in 2018 as a Percent of Total Estimated Savings	Estimated Annual Sales by 2018 (MMBtu)
National Grid - Natural Gas Savings Only			
Technical Potential (Traditional)	5,294,129	76.7%	20,089,887
Max. Achievable Potential	3,916,204		
Max. Achievable Cost Effective	3,198,934		
Potentially Obtainable	1,558,051		
Northern Utilities - Natural Gas Savings Only			
Technical Potential (Traditional)	1,589,633	23.3%	6,193,361
Max. Achievable Potential	1,195,725		
Max. Achievable Cost Effective	973,825		
Potentially Obtainable	466,856		
All Natural Gas Utilities Combined - Totals			
Technical Potential (Traditional)	6,883,763	100.0%	26,283,248
Max. Achievable Potential	5,111,929		
Max. Achievable Cost Effective	4,172,758		
Potentially Obtainable	2,024,907		

1.3 Potentially Obtainable Scenario

In the Potentially Obtainable scenario developed for this report, all cost-effective energy efficiency measures were assessed in light of customer priorities and estimated pricing behaviors (i.e. sensitivity to payback). Concerning priorities, customers' responses to questions included in this projects' sector-specific telephone surveys and site visits were used to determine the percentage of customers that stated they were "extremely likely" to purchase energy efficient equipment (73% of residential customers, and 48% of commercial and industrial customers). Customer behaviors regarding pricing were estimated based on some simplifying assumptions that all "extremely likely to purchase" customers would potentially install energy efficient measures if the price were below a certain level (i.e., 7 cents levelized cost per /kWh saved) and half of those same customers would likely install cost-effective measures in cases where the costs were more than 7 cents/kWh saved (the model also built in functionality to eliminate those measures with extremely high levelized costs in order to avoid outliers from being considered in the Potentially Obtainable scenario). Embedded within this approach was the assumption that fifty percent of the associated energy efficiency measure cost would be provided to these customers through a measure rebate to achieve the desired customer purchase action (essentially reducing the customer's out-of-pocket cost to 3.5 c/kWh in this example, or equivalent to approximately a 1 to 2 year payback on the customers' portion of the energy efficiency measure investment). This rebate level assumption is based upon a previous review conducted by GDS of numerous energy efficiency studies, including a National Energy

Efficiency Best Practices Study and was supplemented with data collected through the phone surveys and site visits conducted as part of this current project.[10,11]

1.4 Implementation Costs

To achieve the Potentially Obtainable amount of energy efficiency savings by 2018, substantial efforts, including continued and expanded utility programmatic support will be required. Such programmatic support would include rebates to customers (including potential targeted mid-stream and upstream market actors), program marketing and outreach, administration, planning, and program evaluation activities. Although not included in this report's "cost to achieve estimates," all such costs would be required to ensure the delivery of quality and reliable energy efficiency products and services to New Hampshire's consumers. As noted above, the projection for Potentially Obtainable electricity and non-electric energy savings assumes that customers receive rebates equivalent to fifty percent of measure incremental (or full) costs. This incentive level assumption will help to reduce customer out-of-pocket costs and will quicken the paybacks on measures installed to more actionable levels. The fifty percent incentive is based both upon customer provided input (via this project's phone surveys and site visits data collection efforts), and from review of numerous energy efficiency studies including the National Energy Efficiency Best Practices Study. If customers had to receive 100% of measure incremental or full costs to achieve the Potentially Obtainable scenario's savings levels, then program budgets would double.

1.5 Market-Driven vs. Retrofit

Energy efficiency potential in the existing stock of buildings can be captured over time through two principal processes:

1. as equipment replacements are made normally in the market when a piece of equipment is at the end of its useful life (often referred to as "market-driven" or "replace-on-burnout"); and,

2. at any time in the life of the equipment or building (referred to as "retrofit").

Market-driven measures are generally characterized by incremental measure costs and savings (e.g., the incremental costs and savings of a high-efficiency versus a standard efficiency air conditioner); whereas retrofit measures are generally characterized by full costs and savings (e.g., the full costs and savings associated with retrofitting ceiling insulation into an existing attic). A specialized retrofit case is often referred to as "early replacement" or "early retirement". This refers to a piece of equipment whose replacement is accelerated by several years, as compared to the market-driven assumption, for the purpose of capturing energy savings earlier than they would otherwise occur.

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[10] See "National Energy Efficiency Best Practices Study, Volume NR5, Non-Residential Large Comprehensive Incentive Programs Best Practices Report", prepared by Quantum Consulting for Pacific Gas and Electric Company, December 2004, page NR5-51.

[11] As part of this project, telephone surveys were conducted with 400 residential customers and 200 small commercial customers, and site visits were conducted with 100 larger commercial customers and 100 industrial customers. Questions were included in these surveys and site visits to assess customer interest in energy efficiency and the value of incentives to the customer decision-making process.

For this study, the GDS Team has examined the impacts of "early replacement" for a select group of measures (i.e., T-8 lighting, insulation and weatherization measures in existing buildings). For these measures, GDS assumed that customers would receive an incentive equivalent to 50% of the full cost of the energy efficiency measures at the time of retrofit.[12]

1.6 Customer Participation and Barriers

Based on results from the customer telephone surveys and on-site interviews, a number of insights regarding customer participation, preferences and barriers have been identified. Highlights are presented below. Please refer to Section 7 of this report for more detailed information.

1.6.1 Residential Customer Program Participation and Barriers Summary

- Over 90% of the residential customers surveyed said they pay "some" or "substantial" attention to controlling energy costs
- After being read a definition of energy efficiency and the fact that such measures typically cost more than less efficient models (often 20 to 30% more), 73% stated that they were "extremely likely" to purchase energy efficient equipment if it lowered their energy bill, increased comfort, or helped the environment.
- Installation of energy efficiency features are commonly considered as part of remodeling projects (64% among recently remodeled homes, and 90% among homes with a future remodeling plan).
- About half of the households surveyed are aware of their utility offering energy efficiency programs, and 30% have participated in them in some way.
- Low income households were found to have a significantly higher participation rate (they are twice as likely to report participating in such programs).
- Among participants, satisfaction with their utilities' programs seems extremely high.
- The two most frequently cited reasons for nonparticipation were: (1) there was no recent purchase of energy-using household items, and (2) unawareness of program resources.

1.6.2 Commercial and Industrial Customer Program Participation and Barriers Summary

- Of the small and large commercial and industrial customers surveyed, 86% of respondents reported some or high level of attention to controlling energy costs.
- 48% stated that they were "extremely likely" to purchase energy efficient equipment if it lowered their energy bill, increased comfort, or helped the environment.
- Overall awareness of energy efficiency programs and incentives offered by utility providers was significantly higher in the large commercial/industrial respondents (86%) compared to the small commercial/industrial respondents (60%).
- Past participation in utility provider offered programs was similarly higher in the large customer group who was aware of the programs offered (86%) compared to the small customer group aware of the programs offered (30%).
- Of respondents who have participated in their utility's energy efficiency programs, a significant majority of both small customers (94%) and large customers (98%) reported that they would participate in the programs again if given the opportunity.

[12] Tying incentives to the full installed cost of targeted measures in the case of early replacement (retrofits) is typical of the way that retrofit programs are currently being implemented here in New Hampshire and throughout the country.

- The single largest barrier to respondents investing in energy efficiency measures was concern about initial premium costs of equipment and insufficient payback (69%).
- Respondents indicated that the two most important factors influencing decisions to invest in energy efficient equipment are: (1) expectations of lower monthly energy bills and (2) rebates or incentives for purchasing energy efficient equipment that would help offset some of the initial costs.
- Other factors such as business image, environmental impact, occupant comfort, and sales person recommendation were less likely to influence decisions to invest in energy efficient equipment.

1.7. Past/Current Program Capture and Recommendations

To date, New Hampshire's electric and gas utilities have been quite effective in achieving energy and capacity savings and energy efficiency measure penetration across the state. But, as shown in Table 7 and Table 8 below, there is much room for additional penetration. In total, from 2002 through 2008, the electric energy efficiency programs are saving an estimated cumulative total of nearly 560 million kWh per year of energy[13]. This represents a savings of five percent of the total forecast energy usage for New Hampshire in 2008. Similarly from 2003 through 2008, the natural gas efficiency programs saved an estimated total of over 2.4 million therms per year[14]. This represents a savings of 1.1 percent of the total forecasted natural gas usage for New Hampshire in 2008.

Table 7. Cumulative Annual Program Savings as Percent of 2008 Sales: 2002-2008 – Electric

Sector	Total Annual Savings Since 2002 (MWh)	Forecasted Sales 2008 (MWh)	Cummulative Annual Savings as a Percent of 2008 Sector Sales	Cummulative Annual Savings as a Percent of 2008 Total Sales
Residential	120,064	4,537,480	2.6%	1.1%
Commercial/Industrial	437,210	6,650,732	6.6%	3.9%
Total	**557,274**	**11,188,212**		**5.0%**

Table 8. Cumulative Annual Program Savings as Percent of 2008 Sales: 2003-2008 – Natural Gas

Sector	Total Annual Savings Since 2003 (decatherms)	Forecasted Sales 2008 (decatherms)	Cummulative Annual Savings as a Percent of 2008 Sector Sales	Cummulative Annual Savings as a Percent of 2008 Total Sales
Residential	95,387	8,435,900	1.1%	0.4%
Commercial/Industrial	150,248	14,267,000	1.1%	0.7%
Total	**245,635**	**22,702,900**		**1.1%**

It is important to note that the figures in the above two tables are conservative in several ways. First, the utility providers have been actively offering efficiency programs since well before 2002 so the total amount of energy saved since the inception of efficiency programs is much higher.

[13] Estimate is based on reported lifetime savings from 2005-2008 available on NHPUC website, GDS estimates for program measure lives used to calculate annual savings, and extrapolated kWh savings estimates for 2002-2004.

[14] Estimate based on reported savings from 2003-2007 and GDS estimates for program measure lives

Second, these figures consider only cumulative annual savings, not lifetime savings[15]. In reality, annual savings are realized every year over the assumed measure life of the programs. The data was reported in the above manner to provide an appropriate comparison to the forecast 2008 usage. More details regarding this analysis are presented in Section 8 of this report.

To increase the likelihood of achieving the additional energy efficiency savings potential highlighted in this study, the following findings/recommendations are suggested (see Section 8 for more details):

To date, the efficiency programs offered in New Hampshire by the state's four largest electric utilities and two natural gas distribution companies have been successful and have saved a substantial amount of energy. Many of the programs have and are continuing to perform quite well in terms of cost per unit of energy saved and customer participation. Several other programs have shown positive trends becoming more cost effective on a yearly basis.

For all programs, but most notably in the electric market, the cost per kWh saved in the commercial and industrial sectors has been better than in the residential market. This might explain why in general, commercial and industrial customers have indicated a higher awareness of the utilities' efficiency programs available to them as well as an increased likelihood of program participation compared to residential customers. Given the scale of energy consumption in the commercial and industrial sectors, these customers continue to represent a substantial area for potential energy savings in the upcoming years.

- Recommendation: Additional penetration can be achieved through increased outreach to small commercial/industrial customers and by expanding current program offerings to include other cost effective measures not currently included in the companies' CORE and utility-specific programs.

Residential customer participation in the state's electric and natural gas energy efficiency programs has met or exceeded program expectations on a yearly basis. However, in the phone surveys more than half of respondents indicated that they were not aware of the programs offered by their utilities, or that they were even eligible. Of the customers who were aware of the programs, a high percentage participated and indicated they would participate in the future.

- Recommendation: This data underscores the importance of increasing consumer education on the programs available to residential customers and of the associated benefits.

One final finding from the study is that nearly all of the most cost effective energy efficiency measures are included in current programs in some manner. In several programs, however, the cost effective measures are targeted to a small percentage of consumers. The best example of this is the *Home Energy Solutions* program which targets consumers with 65% or greater electric heating. Customers with electric heat as their primary heating source represent approximately 4% of the total population based on the phone surveys.[16]

[15] Cumulative annual savings were calculated by determining the annualized savings in a given year and summing those annual savings for each of the program years reviewed.

[16] The 4% represents total number of customers with electric heat as their primary source for heating. A smaller percentage than 4% would qualify for participation in the Home Energy Solutions program, since 65% or more of their space heating needs to be met with electric heat.

- Recommendation: Expanding the number and types of products and services available through the existing residential energy efficiency programs, and promotion of those programs to include a larger number of potential participants may lead to increased overall energy savings. It is important to recognize that such expansion would require providing services to customers that heat with fuels other than electric or natural gas. Issues regarding who would pay for the provision of services to such customers would need to be addressed.

1.8 Structure of this Report

Section 2 of this report provides an overview of current and forecasted electric and natural gas energy usage in New Hampshire. Information on geographic, economic, demographic and energy usage characteristics of the State is also presented in Section 2. Section 3 of this report provides a detailed discussion of the research plan and methodologies used for the collection and analysis of all data in this report. Results from the participation, preferences and barriers questions asked as part of this project's phone surveys and site visit interviews are also presented in Section 3. Sections 4, 5 and 6 provide detailed results from the electric and non-electric energy efficiency potential analysis conducted for the residential, commercial and industrial sectors, respectively. Detailed results are presented in these sections regarding technical potential, maximum achievable potential, maximum achievable cost effective potential and the potentially obtainable scenario. Energy (kWh), capacity (kW), and associated therm (MMBTu) and environmental (tons of CO_2) savings are presented along with additional description of the methodologies used, where applicable.

This project included a major enhancement to a majority of the technical potential studies that have been conducted across the country in the past. Rather than relying on best available information from existing secondary sources to estimate current levels of energy using equipment saturations and penetration of energy efficiency measures, significant primary data collection efforts were undertaken to help inform and derive New Hampshire-specific values where possible within the time requirements and work scope specified for this project. As such, this effort was completed through a combination of primary and secondary data collection and analysis activities. Detailed findings and an assessment of the value resulting from this enhanced, New Hampshire-specific data collection effort is presented in Section 7 of this report.

Section 8 assesses the amount of energy savings that past and current energy efficiency programs in the state have already captured. Recommendations for potential program modifications and measure offerings are also included in this section.

Section 2: Characterization of Customer Base, Electric and Natural Gas Usage, and Load Forecasts for the State of New Hampshire

This section of the report provides electric and natural gas utility forecasts for energy usage in the State of New Hampshire based on data provided by the four electric and two natural gas utilities supporting this project. The utility-provided forecast information has been compared against the latest available ISO-NE forecasted data, where appropriate, to ensure reasonableness. In order to develop estimates of energy savings potential, it is important to understand how energy is used by households and businesses in New Hampshire. Therefore, this section also provides information on geographic, economic, demographic and energy usage characteristics of the State.

2.1 New Hampshire Geographic and Demographic Characteristics

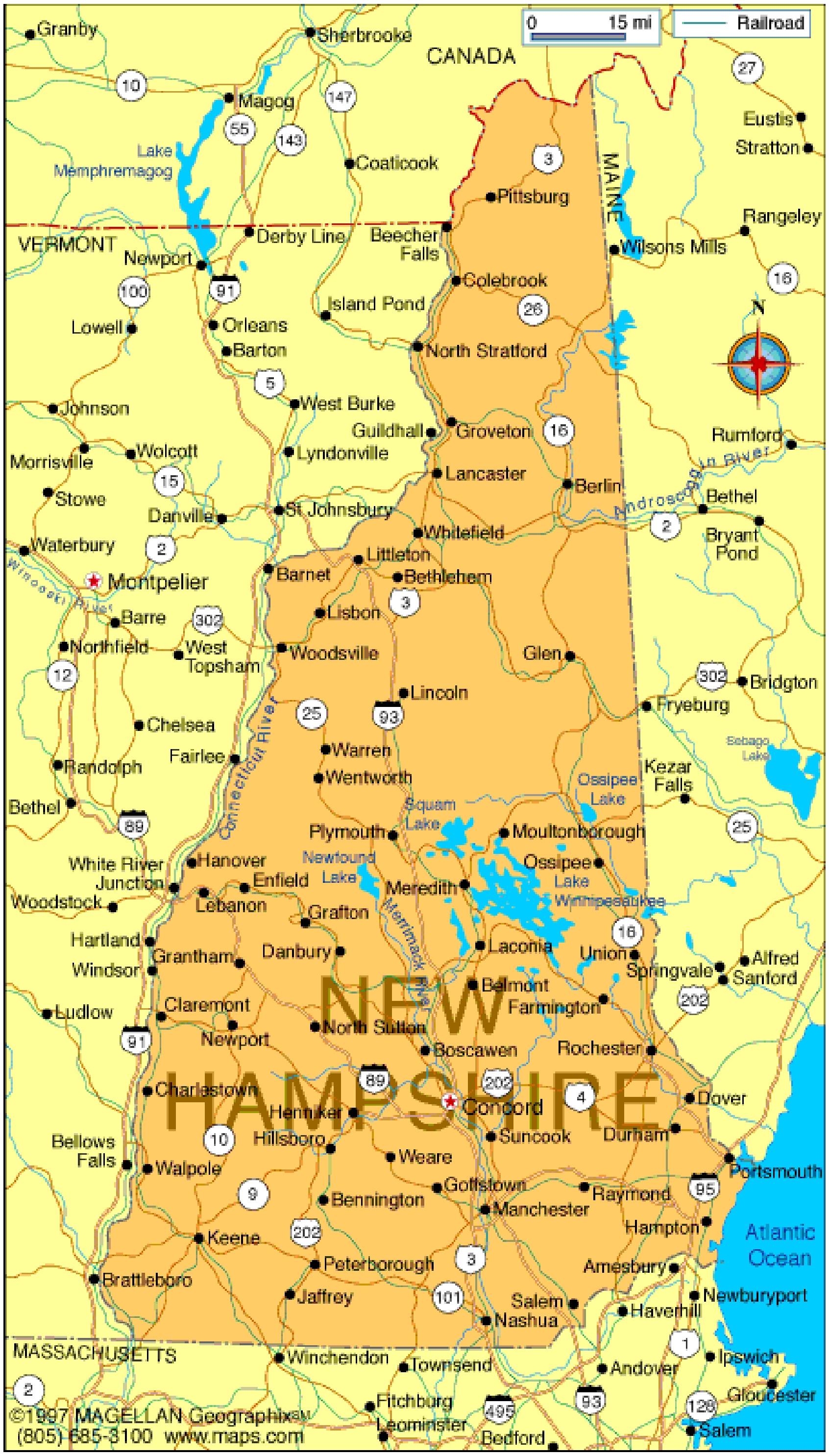
New Hampshire is the third largest state in New England after Maine and Vermont by total land area (fourth largest by population after Massachusetts, Connecticut and Maine).[17] The State is bordered by Canada, Vermont, Massachusetts, and Maine. The Connecticut River forms the western boundary with Vermont, while Maine forms a boundary for nearly its entire eastern border, until meeting the Atlantic Ocean near its southeastern border with Massachusetts. Manchester is the largest of New Hampshire's 221 towns with an estimated population of 109,497 in 2006 according the US Census data. [18]

New Hampshire ranks 41st in the country (by population), and at approximately 9,000 square miles, is the fourth smallest state by total area (68 miles at its widest point, and 190 miles long). New Hampshire is the second most forested state in the country, after Maine, in percentage of land covered by woods. Major regions of the state include the Great North Woods, the White Mountains, the Lakes Region, the Merrimack Valley, the Monadnock Region, the Dartmouth-Lake Sunapee Region, and the Seacoast.

The White Mountain National Forest covers approximately 1,171 square miles in the north-central portion of the state (including 5.6% of which is in the neighboring state of Maine). Lake Winnipesaukee is the largest lake in New Hampshire, covering approximately 72 square miles in the east-central part of the state.[19] The Seacoast area of New Hampshire has the smallest shoreline of any coastal state (just 18 miles long). Figure 9 provides a map of the state.

[17] http://quickfacts.census.gov/qfd/states/44000.html. New Hampshire's population density of 137.8 persons per square mile is higher than the population density in Vermont (65.8) and Maine (41.3), but it is much lower than the other three New England states. For more detailed information, see http://www.answers.com/topic/list-of-u-s-states-by-population-density.
[18] 2006 population estimate for Manchester, NH. http://www.nh.gov/nhes/elmi/htmlprofiles/manchester.html
[19] http://en.wikipedia.org/wiki/New_Hampshire.

Figure 9. New Hampshire Map[20]



[20] http://www.infoplease.com/atlas/state/newhampshire.html

2.2 New Hampshire Economic and Demographic Characteristics

New Hampshire is a rural state with a population of approximately 1,350,000 persons in 2008 and 604,000 housing units.[21] According to the Energy Information Administration, the state's energy consumption per capita is among the lowest in the country. This is due, in part to the low demand for air conditioning and the fact that relatively few households use electricity as their primary energy source for home heating. Over half of the households in New Hampshire heat their homes with fuel oil in the winter.[22]

The New Hampshire Employment Security Economic and Labor Market Information Bureau prepares an annual Economic Analysis Report for the state.[23] The Bureau's 2008 Report noted that New Hampshire has been growing faster than any of the other New England states, although this growth is occurring as a decreasing rate. Gross Domestic Product was $57.3 billion at the end of 2007, a 2.3% increase from 2006, but well below the 4.9% and 4.0% growth in 2005 and 2004 respectively. The seasonally adjusted unemployment rate for New Hampshire was 3.8% at the end of the first quarter 2008, and has been consistently below the country's average rate over the past fifteen years. Total employment is projected to grow in the state by 13.9% from 2006 to 2016. Although real estate activity has declined 5.6% from April 2007 to April 2008, this decline has been one of the smallest compared to the other New England states. Major areas for job growth are expected to include: healthcare, social services, computers and mathematics, and personal services.

To get a sense of the population mix in the state, electric and natural gas utility customer information was provided and is summarized below. This information was used in sample plan development for telephone surveys and site visits that were conducted as part of this project. As shown in Table 9, the four investor-owned electric utilities analyzed for this report have a collective total of 612,636 residential and low income customers, with PSNH serving a majority of these customers (67% and 83% respectively). A majority of natural gas customers are served by National Grid (61%).

Table 9. Total Customer Counts – Residential, Low Income NH Electric and Natural Gas Utilities[24]

Utility	Residential		Low Income		Total	
PSNH	392,202	67%	22,118	83%	414,320	68%
NH Electric Coop	64,164	11%	2,423	9%	66,587	11%
Unitil	58,550	10%	2,083	8%	60,633	10%
National Grid-Electric	70,986	12%	110	<0.5%	71,096	11%
Subtotal Electric*	585,902	100%	26,624	100%	612,636	100%
National Grid-Gas	33,882	61%	1,117	100%	34,999	61%
Northern Utilities	21,988	39%	0	0%	21,988	39%
Subtotal Natural Gas+	58,870	100.0%	1,117	100.0%	56,987	100.0%

[21] Data obtained by GDS from "On-demand reports and maps from Business Analyst Online", based on U.S Bureau of the Census, 2000 Census of Population and Housing, ESRI forecasts for 2008 and 2013.
[22] Primary data collection – results from this project's residential telephone surveys
[23] *New Hampshire Economic Analysis Report 2008*, New Hampshire Employment Security Economic and Labor Market Information Bureau
[24] Likely underestimates the number of low-income customers for each utility. As shown in this table, the estimated percentage of New Hampshire's population within these combined utility service territories is 4.3% (26,624/612,636), excluding double counting from natural gas utility customers that are also electric utility customers. In comparison, according to the 2007 American Community Survey of the U.S. Census Bureau, the percentage of the state's population at or below the poverty level is 7.1%.

* Excludes municipal electric utility customers
+ Represents subset of electric customers

The State's commercial and industrial customer base, to accommodate data collection efforts required for this report, were separated into small (<100 kW peak demand or 300,000 kWh/year) and larger customer groupings. As shown in Table 10, the majority of small non-residential electric customers are located in PSNH's service territory (74%). The number of small commercial/industrial natural gas customers are split fairly evenly at 53% Northern Utilities and 47% National Grid. Based on review of Standard Industrial Classification (SIC) Code data included in some of the utility-provided customer data files, it appears that approximately 40% of New Hampshire's small non-residential electric and natural gas customers are in the Services sector (SIC codes 70-89). Between 11% and 12% of the state's small commercial/industrial customers appear to be in the Retail Trades sector (SIC Codes 52-59). The Finance, Insurance and Real Estate sector (SIC Codes 60-67) make up the next largest small C/I customer focus at approximately 4%. Followed by Manufacturing and Transportation/Public Utilities (SIC Codes 20-39 and 40-49 respectively).

Table 10. Total Customer Counts – Small Non-Residential NH Electric and Gas Utilities

Utility	Count	% Total
PSNH	72,031	74%
NH Electric Coop	9,845	10%
Unitil	9,092	9%
National Grid-Electric	6,627	7%
Subtotal Electric*	97.595	100%
National Grid-Gas	5,708	47%
Northern Utilities	6,470	53%
Subtotal Natural Gas+	12,178	100.0%

* Excludes municipal electric utility customers
+ Represents subset of electric customers

The overall number of estimated large commercial and industrial accounts, as shown in Table 11 is 2,369. In summarizing data by SIC code in the top portion of the table, information provided by the utilities during the data acquisition/submission process was used. Not all utilities had complete customer SIC code information available for use, but based upon the SIC information received, manufacturing, services and retail trade were the three largest sectors observed. The bottom portion of the table allocates those SIC codes associated with Manufacturing as Industrial and the remainder as Commercial. As can be seen, just over 31% of those accounts classified in the data are industrial accounts.

The information presented in Table 11, shows an estimate of New Hampshire's large commercial and industrial (C&I) customer population based on a count of the number of utility-provided customer accounts. For these larger accounts, it is helpful to view the customers based on their energy usage. As shown below in Table 12, the overall amount of electric consumption among the utilities' larger commercial and industrial customers is estimated to be over 3,700 GWh. Although the industrial sector customers represent less than one third of all accounts classified in the utility data, these industrial sector customers represent nearly 43% of the consumption of all classified accounts.

Table 11. Customer Count of Large C&I Population Summary (Number of Accounts)

SIC Code Grouping	Gas Service	Electric Only	Total
By SIC Code Grouping			
01-09: Agriculture, Forestry and Fishing	0	2	2
10-14: Mining	0	3	3
15-17: Construction	2	1	3
20-39: Manufacturing	192	367	559
40-49: Transportation and Public Utilities	26	93	119
50-51: Wholesale Trade	9	21	30
52-59: Retail Trade	134	240	374
60-67: Finance, Insurance and Real Estate	46	97	143
70-89: Services	137	352	489
91-97: Public Administration	27	36	63
99: Non Classified Establishments	3	6	9
Not Provided	69	506	575
Total	645	1,724	2,369
By Commercial vs. Industrial			
Commercial	384	851	1,235
Industrial	192	367	559
Not Provided	69	506	575
Total	645	1,724	2,369

Table 12. Electric Energy Consumption of Large C&I Population Summary (kWh - 2007)

SIC Code Grouping	Gas Service	Electric Only	Total
By SIC Code Grouping			
01-09: Agriculture, Forestry and Fishing	0	3,457,200	3,457,200
10-14: Mining	0	1,345,640	1,345,640
15-17: Construction	357,542	566,960	924,502
20-39: Manufacturing	522,971,163	942,650,275	1,465,621,438
40-49: Transportation and Public Utilities	50,356,974	184,107,025	234,463,999
50-51: Wholesale Trade	9,624,800	27,927,516	37,552,316
52-59: Retail Trade	184,430,793	395,511,692	579,942,485
60-67: Finance, Insurance and Real Estate	62,338,610	225,973,672	288,312,282
70-89: Services	165,927,326	567,668,427	733,595,753
91-97: Public Administration	34,460,608	51,171,299	85,631,907
99: Non Classified Establishments	2,094,145	3,322,085	5,416,230
Not Provided	48,549,165	240,062,143	288,611,309
Total (kWh)	1,081,111,126	2,643,763,935	3,724,875,061
By Commercial vs. Industrial			
Commercial	509,590,798	1,461,051,516	1,970,642,314
Industrial	522,971,163	942,650,275	1,465,621,438
Not Provided	48,549,165	240,062,143	288,611,309
Total (kWh)	1,081,111,126	2,643,763,935	3,724,875,061

2.2.1 Survey Respondent Characteristics

The primary data collection efforts for this project included a combination of phone and site surveys of residential, commercial and industrial New Hampshire customers. The surveys were used to obtain a great deal of customer demographic information. The most relevant customer demographic information is summarized below; additional information obtained from the surveys is presented in Appendix J to this report.

Of residential survey respondents, 94% were permanent as opposed to seasonal residents, and nearly 80% of respondents owned the property they were living in. Over 53% of homes were more than 28 years old. Over 72% of respondents had completed at least some college and nearly 18% have completed postgraduate studies.

Among the small commercial and industrial respondents, 62% owned the property and 38% leased the space. 98.5% of respondents pay for electricity in the space. The mean square footage of the small commercial and industrial facilities surveyed was 11,747 square feet.

Among the large commercial and industrial respondents, 73% owned the property and 27% leased the space. The mean square footage of the large commercial and industrial facilities surveyed was nearly 90,000 square feet.

2.3 Forecasted Electricity and Natural Gas Sales in New Hampshire

Based on sales information provided directly by this project's four participating electric utilities and two participating natural gas distribution companies, total and customer sector-specific energy (GWH), demand (MW) and fuel (MMBTu) forecasts were compiled. Where applicable, these forecasts were compared against relevant ISO-NE and EIA data to assess reasonableness. As shown in Figure 10, electric energy sales projected by the four participating electric utilities in New Hampshire is projected to grow from approximately 11,200 GWH in 2008 to over 13,000 GWH by the year 2018. This represents an annual rate of 1.3 percent. This represents nearly 93 percent of the total electric energy sales in the state, when compared with ISO-NE's latest forecast and appears reasonable given that the utility forecasts do not include sales from a number of smaller municipal electric utilities that also serve customers in the state. Figure 11 shows how the utilities' electric energy sales projections are broken down between residential, commercial and industrial customer sectors. The residential sector has the greatest sales, approximately 40 percent of total sales (4,537 GWH) in 2008, and is projected to grow slightly to 5,590 GWH by 2018 (representing a 1.7 percent annual growth rate). Commercial sector sales also currently make up approximately 40 percent (4,525 GWH) of the combined utilities' total 2008 electric energy sales, and are projected to grow just slightly to 5,354 GWH by 2018 (a 1.4 percent projected annual growth rate). The industrial sector currently represents 19 percent of total 2008 sales (2,126 GWH) and is expected to stay fairly constant, dropping slightly to 2,103 GWH by the year 2018 (a 0.1 percent annual decline). This figure also shows approximately 42 GWH/year in projected street lighting sales (representing 0.3 percent of total projected sales in 2018).

Figure 10. Forecasted Electric GWH Sales Total (2008 – 2018) - from Utility Data vs. ISO-NE Projections

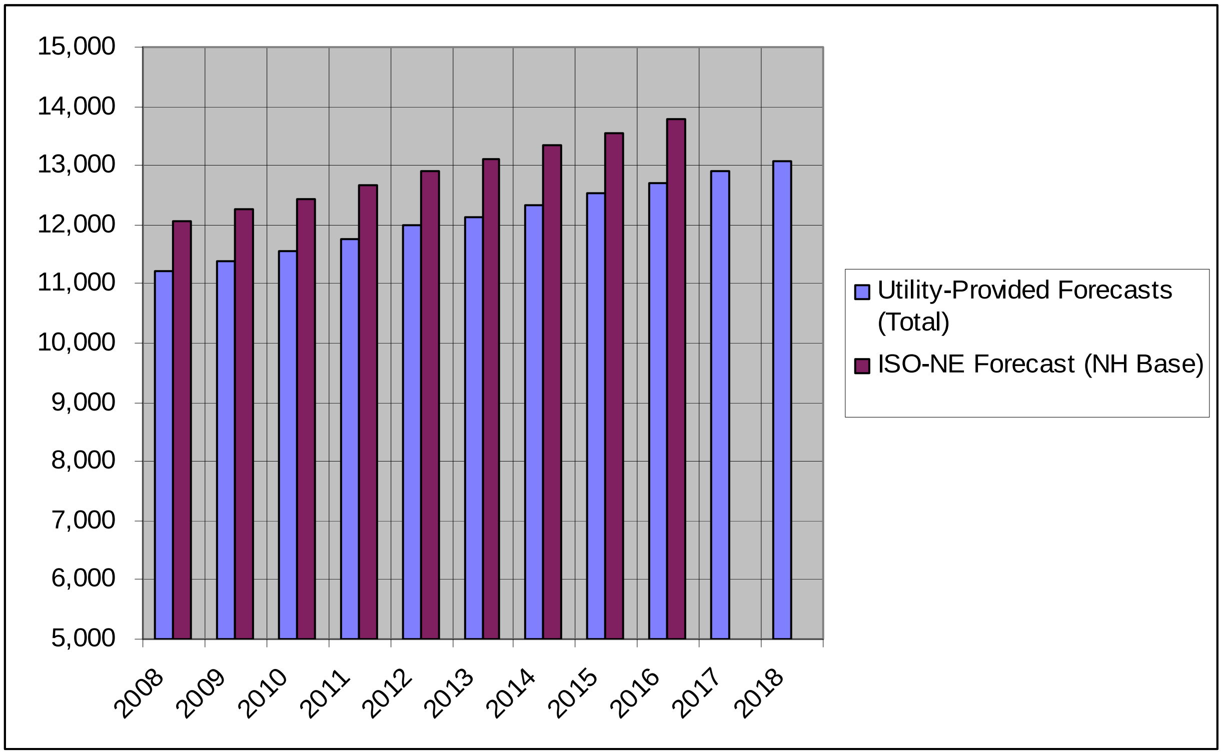
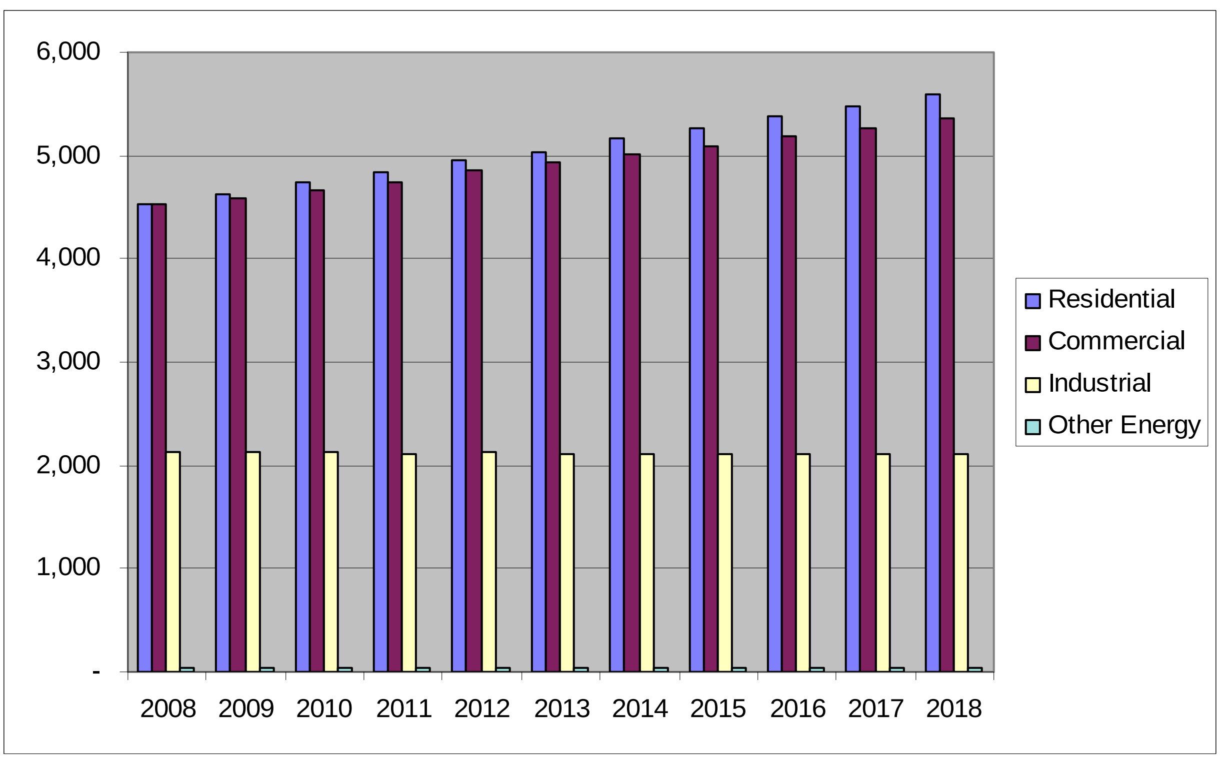


Figure 11. Forecasted Electric GWH Sales By Sector (2008 – 2018)



Electric system peak load for the combined four participating electric utilities in New Hampshire, as shown in Figure 12, is projected to grow from approximately 2,400 MW in 2008 to nearly 3,000 MW by the year 2018 (an annual rate of 1.8 percent). This represents nearly 95% of the state's total forecasted electric demand, when compared with ISO-NE's latest forecast, and appears reasonable given that the utility forecasts do not include peak load projections from a number of smaller municipal electric utilities that also serve customers in the state. Figure 13 shows how the utilities' electric peak load projections are broken down between residential, commercial and industrial customer sectors. The commercial sector has the greatest peak demand, approximately 43 percent (1,023 MW) in 2008, and is projected to grow slightly to 1,279 MW by 2018 (representing a 1.8 percent annual growth rate). Residential sector demand currently makes up approximately 40 percent (962 MW) of the combined utilities' total 2008 peak, and is projected to grow to 1,206 MW by 2018 (also a 1.8 percent projected annual growth rate). The industrial sector currently represents just under 17 percent of total 2008 peak load (962 MW) and is expected to grow to 498 MW by the year 2018 (a 1.9 percent annual increase). This figure also shows approximately 3 MW per year in projected street lighting demand (constant for the period 2008 through 2018).

Figure 12. Forecasted Electric Demand (MW) Total 2008 – 2018 - Utility Data vs. ISO-NE Projections

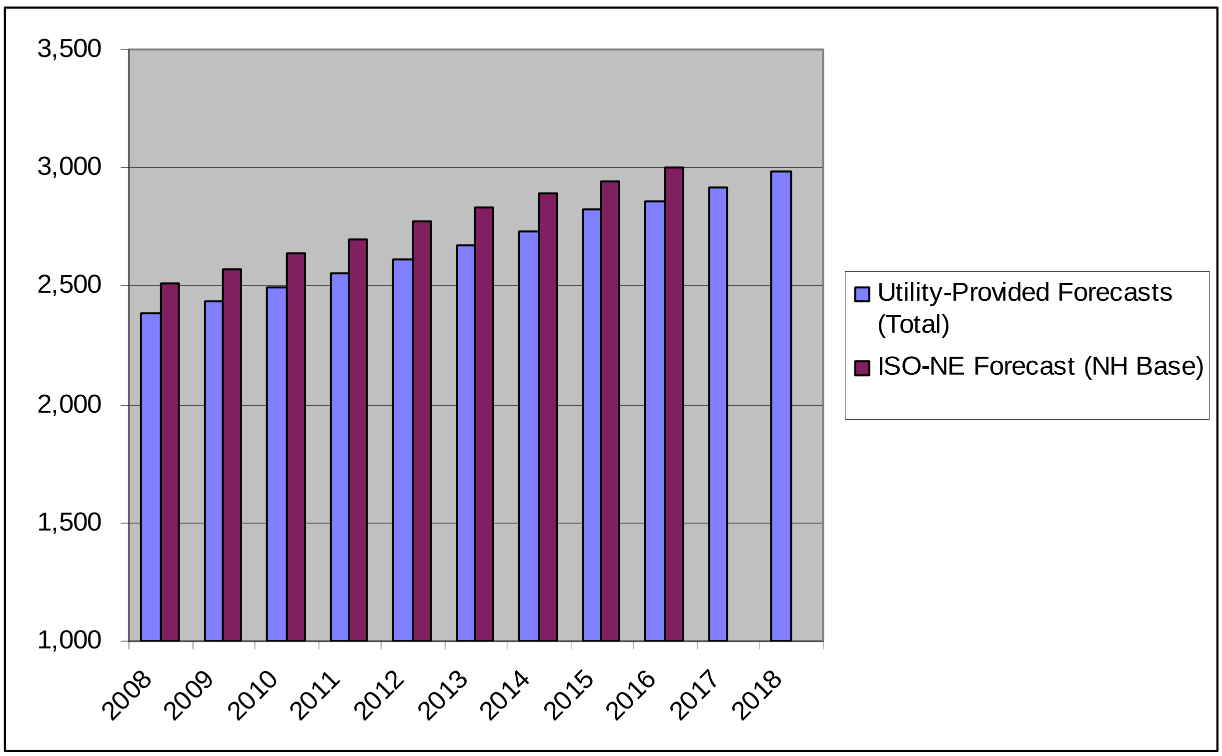
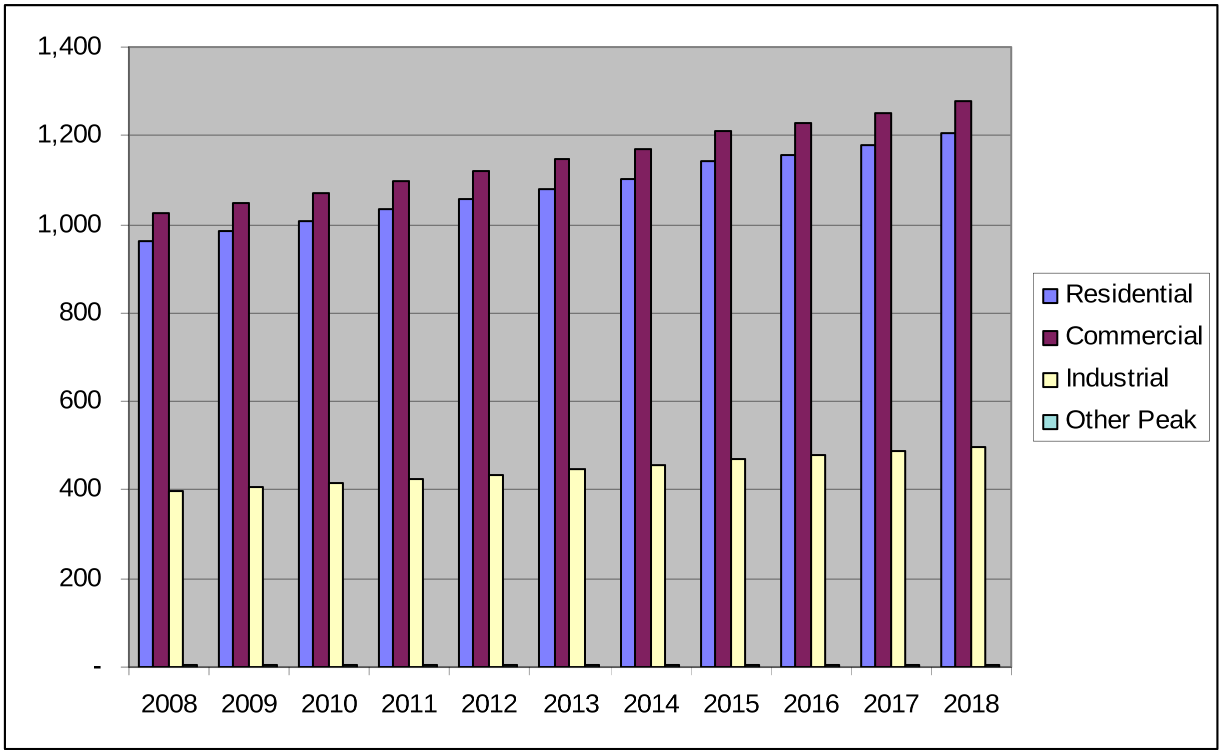


Figure 13. Forecasted Electric Demand (MW) By Sector 2008 – 2018



In addition to electric energy and peak demand, this study estimates the potential for additional natural gas energy efficiency and related propane and fuel oil savings opportunities. As such, Figure 14, shows that natural gas sales is projected to grow from 20,640 MMBTu in period 2008 to 26,283 MMBTus by 2018 (an annual growth rate of 2 percent).[25] This compares reasonably to the most recent data available from the US Department of Energy's Energy Information Administration (EIA), where New Hampshire's natural gas sales for 2007 was estimated to be 21,722 MMBTu. Figure 15 shows how New Hampshire's the natural gas utilities' MMBTu sales projections are broken down between residential, commercial and industrial customer sectors. The commercial sector has the greatest sales approximately 44 percent (9,428 MMBTu) in 2008, and is projected to grow to 12,666 MMBTu by 2018 (representing a 2.6 percent annual growth rate). Residential sector sales currently makes up approximately 36 percent (7,698 MMBTu) of the combined utilities' total 2008 natural gas sales, and is projected to grow to 8,189 MMBTu by 2018 (a 0.6 percent projected annual growth rate). The industrial sector currently represents just over 19 percent of total 2008 sales (4,041 MMBTu) and is expected to grow to 5,428 MMBTu by the year 2018 (a 2.6 percent annual increase).

[25] Based on participating New Hampshire Natural Gas distribution company-provided projections.

Figure 14. Forecasted Natural Gas MMBTu Sales Total (2008 – 2018) - Utility Projections vs. EIA Data

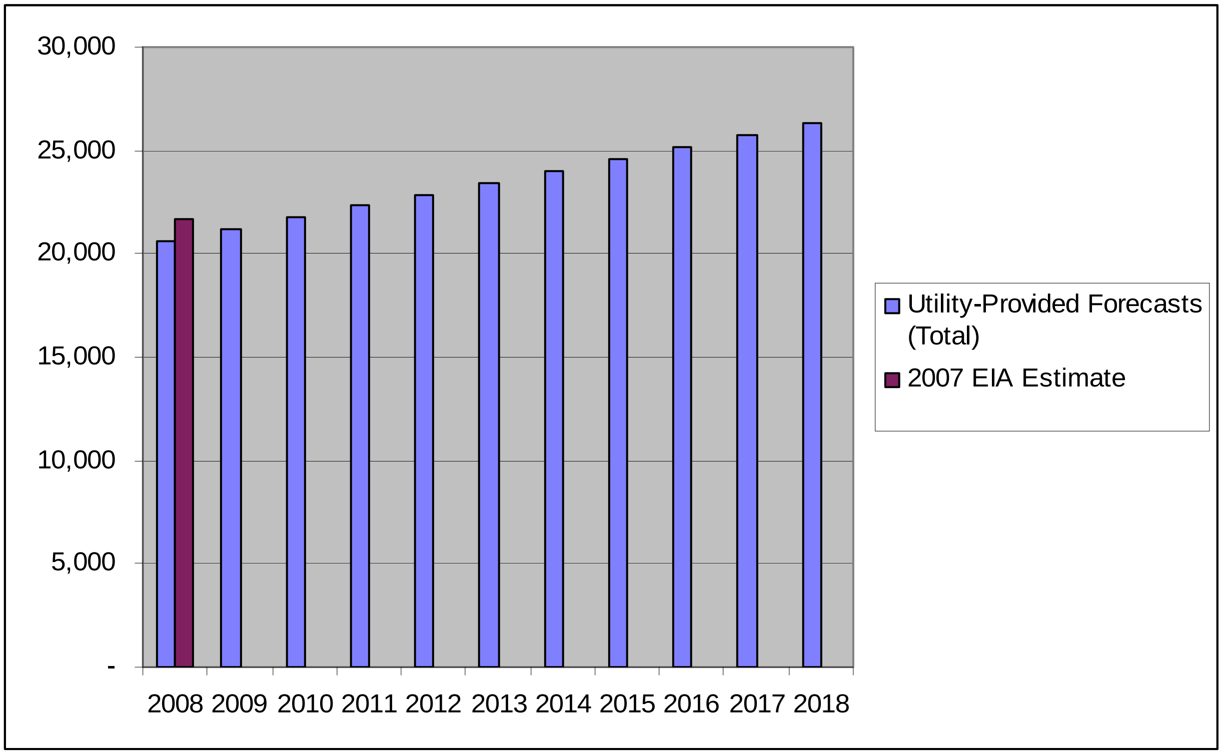
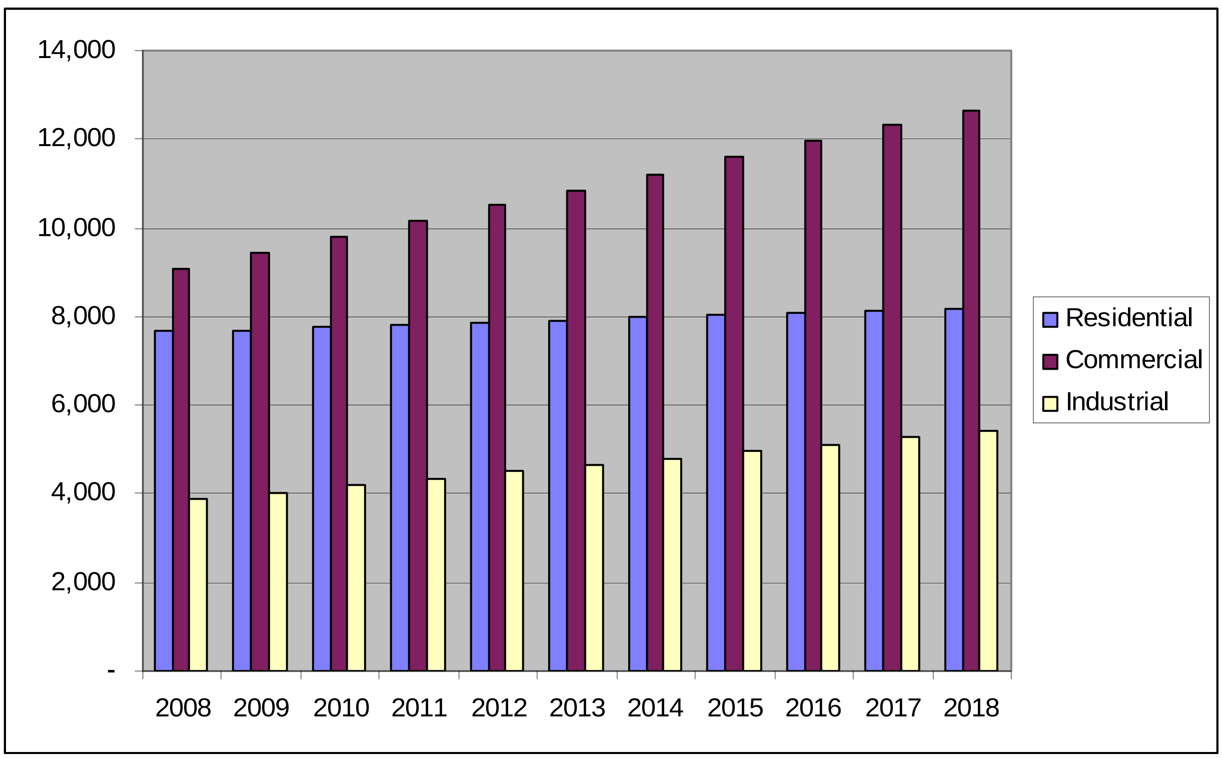


Figure 15. Forecasted Natural Gas MMBTu Sales By Sector (2008 – 2018)



New Hampshire's electric and natural gas utilities have been operating energy efficiency programs for a number of years. The above forecasts reflect the energy savings that have already resulted from these utilities' previous efficiency program efforts.

In New Hampshire, as with all states, the growth in the demand for electricity and natural gas will vary by region where some regions may see much higher growth rates. On a statewide basis, however, areas showing faster growth are offset by slower growth areas of the state to produce an overall projected growth rate of approximately only 1.3, 1.8 and 2.0 percent for electric energy, demand and natural gas sales respectively.

Section 3: Overall Project Implementation Approach

This section of the report presents an overview of the approach and methodologies used by the GDS Team for completion of each of the following tasks:

- Analyzing current saturations of energy using equipment and penetrations of energy efficiency equipment and practices in each end-use sector

- Producing an up-to-date list of currently available and soon to be commercially available technologies which may play a part in future efficiency programs

- Estimating customer participation rates/levels by program, based on different payback/incentive levels and define/analyze significant barriers that customers face when investing in additional energy efficiency

- Developing, by sector, a simplified end-use model of state electricity and natural gas consumption and peak demand

- Estimating, state-wide and for each of the four New Hampshire retail electricity providers and two natural gas distribution companies, the technical, maximum achievable, maximum achievable cost effective, and potentially obtainable scenario for electricity, natural gas, and related propane and fuel oil savings over the next 10 year period, and the budgets (where appropriate) required to achieve that potential

- Evaluating extent to which past and current energy efficiency programs have achieved energy savings to date, provide sensitivity analysis of realized energy savings based on different resource levels (including absence of current SBC-funded model), and recommend modifications to program and measure offerings that would increase the likelihood of achieving identified potential

3.1 Energy Using Equipment Saturations and Efficiency Penetrations Analysis

This task represents a major enhancement to technical potential studies that have been conducted across the country in the past. Rather than relying on best available information from existing secondary sources to estimate current levels of energy using equipment saturations and penetration of energy efficiency measures, significant primary data collection efforts were undertaken to help inform and derive New Hampshire-specific values where possible within the time requirements and work scope specified for this project. As such, this effort was completed through a combination of primary and secondary data collection and analysis activities. Detailed results and an assessment of the value resulting from this enhanced, New Hampshire-specific data collection effort is presented in Section 7 of this report. Following is a discussion of the methodologies utilized to complete this task.

First, a measure list was compiled, the approach for which is described in Section 3.2 below. The current saturation of each relevant type of energy using equipment and the penetration of associated energy efficiency equipment and practices was then determined. In this effort, it was important to recognize and quantify differences in end-use saturations and penetrations between the residential, commercial and industrial sectors, and building types within in each sector (see Table 13, Table 14 and Table 15).

Table 13. Residential Sector Building Types and Energy Using Equipment

Building Types/Considerations
Single Family
Multi Family
Low Income
Existing Homes
New Construction
Energy Using Equipment/End-Use Measures
Appliances
Water Heating
Space Conditioning (heating/cooling)
Lighting
Building Envelope
Other (pools, standby power)

Table 14. Commercial Sector Building Types and Energy Using Equipment

Building Types/Considerations
Warehouse
Retail
Grocery
Office
Lodging
Health
Restaurant
Education
Other (assembly, etc.)
Existing Buildings/New Construction
Energy Using Equipment/End-Use Measures
Appliances, Computers & Office Equipment
Water Heating
Space Heating
Space Cooling – Chillers
Space Cooling – Unitary & Split AC
Ventilation
HVAC Controls
Non-HVAC Motors
Building Envelope
Lighting
Lighting Controls
Refrigeration
Cooking
Compressed Air
Pools
Other (transformers)

Table 15. Industrial Sector Business Types and Energy Using Equipment

Business Types/Considerations
Apparel And Other Finished Products Made From Fabrics And Similar Materials
Chemicals And Allied Products
Electronic And Other Electrical Equipment And Components, Except Computer Equipment
Fabricated Metal Products, Except Machinery And Transportation Equipment
Food And Kindred Products
Furniture And Fixtures
Industrial And Commercial Machinery And Computer Equipment
Leather And Leather Products
Lumber And Wood Products, Except Furniture
Measuring, Analyzing, And Controlling Instruments; Photographic, Medical, And Optical Goods; Watches And Clocks
Miscellaneous Manufacturing Industries
Paper And Allied Products
Petroleum Refining And Related Industries
Primary Metal Industries
Printing, Publishing, And Allied Industries
Rubber And Miscellaneous Plastics Products
Stone, Clay, Glass, And Concrete Products
Textile Mill Products
Tobacco Products
Transportation Equipment
Energy Using Equipment/End-Use Measures
Conventional Boiler Use
CHP and /or Cogeneration Process
Process Heating
Process Cooling and Refrigeration
Machine Drives
Electro-Chemical Processes
Other Process Use
Facility HVAC
Facility Lighting
Other Facility Support
Onsite Transportation
Conventional Electric Generation
Other Non-Process Use

As noted above, a combination of primary and secondary data collection and analysis activities were conducted by the GDS Team to develop the New Hampshire sector and building-specific saturation and penetration rates used for this report. Primary data collection consisted of telephone surveys of a statistically valid sample of residential and small commercial/industrial customers (400 residential customers and 200 small commercial customers) and site visits for a sample of 100 larger commercial and 100 industrial customers.

3.1.1 Survey Instruments and Site Visit Data Collection Forms

The process of developing survey questions and site visit data collection forms was mostly dictated by the types of data required by the computer models being used by the GDS Team to estimate energy saving potential. For the questions that examined current saturations and penetrations of energy efficient equipment and practices, GDS first identified a list of currently and soon-to-be commercially available technologies that may play a part in future efficiency programs; then specific questions that address these technologies were developed.

For the phone surveys, survey instruments from two existing studies served as references: the 2004 California Statewide Residential Appliance Saturation Study (for the residential questionnaire), and the U.S. Department of Energy's 2003 Commercial Buildings Energy Consumption Survey (for the small commercial/industrial questionnaires). For the site visit data collection forms, instruments based on somewhat relevant previous projects were used as a starting point. In addition, the survey instruments included questions to explore customers' attitudes toward and perceptions of energy efficiency. These questions addressed factors that affect the adoption of energy efficiency measures, significant barriers customers may face when investing in energy efficiency measures, awareness of energy efficiency, program participation and satisfaction, and past purchase practices. A major challenge in this effort was to develop instruments that would provide useful information on a number of important energy end-use measures, without requiring respondents to spend too much time on the phone, or on site. Targeted durations of 15 minutes per phone survey and 2.5 hours per site visit were set.

New Hampshire Public Utility Commission reviewed preliminary research instruments, both for the phone surveys and site visits, in several phone conferences, and discussed their priorities with the GDS Team. Based on these discussions, RIA finalized the phone survey instruments for the residential and the small commercial/industrial surveys which primarily asked questions in a closed-ended format, with a few opportunities for verbatim responses. GDS and RLW finalized the site visit data collection forms using identical questions from the phone surveys wherever practical and a tabular format for collection of end-use area and measure specific saturation and penetration data. Appendix A presents the Team's Residential Sector Telephone Survey. Appendix B is the Small Commercial/Industrial Sector Telephone Survey. Appendix C provides a copy of the On-Site Data Collection Instrument for the Larger Commercial and Industrial Sector.

3.1.2 Sampling

The sampling plans for residential and small commercial/industrial telephone surveys were developed based on records received from each of the electric and gas utilities. Records that represented duplicates due to multiple program participation were combined and participation codes were retained for programs. In residential accounts, all low-income customers were identified based on their rate code or income flag. Identified low-income customers represented 5% of the customer accounts received. A similar approach was taken with the small commercial/industrial accounts, which were also screened to ensure that all electric accounts had less than 100kW demand or 300,000 kWh annual consumption.

By definition, all records for gas utility customers are duplicates since all gas customers also are customers of one of the electric utilities and would be included in those records. Therefore, as an initial step, each gas customer record was matched by telephone number to one of the electric utilities. The next step was to remove records with no phone number. Table 16 and Table 17 display the final sample quotas for the residential and small commercial/industrial phone surveys. As shown in Table 16, quotas were included in the residential sample to ensure representation from both the non-low-income and low-income populations, and for electric and gas customers associated with each of the four major electric and two major natural gas utilities in the state. The residential sample is designed to achieve 5 percent precision at a 95 percent confidence level, with 10 percent precision and 90 percent confidence level for each of the utilities.[26]

Table 16. Sample Quotas - Residential NH Electric and Gas Utilities

Utility	Non Low Income				Low Income				Total
	Random Draw	Electric Only	w/Gas Service	N	Random Draw	Electric Only	w/Gas Service	N	
PSNH	3,500	142	33	175	300	12	3	15	190
NH Electric Coop	1,280	52	12	64	120	5	1	6	70
Unitil	1,280	52	12	64	120	5	1	6	70
Granite State Electric	1,280	52	12	64	120	5	1	6	70
Totals	7,340	298	69	367	660	27	6	33	400

As shown in Table 17, specific quotas were also included with the small commercial/industrial sector to ensure representation from both electric and gas customers. This small commercial/industrial sample is designed to achieve 5 percent precision at the 85 percent confidence level, with 12 percent precision at the 85 percent confidence level for each of the utilities.

Table 17. Sample Quotas – Small C/I NH Electric and Gas

Utility	Random Draw	N		Total
		Electric Only	Gas Service	
PSNH	3,325	87	8	95
NH Electric Coop	1,225	32	3	35
Unitil	1,225	32	3	35
Granite State Electric	1,225	32	3	35
Totals	7,000	183	17	200

In the end, 411 interviews with residential customers and 200 interviews with small commercial/industrial customers were completed. As shown in Table 18 and Table 19, over 6,100 and 4,000 calls to residential and small commercial customers respectively had to be made to fill the 400/200 quotas targeted. More information and summary results from the phone survey efforts are presented later in this report.

Table 18. Disposition of Residential Survey

DISPOSITION	TOTAL	% TOTAL
Complete	411	6.7%
No answer	789	12.8%
Answering machine	2,838	46.1%
Busy	167	2.7%
Bad number	476	7.7%
Fax number	29	0.5%
Call intercept	7	0.1%
Appointment	451	7.3%
First refusal	214	3.5%

[26]. Estimates for subgroups within the residential sample, including the low-income estimates, are based on smaller sample sizes. Thus the margin of error for these estimates is higher

DISPOSITION	TOTAL	% TOTAL
Second refusal	549	8.9%
Language barrier	24	0.4%
No eligible respondent	24	0.4%
Business – NPR	95	1.5%
Never call	15	0.2%
Quota full	0	0.0%
Partial – Callback	39	0.6%
Partial – Refusal	31	0.5%
TOTAL DIALINGS	**6,159**	**100%**
INCIDENCE (%)	**95.46**	

Table 19. Disposition of Small Commercial/Industrial Survey

DISPOSITION	TOTAL	% TOTAL
Complete	200	4.9%
No answer	1,750	43.1%
Answering machine	81	2.0%
Busy	151	3.7%
Bad number	135	3.3%
Fax number	25	0.6%
Updated contact	176	4.3%
Appointment	815	20.1%
First refusal	61	1.5%
Second refusal	285	7.0%
Language barrier	3	0.1%
No eligible respondent	12	0.3%
Private residence	194	4.8%
Never call	3	0.1%
Quota full	0	0.0%
Partial – Callback	55	1.4%
Partial – Refusal	25	0.6%
Own but not occupy	10	0.3%
Residential use	6	0.2%
Made at corporate	76	1.9%
TOTAL DIALINGS	**4,063**	**100%**
INCIDENCE (%)	**73.13**	

A key element of the larger commercial and industrial on-site surveys was the systematic selection of sample points to visit. As originally proposed, 200 site visits were targeted for performance overall. A sample size of 68 provides an expected absolute precision of 10% for proportional results. This suggests that a sample size of 200 can be considered adequate for the consideration of targeting sub-groups of the sample such as commercial versus industrial or fuel types (gas).

Table 20 below presents the number of accounts determined to be Large C&I after identifying[27] them from the sponsor provided electric customer data. The overall number of estimated large commercial and industrial accounts is 2,369. In summarizing data by SIC code in the top portion of the table, information provided by the sponsors during the data acquisition/submission process was used. Not all sponsors had SIC code information available for use, but based upon the SIC information received, manufacturing, services and retail trade were the three largest sectors observed. The bottom portion of the table allocates those SIC codes associated with Manufacturing as Industrial and the remainder as Commercial. Just over 31 percent of those accounts classified in the data are industrial accounts.

[27] For PSNH, Large C&I were defined as their rate code GV or LV. For Unitil, they were defined as having a demand greater than 100 kW based upon a provided Total Demand field or as having more than 300,000 kWh of annual consumption if demand was not available. Similarly for National Grid they were defined as customers having a demand greater than 100 kW based upon a provided Average Bill Demand kW field or as having more than 300,000 kWh/year if demand was not available. NHEC provided a list of Small C&I customers as queried to meet the study designated Small C&I definition of accounts with less than 100 kW of demand when available, otherwise less than 300,000 kWh/year.

To identify gas customers, the GDS Team gathered gas customer data from the sponsors. Using the address, company name, and phone numbers within the gas customer data, a total of 645 customers within the large C&I electric customer dataset were identified as having gas service. There are sure to be more gas customers in the sample frame beyond those identified. In fact we received a total of 12,178 total (small and large) gas commercial or industrial customer records from National Grid and Northern Utilities from which the 645 Large Commercial and Industrial accounts were successfully mapped in to the dataset of identified large electric Commercial and Industrial customers. This identified group represents just over 31 percent of the Large C&I population gathered from the electric sponsors.

Table 20. Large C&I Population Summary (Accounts)

SIC Code Grouping	Gas Service	Electric Only	Total
By SIC Code Grouping			
01-09: Agriculture, Forestry and Fishing	0	2	2
10-14: Mining	0	3	3
15-17: Construction	2	1	3
20-39: Manufacturing	192	367	559
40-49: Transportation and Public Utilities	26	93	119
50-51: Wholesale Trade	9	21	30
52-59: Retail Trade	134	240	374
60-67: Finance, Insurance and Real Estate	46	97	143
70-89: Services	137	352	489
91-97: Public Administration	27	36	63
99: Non Classified Establishments	3	6	9
Not Provided	69	506	575
Total	645	1,724	2,369
By Commercial vs. Industrial			
Commercial	384	851	1,235
Industrial	192	367	559
Not Provided	69	506	575
Total	645	1,724	2,369

Table 21 below presents the electrical consumption (kWh) of the Large C&I customers, also by SIC Code and Commercial versus Industrial. The overall amount of electric consumption among the large Commercial and Industrial sample frame is estimated to be 3,725 GWh. Although the industrial accounts represent a third of the accounts classified in the sponsor data, they represent nearly 43 percent of the consumption of all classified accounts.

Table 21. Large C&I Population Summary (kWh)

SIC Code Grouping	Gas Service	Electric Only	Total
By SIC Code Grouping			
01-09: Agriculture, Forestry and Fishing	0	3,457,200	3,457,200
10-14: Mining	0	1,345,640	1,345,640
15-17: Construction	357,542	566,960	924,502
20-39: Manufacturing	522,971,163	942,650,275	1,465,621,438
40-49: Transportation and Public Utilities	50,356,974	184,107,025	234,463,999
50-51: Wholesale Trade	9,624,800	27,927,516	37,552,316
52-59: Retail Trade	184,430,793	395,511,692	579,942,485
60-67: Finance, Insurance and Real Estate	62,338,610	225,973,672	288,312,282
70-89: Services	165,927,326	567,668,427	733,595,753

91-97: Public Administration	34,460,608	51,171,299	85,631,907
99: Non Classified Establishments	2,094,145	3,322,085	5,416,230
Not Provided	48,549,165	240,062,143	288,611,309
Total	1,081,111,126	2,643,763,935	3,724,875,061
By Commercial vs. Industrial			
Commercial	509,590,798	1,461,051,516	1,970,642,314
Industrial	522,971,163	942,650,275	1,465,621,438
Not Provided	48,549,165	240,062,143	288,611,309
Total	1,081,111,126	2,643,763,935	3,724,875,061

Based upon the exploration of the Large C&I data gathered, a sample approach that targeted large industrial and large commercial equally seemed reasonable – particularly given that the modeling and analysis of additional energy efficiency potential will be done discretely for each and that the consumption of industrial versus commercial accounts is moderately close to 50/50.

The sample design requested in the RFP asked for adequate representation of each sponsor (i.e., the four electric utilities and the two natural gas distribution companies) in the final sample. Table 22 presents the number of accounts by utility for electric and gas as determined from aggregating the entire large commercial and industrial electric customer information and an effort to map in information from the gas utilities based upon information in common fields.

Table 22. Large C&I Accounts by Sponsor and by Commercial versus Industrial

	Commercial		**Industrial**		**Unclassified**		**Total**	
Utility	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Electric								
NHEC	15	1%	0	0	316	57%	331	14%
PSNH	1,012	83%	492	88%	8	1%	1,512	65%
Unitil	84	7%	12	2%	158	29%	254	11%
GSE	112	9%	58	10%	71	13%	241	10%
Total	1,223	100%	562	100%	553	100%	2,338	100%
Gas								
National Grid	232	61%	142	74%	30	82%	404	63%
Northern	149	39%	50	26%	42	18%	241	37%
Total	381	100%	192	100%	72	100%	645	100%

Due to an inability to fully categorize all of the sponsor information by the various sectors among electric customers, the GDS Team felt that the best approach to sampling for the large C&I site visits would be to target 100 commercial facilities and 100 industrial facilities with minimum sample quotas for each electric utility with an overall quota for gas customers. Such a sample would further seek to balance the need for targeting the number of large C&I customers from each sponsor to their approximate portion of the total (with a minimum quota size of 7) with the need to visit customers with gas use. This would be done iteratively as the recruitment process proceeds depending upon the actual incidence of gas customers among the recruited Large C&I sample frame (discussed later).

Table 23 below provides the GDS Team's proposed sample design in which we have allocated the targeted visits within the commercial and industrial categories similarly as the proportion of accounts by utility in each category are very similar (Table 22). The predicted gas column in

Table 23 provides an estimate of the number of gas customers that would naturally fall into the sample for each sponsor given the identified gas customers in each sector – along with the gas utility they are likely to represent. An estimated 64 gas customers were anticipated to be recruited naturally in this regard, comprised of 30 in the large commercial sector and 34 in the industrial. Given the interest in gas measures as part of this study, the GDS Team believed that additional targeting of this group of customers was needed. Therefore, visiting 68 gas customers overall was suggested, which targets a 90 percent confidence with +/-10 percent relative precision for proportional results. Therefore, depending on the incidence of gas customers experienced in the recruitment process, an additional 4 gas sites may need to be explicitly targeted to achieve a total of 68.

Table 23. Large C&I Sample Design

Utility	Large Commercial		Large Industrial	
	N	Predicted Gas Subset	N	Predicted Gas Subset
NHEC	7	0	7	0
PSNH	76	16 NGRID and 9 Northern	75	21 NGRID and 7 Northern
Unitil	8	2 NGRID and 1 Northern	7	5 NGRID
GSE	9	2 (Northern)	11	2 (Northern)
Total	100	30	100	34

In the end, all the electric utility-specific quotas were met for both the commercial and industrial sectors. The predicted gas utility subsets were exceeded (23 Northern Utility completes vs. predicted 21, and 59 National Grid completes vs. predicted 44).

Scheduling and fielding began on June 9th and all site visits were completed before August 9th, 2008. Advance letters were sent by the PUC to 500 randomly selected customers within the quota areas targeted and a drawing for a $500 gift card was offered to increase likelihood of participation.[28] Appendix D provides a copy of the PUC advance letter and the GDS Team's recruiting script. Although the GDS Team was able to achieve a 40% response rate (200 completes, out of a 500 customer sample frame), as discussed in more detail in the section below, the time required to recruit, schedule and conduct the site visits, and hard enter and analyze all resulting data greatly exceeded original estimates.

3.1.3 Data Collection and Analysis

The telephone interviews were conducted from RKM Research and Communication's call center using trained, professional survey managers and interviewers who utilized a computer assisted telephone interviewing (CATI) system. All staff were thoroughly trained as to the nature of the study, the importance of the information being collected, and management of the sample. Before the final data collection phase, RKM conducted a pretest with 20 residential and 22 commercial/industrial completes to identify any problems the respondents or interviewers might have understanding questions, or with the survey length. Some modifications were made to questions based on the results of the pretest, but these were insignificant and the total number of pretests was included in the final dataset.

Fielding of the phone surveys was conducted from June 17th through 26th, 2008, during the day, evening, and weekend hours to reach as many targets as possible. The average length of the

[28] NH Industries, Lebanon, NH was the winner of the drawing held on September 5th at the PUC offices. Instead of a $500 gift card, per their request, a charitable donation was made on their behalf to the United Way of the Upper Valley.

survey was 16 minutes for the residential survey and 17 minutes for the small commercial/industrial survey. To counteract non-response bias, up to six attempts per telephone number were made to complete the surveys. All soft refusals were put into a separate sample file and were assigned to different interviewers to call back. All were called back except those refusals received in the very last days of the study, as a result of the waiting period between when the initial refusal was received and when the callback was attempted. Detailed call disposition information was presented earlier in Table 18 and Table 19. The completed survey data was analyzed using SPSS statistical software and appropriate data entry accuracy verification and data cleaning procedures.

The site visits were conducted by experienced RLW and GDS engineers and trained staff. Starting with development of the site visit data collection form, key staff from both RLW and GDS (including a number of those that would be conducting the actual site visits) were actively involved in the development of the form and the planning/scheduling approach for the site visits. All dedicated site visit staff (totaling more than 8 individuals) were thoroughly trained as to the nature of the study, the importance of the information being collected, and management of the sample.

As part of the initial data collection phase, RLW and GDS staff pretested the site visit data collection form by jointly conducting visits during the first two weeks in the field to identify any problems the auditors might have understanding questions or with the visit length, collecting the required measure data, and ensuring consistency of interpretation and treatment of equipment and situations encountered in the field by multiple auditors. Some modifications were made to implementation approaches based on the results of the pretest, but these were insignificant and the total number of pretests was included in the final dataset. Open and regular communication between the multiple auditors was encouraged and conducted throughout the site visit fielding period to maximize consistency.

Fielding of the site visits was conducted from June 9th through August 9th, 2008, during the workday hours to reach as many targets as possible. The average length per site visit was 3.25 hours. Project sponsors were kept aware of weekly schedules and attended as observers on a number of the site visits. To counteract non-response bias, up to six attempts per potential respondent were made to recruit facilities for the site visits. After identifying the correct person or persons to speak with at the targeted facility, all soft refusals or referrals to other personnel within the office or corporate headquarters location, were noted in the sample file and called back. All were called back except those refusals received in the very last days of the study, as a result of the waiting period between when the initial refusal was received and when the callback was attempted. After preparing the random sample required to fill specified quotas, additional facility names were not added until a direct refusal was received or six attempts were made to recruit each facility on the quota list.

The completed survey data for each site was recorded in paper files (22 pages per completed site visit) and was entered manually into an analyzable Excel spreadsheet file. Direct conversations between data entry personnel and field data collection staff were held when necessary to ensure proper interpretation of field notes. Data entry accuracy verification and data cleaning procedures were employed and analyses were conducted using pivot tables and targeted data mining where appropriate.

3.1.4 Derivation of Saturation and Penetration Values and Weighting of Results

Results from the phone surveys and site visits were analyzed to derive values for saturation of energy using equipment and penetration of energy efficiency equipment and practices, where applicable, in each end-use sector. Results from these analyses are discussed in more detail in

Section 7 of this report. For the residential sector and small commercial/industrial sector phone surveys, multiple cross tabulations were run to identify appropriate measure-specific responses based on heating source, single and multifamily housing types, building type and numerous other relevant variables.

For the larger commercial and industrial facility results, values were derived using multiple pivot tables. In all cases where sufficient responses existed (N>30, or lower if deemed to be reasonably representative of the building type of interest), values from the site surveys were reported for the specific building type. Otherwise, values were averaged across and applied to all building types for a specific measure. This was done to ensure that statistical validity was maintained in the model and that results were not skewed by a small number of responses.

Results from the small commercial and industrial phone surveys and large commercial and industrial site visits were combined using a weighted average. The weighting factors were developed using customer-specific energy sales information provided by the electric and gas utilities for their small (less than 100kW demand) and large customers. The weighting factors were based on the ratio of total electrical consumption in the small commercial and industrial sector compared to total electrical consumption in the large commercial and industrial sector. This ratio was applied to the results for the small and large customers to determine a weighted average for both the electric and non-electric models.

Excellent New Hampshire-specific information was collected on saturations and penetrations (referred to in our models as base and remaining factors) for a number of residential, commercial and industrial energy using equipment through the phone surveys and site visits conducted as part of this project. Such real customer-specific values have typically not been collected as part of the numerous technical potential studies that have been completed to-date for others across the country. Given the extensive list of measures identified for assessment in this study (as discussed in more detail in the section below), it was not possible to develop survey and site visit instruments of sufficient depth and breadth to collect information from which to derive values for all measures of interest to the Commission, OCA and the project's participating utilities. As such, in numerous cases, secondary sources for penetration and saturation data were identified, used and documented. Wherever possible, these secondary sources were verified for reasonableness, or modified based on results obtained through this project's primary data collection activities.

3.2 Measures List Development

This task was initially proposed to be based mainly on the GDS Team's existing information and databases of sector-specific electricity, gas and other fossil fuel end-use technologies and efficiency measures, and was to be supplemented as necessary to ensure inclusion of other technology areas of interest to the Commission, the OCA, and the four electric and two gas utilities supporting this project. Initial lists of electric and natural gas measures were compiled by GDS for the state's residential, commercial and industrial customer sectors, and were shared with the project sponsors on April 3rd for review and comment. As shown in Table 24, Table 25, and Table 26, these initial sector-specific lists contained a total of 252 unique measures (79 residential, 130 commercial, and 43 industrial).

Table 24. Measure End Uses and Number of Measures Per End Use – Residential

Residential Sector			
Electric Measures		Non-Electric Measures	
Appliances	9	2	Dryers
Lighting	4	7	Building Envelope
Space Heating, Cooling and Building Envelope	21	8	Space Heating, Cooling and Building Envelope
Water Heating	9	13	Water Heating
Standby Power	1	-	
Pools	1	-	
New Construction	1	-	
Low Income	3	-	
Total Measures in Sector	**49**	**30**	**79 (total)**

Table 25. Measure End Uses and Number of Measures Per End Use - Commercial

Commercial Sector			
Electric Measures		Non-Electric Measures	
Space Heating	3	17	Space Heating
Water Heating	5	12	Water Heating
Building Envelope	2	7	Building Envelope
Space Cooling – Chillers	3	3	Pool heating
Space Cooling – Packaged AC	8	1	Dryers
Space Cooling – Maintenance	3	6	Cooking
HVAC Controls	4	-	
Ventilation	11	-	
Motors	2	-	
Lighting	20	-	
Lighting Controls	7	-	
Refrigeration	12	-	
Compressed Air	2	-	
Monitor Power Management	1	-	
Transformers	1	-	
Total Measures in Sector	**84**	**46**	**130 (total)**

Table 26. Measure End Uses and Number of Measures Per End Use - Industrial

Industrial Sector			
Electric Measures		Non-Electric Measures	
Process Heating	1	2	Process Heating
Process Cooling & Refrigeration	1	20	Space Heating
Machine Drives	1	5	Water Heating
Facility HVAC	1	7	Building Envelope
Facility Lighting	1	-	
Other Facility Support	1	-	
Onsite Transportation	1	-	
Sensors & Controls	1	-	
Other End Uses	1	-	
Total Measures in Sector	**9**	**34**	**43 (total)**

Following multiple meetings and discussions over the subsequent 5 month period, ending September 26th, 2008, these lists grew by nearly a factor of two to 471 individual measures as shown in Table 27, Table 28 and Table 29. A significant amount of time was also expended during this period identifying, reviewing and documenting secondary and other available data sources to develop reasonable assumptions regarding measure lives, installed incremental and full costs (where appropriate), and electric energy, demand, and MMBTu savings associated with each of the measures included on the final lists.[29] Please refer to Appendix E for a comprehensive listing of all residential electric and non-electric measures and associated

[29] The GDS Team's existing sector-specific technical potential calculation models were also modified substantially during this period to accommodate the large increase in the number of measures and expanded measure categories to be assessed.

assumptions and sources assessed in this report. Appendix F and Appendix G provide similar detailed information for the commercial and industrial sectors respectively.[30]

Table 27. Measure End Uses and Number of Measures Per End Use - Residential

Residential Sector	
Combined Electric and Non-Electric Measures	
Appliances	17
Lighting	13
Space Heating and Cooling	59
Building Envelope	75
Water Heating	41
Standby Power	3
Pools	9
New Construction	Addressed in Building Envelope Measures
Low Income	
Total Measures in Sector	**217 total (up from 79)**

Table 28. Measure End Uses and Number of Measures Per End Use - Commercial

Commercial Sector			
Electric Measures		Non-Electric Measures	
Appliances/Office Equipment	7	-	
Space Heating	3	30	Space Heating
Water Heating	12	17	Water Heating
Pools	7	5	Pools
Building Envelope	5	13	Building Envelope
Space Cooling – Chillers	7	2	Space Cooling – Chillers
Space Cooling – Packaged AC	11	5	Process Heat
Cooking	6	10	Cooking
HVAC Controls	8	7	HVAC Controls
Ventilation	17	6	Ventilation
Motors	2	-	
Lighting	28	-	
Lighting Controls	12	-	
Refrigeration	18	-	
Compressed Air	2	-	
Transformers	1	-	
Total Measures in Sector	**146**	**95**	**241 total (up from 130)**

Table 29. Measure End Uses and Number of Measures Per End Use - Industrial

Industrial Sector			
Electric Measures		Non-Electric Measures	
Process Heating	1	1	Process Heating
Process Cooling & Refrigeration	1	1	Conventional Boilers
Machine Drives	1	-	
Facility HVAC	1	1	Facility HVAC
Facility Lighting	1	-	
Other Facility Support	1	1	Other Facility Support
Onsite Transportation	1	-	
Sensors & Controls	1	-	
Other End Uses	1	-	
Total Measures in Sector	**9**	**4**	**13 total (down from 43)**

[30] Although the measures lists are extensive, they are not exhaustive, particularly for potential fuel oil and propane savings. Some potential measures were identified that were not modeled due to data or other limitations. These include, but are not limited to air conditioning peak demand savings from off peak cooling with energy storage, more advanced windows than double pane with low-E, super high efficiency gas condensing hot water heaters used particularly in combo systems that provide both space and hot water heating, data center and certain information technology potential energy saving measures, and some emerging but not yet commercialized technologies.

3.3 Customer Program Participation Rates and Barriers

Estimates of customer participation rates/levels by program and identification of barriers that customers face when investing in additional energy efficiency were developed based mainly on direct results from the GDS Team's phone surveys and site visits. Specifically, for each customer sector, questions were asked to assess customers' attitudes towards energy efficiency, past program participation and satisfaction, and barriers that might be preventing them from making future investments in energy efficiency.

3.3.1 Residential Customer Attitudes

The residential survey included questions about respondents' attitudes toward energy efficiency. More specifically, these questions attempted to explore respondents' level of consideration of energy saving and to assess factors that affect the adoption of energy efficiency measures. First, the respondents were asked to rate the level of attention their household pays to controlling energy costs through general energy efficiency operational practices such as adjusting room temperatures, shutting computers and lights off, etc. Table 30 provides the result. In general, the level of attention paid to controlling energy cost seems high. About two thirds (63 percent) said they pay "substantial attention," and 30 percent said they pay "some attention." Only a small percentage of the respondents said they pay "very little" or "no attention" to these matters (6 percent).

Table 30. Attention Paid to Controlling Household Energy Costs

	Frequency	Valid Percent
Substantial attention to these matters	256	63.4%
Some attention	121	30.0%
Very little attention	20	5.0%
No attention	5	1.2%
Don't know	2	0.5%
Total	404	100%

Respondents rated their likelihood of purchasing energy efficient equipment instead of standard equipment given several conditions generally assumed to increase the attractiveness of adopting energy efficient equipment. Just before introducing this question, the term "energy efficient equipment" was defined by stating "I am referring to new equipment specifically designed to be more energy efficient than other new models. Energy efficient models typically cost more than other models, perhaps 20-30 percent more." The order of these factors was randomized to avoid any response biases. The result is shown in Table 31. Overall, it seems the respondents found these factors appealing. In particular, a high percent of respondents (78 percent) said they would be "extremely likely" to purchase energy efficient equipment if their monthly energy bill would be less. This was rated significantly higher than any other factor (p<.05). The next highest rated factors were increased comfort, increased home value, feeling pro-environment, and receiving a rebate (more than 70 percent of the respondents said they are "extremely likely" to choose energy efficiency equipment as a result of these factors).[31] In contrast, "sales persons' recommendation" was rated significantly lower than any other factors (p<.05). Twenty-four percent reported they were "not at all likely" and 35 percent said they were "extremely likely" to purchase energy efficient equipment over standard items given this (sales person recommendation) condition.

[31] Respondents with lower educational achievement rated this factor significantly lower (p<.05).

Table 31. Likelihood of Purchasing Energy Efficient Equipment

		1=NOT AT ALL LIKELY	2	3	4	5= EXTREMELY LIKELY	TOTAL
a… your monthly energy bill would be less	N	12	1	22	50	306	391
	Row %	3%	0%	6%	13%	78%	100%
b… it increased the level of comfort	N	22	7	31	55	276	391
	Row %	6%	2%	8%	14%	71%	100%
c… you felt you were helping to protect environment	N	29	8	24	55	278	394
	Row %	7%	2%	6%	14%	71%	100%
d… it increased the home value	N	23	7	26	30	224	310
	Row %	7%	2%	8%	10%	72%	100%
e… you received a rebate	N	33	2	29	53	278	395
	Row %	8%	1%	7%	13%	70%	100%
f… your sales person recommended it	N	91	25	74	59	134	383
	Row %	24%	7%	19%	15%	35%	100%

Note: “Don’t know” responses were treated as missing data. Frequency of “it increased the home value” (d) is shown only if the respondents were home owners.

Table 32 shows factors respondents identified as barriers to investing in energy efficiency measures. The table provides a coded summary of the open-ended responses. Nearly three quarters of the responses dealt with uncertainty of payback and initial higher upfront costs (71 percent). In a distant second place, 10 percent of respondents said that current equipment is meeting their needs; 5 percent said they are renters and not able to do home improvements. Six percent of the respondents were concerned about various aspects of energy efficient equipments such as quality, design, features, and safety.

Table 32. Primary Reasons for Not Purchasing Efficient Equipment/Making Efficiency Improvements

	Frequency	Valid Percent
Cost / benefit, payback	189	71%
Current equipment is satisfactory	27	10%
Renters, not owners of property	14	5%
Quality concern	10	4%
Concerned about cosmetics, features	3	1%
Concerned about safety	2	1%
Other	20	8%
Total	265	100%

Note: “Don’t know,” “refusal,” and “no reason” responses were treated as missing data.

3.3.2 Residential Customer Program Awareness and Participation

Finally, the surveyed households were asked about their awareness of and participation in their utilities’ energy efficiency programs. Table 33 shows the respondents’ awareness of their utilities' energy efficiency programs. Overall, approximately 50 percent of the households know their utility offers energy efficiency programs. NH Electric Coop's customers have the highest awareness level (61 percent) and Granite State Electric's customers have the lowest awareness (42 percent) of their utilities' efficiency programs.[32] However, the differences in customers' awareness among the four utilities were not statistically significant.

Table 33. Awareness of Utility's Energy Efficiency Programs

		GRANITE STATE ELECTRIC	NH ELECTRIC COOP	PSNH	UNITIL	TOTAL
Yes	N	28	41	89	35	193
	Column %	41.8%	61.2%	47.1%	51.5%	49.4%
No	N	39	26	100	33	198
	Column %	58.2%	38.8%	52.9%	48.5%	50.6%
Total	N	67	67	189	68	391
	Column %	100%	100%	100%	100%	100%

Note: "Don't know" responses were treated as missing data.

Table 34 shows the respondents' participation in their utilities' energy efficiency programs, including participation by purchasing products promoted through these programs. Of the respondents who are aware of their utilities' program, the overall participation rate was 31 percent (15 percent of the sample population). There was no difference in the participation rates among the four utilities. One interesting finding was that the low income households reported significantly higher participation in efficiency programs.[33] The low income group was about twice as likely to have participated in such programs (58 percent) as the non-low income group (29 percent). Though not shown in the table, the data indicate an extremely high rate of satisfaction among participants. Almost all participating respondents reported they would participate again in their utilities' efficiency program if they have a future opportunity. Satisfaction and interest in repeat participation was equally high among both low and non-low income groups.

Table 34. Participation in Utility's Energy Efficiency Programs

		GRANITE STATE ELECTRIC	NH ELECTRIC COOP	PSNH	UNITIL	TOTAL
Yes	N	9	14	28	8	59
	Column %	33.3%	34.1%	31.8%	23.5%	31.1%
No	N	18	27	60	26	131
	Column %	66.7%	65.9%	68.2%	76.5%	68.9%
Total	N	27	41	88	34	190
	Column %	100%	100%	100%	100%	100%

Note: This question was asked only if the previous question (PS1) is "yes". "Don't know" responses were treated as missing.

[32] It is important to note that Granite State Electric customers differed significantly from those of the other utilities, having a larger proportion of lower income families and the demographic characteristics associated with that.
[33] Low income was defined as 183% of Federal Poverty line (per utility low income program eligibility criteria).

For those who reported not participating in their utilities' energy efficiency program, an additional question was asked about the reasons why they have not participated. Each possible reason was read by interviewers and the respondents were allowed to provide multiple reasons. If a respondent agreed that a certain reason contributed to their non participation, they were considered to have "endorsed" that particular reason.

Table 35 summarizes the responses. The most frequently mentioned reason was they have not recently purchased items that use energy (44 percent). The next most frequent reasons for nonparticipation seem to relate to their lack of awareness of or knowledge about utility efficiency programs. Twenty-eight percent reported they "did not know they are eligible," followed by "did not know how to find out about the program" (18 percent). It is possible that some respondents have not made recent purchases because they are unaware of programs that may alleviate their financial concerns about investing in energy efficient products. Several other reasons were mentioned with notably high frequencies. Those are: the sales person did not mention the program (13 percent), insufficient incentive (12 percent), bought unqualified equipment (11 percent), and "was not worth the hassle" to participate in programs (10 percent).

Table 35. Possible Reasons for Not Participating in an Energy Efficiency Program

		ENDORSED	NOT ENDORSED	TOTAL
Haven't recently purchased items	N	59	75	134
	Row %	44%	56%	100%
Didn't know I was eligible	N	37	97	134
	Row %	28%	72%	100%
Don't know how to find out more about program	N	24	110	134
	Row %	18%	82%	100%
Sales person didn't talk about program	N	18	116	134
	Row %	13%	87%	100%
Incentives were not enough	N	16	118	134
	Row %	12%	88%	100%
Have purchased items but not energy efficient	N	15	119	134
	Row %	11%	89%	100%
Wasn't worth the hassle	N	13	121	134
	Row %	10%	90%	100%
Renter, not owner (from "other: specify")	N	3	131	134
	Row %	2%	98%	100%
No need (from "other: specify")	N	3	131	134
	Row %	2%	98%	100%
Other	N	11	123	134
	Row %	8%	92%	100%

Note: Respondents were allowed to provide multiple answers to this question, and later all responses were coded. Thus, the N=134 represents the total number of valid responses.

3.3.3 Residential Customer Program Participation and Barriers Summary

Installation of energy efficiency features are commonly considered as part of remodeling projects (64 percent among recently remodeled homes, and 90 percent among homes with a future remodeling plan). About half of the households surveyed are aware of their utility offering energy efficiency programs, and 30 percent have participated in them in some way. Low income households were found to have a significantly higher participation rate—they are twice as likely to report participating in such programs (one likely reason for this higher participation could be the fact that these households qualify to receive rebates of 100%). Among participants, satisfaction with their utilities' programs seems extremely high. The most frequently cited reasons for nonparticipation were there were no recent purchase of energy-using household items, and unawareness of program resources. It is possible the former reason may be triggered by the latter reason—that is, they have not made a recent purchase of efficient products because they are not informed of available programs.

Awareness of the ENERGY STAR® logo also seems fairly high (82 percent), especially among non-low income households. Reducing the monthly energy bill, in particular, appears to be an important driving factor when making decisions of energy efficient product purchases. Other factors such as increased comfort, protection of the environment, increased home value, and receiving rebates are also highly appealing in making decisions on such purchases. The single biggest barrier for households in investing in energy efficient measures is their concern and uncertainty of payback and initial higher costs.

3.3.4 Commercial and Industrial Customer Attitudes

This section summarizes commercial and industrial customer attitudes on energy efficiency practices and programs. The results are based upon phone surveys of small commercial and industrial customers in addition to site surveys and discussions with larger commercial and industrial customers. Large customers are defined as properties using over 300,000 kWh's of energy per year. The surveys were utilized to obtain information on past purchases and practices, awareness of efficiency programs and equipment, and overall attitudes toward energy efficiency.

3.3.5 Commercial and Industrial Customer Respondent Characteristics

The analyses began with an examination of characteristics of commercial and industrial respondents, followed by question-by-question analysis. Ownership characteristics of respondents and the primary business activities were recorded to determine the distribution of respondents among the four electric utility providers. A summary for both small commercial and industrial customers and large commercial and industrial customers is provided in Table 36 below.

Table 36. Respondent Characteristics Summary

		Warehouse	Retail	Grocery	Office	Lodging	Health	Education	Industrial	Restaurant	Other	**Total**
Small Commercial and Industrial Respondents												
NATIONAL GRID	N	0	6	3	10	0	5	2	2	2	5	35
	Column %	.0%	26.1%	23.1%	17.9%	.0%	35.7%	40.0%	8.7%	20.0%	10.9%	17.5%
NH ELEC COOP	N	1	2	2	10	5	0	0	3	1	11	35
	Column %	25.0%	8.7%	15.4%	17.9%	83.3%	.0%	.0%	13.0%	10.0%	23.9%	17.5%
PSNH	N	3	8	6	26	1	4	3	12	6	26	95
	Column %	75.0%	34.8%	46.2%	46.4%	16.7%	28.6%	60.0%	52.2%	60.0%	56.5%	47.5%
UNITIL	N	0	7	2	10	0	5	0	6	1	4	35
	Column %	.0%	30.4%	15.4%	17.9%	.0%	35.7%	.0%	26.1%	10.0%	8.7%	17.5%
Total	N	4	23	13	56	6	14	5	23	10	46	200
	Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Large Commercial and Industrial Respondents												
NATIONAL GRID	N	0	0	0	3	1	2	0	10	0	2	18
	Column %	.0%	.0%	.0%	14.3%	7.7%	16.7%	.0%	11.1%	.0%	9.1%	9.1%
NH ELEC COOP	N	1	2	0	0	3	0	1	2	2	1	12
	Column %	20.0%	28.6%	.0%	.0%	23.1%	.0%	6.3%	2.2%	50.0%	4.5%	6.1%
PSNH	N	4	5	7	15	8	9	15	73	2	16	154
	Column %	80.0%	71.4%	100.0%	71.4%	61.5%	75.0%	93.8%	81.1%	50.0%	72.7%	78.2%
UNITIL	N	0	0	0	3	1	1	0	5	0	3	13
	Column %	.0%	.0%	.0%	14.3%	7.7%	8.3%	.0%	5.6%	.0%	13.6%	6.6%
Total	N	5	7	7	21	13	12	16	90	4	22	197
	Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

3.3.6 Commercial and Industrial Customer Program Awareness and Participation

Respondents were polled to determine customer awareness and participation in the existing energy efficiency and incentive programs offered by the utility providers. Program awareness was significantly higher among the large commercial and industrial customers (86 percent) compared to small commercial and industrial customers (60 percent). Past participation in efficiency and incentive programs was also notably higher among large customers (85 percent) compared to small customers (30 percent). Differences in awareness and participation levels among utility providers were not statistically significant. Results of small and large customer surveys are summarized below in Table 37.

Table 37. Awareness of Existing Energy Efficiency Programs and Incentives

		Warehouse	Retail	Grocery	Office	Lodging	Health	Education	Industrial	Restaurant	Other	**Total**
Small Commercial and Industrial Respondents												
YES, AWARE	N	4	13	7	33	4	7	4	14	2	27	115
	Column %	100.0%	56.5%	53.8%	62.3%	66.7%	53.8%	80.0%	63.6%	20.0%	61.4%	**59.6%**
NO, NOT AWARE	N	0	10	6	20	2	6	1	8	8	17	78
	Column %	.0%	43.5%	46.2%	37.7%	33.3%	46.2%	20.0%	36.4%	80.0%	38.6%	40.4%
TOTAL	N	4	23	13	53	6	13	5	22	10	44	193
	Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Large Commercial and Industrial Respondents												
YES, AWARE	N	3	2	6	18	11	10	13	77	1	21	162
	Column %	60.0%	40.0%	85.7%	90.0%	84.6%	90.9%	92.9%	87.5%	25.0%	95.5%	**85.7%**
NO, NOT AWARE	N	2	3	1	2	2	1	1	11	3	1	27
	Column %	40.0%	60.0%	14.3%	10.0%	15.4%	9.1%	7.1%	12.5%	75.0%	4.5%	14.3%
TOTAL	N	5	5	7	20	13	11	14	88	4	22	189
	Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Respondents who indicated that they were aware of the existing efficiency and incentive programs offered by their utility providers were then asked whether they had participated in the programs. As summarized in Table 38 below, a substantial difference in participation levels was noted between small (30 percent) and large (86 percent) commercial and industrial respondents.

Table 38. Participation in Utility's Energy Efficiency Programs

		Warehouse	Retail	Grocery	Office	Lodging	Health	Education	Industrial	Restaurant	Other	**Total**
Small Commercial and Industrial Respondents												
YES	N	2	2	2	6	2	2	3	3	2	8	32
	Column %	50.0%	16.7%	28.6%	20.7%	66.7%	33.3%	75.0%	21.4%	100.0%	30.8%	**29.9%**
NO	N	2	10	5	23	1	4	1	11	0	18	75
	Column %	50.0%	83.3%	71.4%	79.3%	33.3%	66.7%	25.0%	78.6%	.0%	69.2%	70.1%
TOTAL	N	4	12	7	29	3	6	4	14	2	26	107
	Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Large Commercial and Industrial Respondents												
YES	N	3	1	2	14	8	8	13	66	1	12	128
	Column %	100.0%	100.0%	100.0%	82.4%	80.0%	88.9%	100.0%	88.0%	100.0%	66.7%	**85.9%**
NO	N	0	0	0	3	2	1	0	9	0	6	21
	Column %	.0%	.0%	.0%	17.6%	20.0%	11.1%	.0%	12.0%	.0%	33.3%	14.1%
TOTAL	N	3	1	2	17	10	9	13	75	1	18	149
	Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: This question was only asked of respondents who were aware of their utilities' energy efficiency programs

Small commercial and industrial respondents who indicated that they had not participated in the energy efficiency programs were asked additional questions regarding their nonparticipation. The most frequently given response for nonparticipation among small customers was they "have not purchased energy-using equipment" (49 percent). The next three most frequently cited reasons seem to relate to their lack of awareness of the programs. Of respondents who have participated in their utility's energy efficiency programs, a significant majority of both small customers (94 percent) and large customers (98 percent) reported that they would participate in the programs again if given the opportunity.

3.3.7 Commercial and Industrial Customer Motivations and Barriers

To first assess customer attitudes towards energy efficiency, respondents were asked to qualify the amount of attention they spend on controlling energy costs through general efficiency practices such as adjusting room temperatures when not occupied and shutting off computers and lights at night. As shown in Table 39, 86 percent of respondents indicated that they pay at least "some attention" to controlling energy costs. No significant differences were observed among any groups or between small and large customers.

Table 39. Attention Paid to Controlling Company Energy Costs – Small/Large Respondents Combined

	Frequency	Valid Percent
Substantial attention to these matters	165	43%
Some attention	163	43%
Very little attention	37	10%
No attention	13	3%
Don't know	4	1%
Total	382	100%

Respondents were then asked to rate the likelihood of purchasing energy efficient equipment instead of standard equipment given several conditions generally assumed to increase the attractiveness of adopting energy efficient equipment. Respondents were told to assume that the energy efficient cost between 20 and 30 percent more than standard models. Among all respondents, reduction of monthly energy bills and receiving a rebate were the reasons most likely to encourage the purchase of energy efficient equipment. Increasing occupant comfort, environmental protection and improving business image were less likely to motivate respondents to specify energy efficient equipment in both small and large customers. A complete summary of results across all building types is provided in Table 40 below.

Table 40. Likelihood of Purchasing Energy Efficient Equipment

		1=NOT AT ALL LIKELY	2	3	4	5= EXTREMELY LIKELY	TOTAL
Small Commercial and Industrial Respondents							
a… your monthly energy bill would be less	N	12	2	16	39	129	198
	Row %	**6%**	**1%**	**8%**	**20%**	**65%**	100%
b… it increased occupant comfort	N	19	5	38	40	97	199
	Row %	**10%**	**3%**	**19%**	**20%**	**49%**	100%
c… you felt you were helping to protect the environment	N	14	3	35	41	104	197
	Row %	**7%**	**2%**	**18%**	**21%**	**53%**	100%
d… it improved business image or value	N	21	4	29	49	94	197
	Row %	**11%**	**2%**	**15%**	**25%**	**48%**	100%
e… you received a rebate	N	17	2	20	31	128	198
	Row %	**9%**	**1%**	**10%**	**16%**	**65%**	100%
f… your sales person recommended it	N	23	11	44	41	75	194
	Row %	**12%**	**6%**	**23%**	**21%**	**39%**	100%
Large Commercial and Industrial Respondents							
a… your monthly energy bill would be less	N	4	9	25	49	94	181
	Row %	**2.2%**	**5.0%**	**13.8%**	**27.1%**	**51.9%**	100.0%
b… it increased occupant comfort	N	8	30	45	47	50	180
	Row %	**4.4%**	**16.7%**	**25.0%**	**26.1%**	**27.8%**	100.0%
c… you felt you were helping to protect the environment	N	5	21	45	48	63	182
	Row %	**2.7%**	**11.5%**	**24.7%**	**26.4%**	**34.6%**	100.0%
d… it improved business image or value	N	8	24	29	48	69	178
	Row %	**4.5%**	**13.5%**	**16.3%**	**27.0%**	**38.8%**	100.0%
e… you received a rebate	N	2	7	21	49	102	181
	Row %	**1.1%**	**3.9%**	**11.6%**	**27.1%**	**56.4%**	100.0%
f… your sales person recommended it	N	14	19	50	54	42	179
	Row %	**7.8%**	**10.6%**	**27.9%**	**30.2%**	**23.5%**	100.0%

Respondents were asked to identify the primary reasons why they would not purchase energy efficient equipment or make energy efficient improvements to the space. Table 41 provides a coded summary of the open-ended responses. By far the most frequent response was concerns over the cost of the equipment and the payback (69 percent). Other responses included satisfaction with current equipment (6 percent), purchasing decisions made at corporate level (5 percent), tenants unwilling to invest in capital improvements for spaces they do not own (4 percent), and no need to replace equipment that is currently in working order (3 percent). Other reasons cited included the use of specialized equipment and the belief that energy efficient equipment would be not available for the specialized process (3 percent), and the quality and reliability of energy efficient equipment (3 percent).

Table 41. Primary Reasons for Not Purchasing Equipment/Making Improvements – Small/Large

	Frequency	Valid Percent
Cost / benefit, payback	225	69%
Current equipment is satisfactory/no need	20	6%
Corporate decision	16	5%
Renting, not owner of property	13	4%
Replacing as needed	8	3%
Not compatible with business needs	10	3%
Quality	9	3%
Not well informed	4	1%
Other	21	6%
Total	326	100%

3.3.8 Commercial and Industrial Customer Program Participation and Barriers Summary

Of the small and large commercial and industrial customers surveyed, 86 percent of respondents reported some or high level of attention to controlling energy costs. Overall awareness of energy efficiency programs and incentives offered by utility providers was significantly higher in the large commercial/industrial respondents (86 percent) compared to the small commercial/industrial respondents (60 percent). Past participation in utility provider offered programs was similarly higher in the large customer group who was aware of the programs offered (86 percent) compared to the small customer group aware of the programs offered (30 percent). Of respondents who have participated in their utility's energy efficiency programs, a significant majority of both small customers (94 percent) and large customers (98 percent) reported that they would participate in the programs again if given the opportunity.

The single largest barrier to respondents investing in energy efficiency measures was concern about initial premium costs of equipment and insufficient payback (69 percent). Respondents indicated that the two most important factors influencing decisions to invest in energy efficient equipment are expectations of lower monthly energy bills and rebates or incentives for purchasing energy efficient equipment that would help offset some of the initial costs. Other factors such as business image, environmental impact, occupant comfort, and sales person recommendation were less likely to influence decisions to invest in energy efficient equipment.

3.4 Forecast Model of State Electricity and Natural Gas Consumption and Peak Demand

Results from this task were presented in Section 2.3 above. As noted previously these forecast models were compiled by RLW for this project based on sales information provided to the GDS Team directly by the project's four participating electric utilities and two participating natural gas distribution companies. Separate total and customer sector-specific energy (MWH), demand (MW) and fuel (MMBTu) forecasts were developed for the state as a whole and by utility service territory. Where applicable, these forecasts were compared against relevant ISO-NE and EIA data to assess reasonableness. Please refer to Figure 10, Figure 11, Figure 12, Figure 13, Figure 14, and Figure 15, presented in Section 2.3 of this report for a summary of these model forecast results.

As will be discussed in more detail in the additional energy efficiency potential modeling methodology section below, these customer-sector electric and gas forecast models served as critical inputs used to estimate the percent potential values for additional energy efficiency opportunities statewide. They were also used to develop energy efficiency potential percentages at the utility-specific territory level.

3.5 Estimates of 10-Year Technical, Maximum Achievable, Maximum Achievable Cost Effective Potentials and Potentially Obtainable Scenario

A main objective of this study was to estimate, state-wide and for each of the four New Hampshire retail electricity providers and two natural gas distribution companies, the technical, maximum achievable, maximum achievable cost effective potentials, and savings from a potentially obtainable scenario for electricity, natural gas, and related propane and fuel oil savings over the next 10 year period, and the budgets (where appropriate) required to achieve that potential. As described in more detail below, the activities undertaken to develop these estimates were based on the GDS Team's existing sector-level models, DR 96-150 cost-effectiveness criteria, and the region's current avoided energy cost projections, as expanded to reflect the increased list of measures to be assessed and customized based on state utility-specific data and the saturation and penetration survey results obtained through this project's survey and site visit activities. All results have been analyzed and compared for reasonableness against overall state consumption and consideration of past participation.

This section of the report presents an overview of the approach and methodology that was used to ultimately determine the various savings potentials additional energy efficiency opportunities in New Hampshire.

3.5.1 Energy Efficiency Potential – Key Data Sources

Data required for performing the energy efficiency potential analysis elements of this study can be grouped into three major categories:

- Measure-specific data including: energy savings (kWh, kW, MMBTu), measure costs (full/incremental), measure lives (full/effective and persistence), etc.

- New Hampshire customer-specific historical, current and forecasted data including: number and types of customers (residential, low income, single/multi-family, commercial, industrial), customer sales by customer class and end use (space heating, space cooling, water heating, lighting, etc.), customer types (SIC/NAICS), average size (square footage of typical single, multi-family homes and commercial/industrial buildings), typical energy use intensity broken down by end use (lighting, cooling, water heating, process), saturation of electric water heating, central cooling, other energy efficiency measures and appliances (and associated appliance saturation trends), and peak load coincidence factors for major electric end-uses by sector.

- New Hampshire statewide and utility-specific and other system-related data including: forecast of electric and natural gas avoided costs (generation, transmission, distribution), electric line losses, reserve margin planning assumption, general rate of inflation and appropriate discount rate, and information on environmental benefits that may occur per kWh or MMBTu saved from energy efficiency programs. Values and sources for these data are provided in Appendix H.

3.5.2 Energy Efficiency Potential Calculation Stages

Three key calculations that have been undertaken to complete this assessment are described below. Following the descriptions, these three stages of potential energy savings calculation are shown graphically in a Venn diagram in Figure 16.[34] A fourth stage, developed for this project, relates to calculation of the likely obtainable potential (a subset of the maximum achievable cost effective potential), and is described separately at the end of this section. Savings interactions for measures like lighting and lighting controls are taken into account at every potential stage listed below.

The first stage in determining energy efficiency potential requires estimation of the technical potential for energy savings in New Hampshire. **Technical potential** is defined as the complete penetration of all measures analyzed in applications where they are deemed to be technically feasible from an engineering perspective. The technical potential for electric energy efficiency for this study was developed from estimates of the technical potential of individual energy efficiency measures applicable to each sector and for relevant end-uses within each sector (residential, commercial, industrial, energy efficient space heating, energy efficient water heating, etc.). For each energy efficiency measure, GDS calculated the electricity savings that could be captured if 100 percent of inefficient electric appliances and equipment were replaced instantaneously (where they are deemed to be technically feasible). Separate technical potentials were calculated for natural gas and related propane and oil saving measures, also by sector and end-use.

The second stage relates to calculation of the maximum achievable energy efficiency potential. **Maximum Achievable potential** is defined as the maximum penetration of an efficient measure that would be adopted absent consideration of cost or customer behavior. The term "achievable" refers to efficiency measure penetration, based on estimates of New Hampshire-specific building stock, energy efficient equipment saturations and realistic penetration levels that can be achieved by 2018 if all remaining standard efficiency equipment were to be replaced on burnout (at the end of its useful measure life) and where all new construction and major renovation activities in the state were done using energy efficient equipment and construction/installation practices. Under this scenario, energy efficient measures with measure lives over ten (10) years would have their potential savings calculated based on the study life divided by measure life ((Study Life = 10) / Measure Life).

In certain circumstances, where early replacement of specific measures is becoming standard practice, maximum achievable potential includes the retrofit of measures before the end of their useful measure life (i.e., T8 lighting, insulation and weatherization of existing homes). In such cases, the entire stock of measures to be retrofitted were modeled so that all were replaced over the ten year study period.

Calculation of the Maximum Achievable Cost Effective (M.A.C.E) potential is the third stage. **Maximum Achievable Cost Effective potential** is defined as the potential for the realistic penetration of energy efficient measures that are cost effective according to the Total Resource Cost (TRC) Test, and would be adopted given aggressive funding levels, and was determined absent consideration of customer behavior. A concerted, sustained campaign involving highly aggressive programs and market interventions would be required to achieve this level of savings.

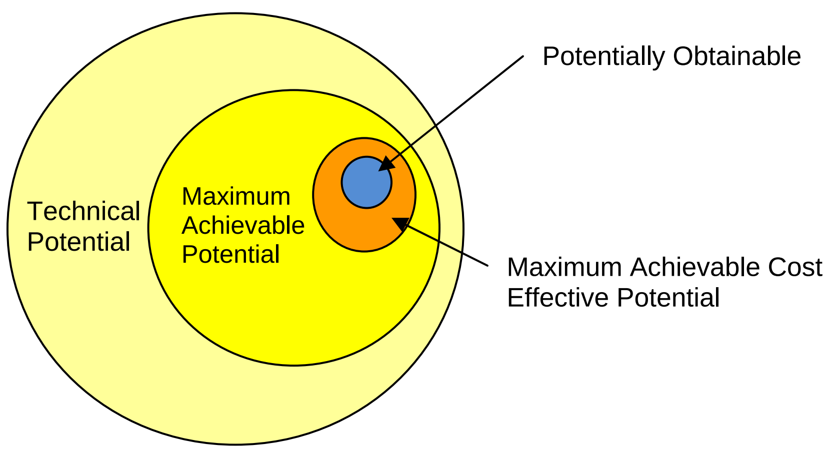
To develop the maximum achievable cost effective potential, GDS retains only those electric and non-electric energy efficiency measures in the analysis that were found to be cost effective (according to the TRC) based on individual measure cost effective analyses conducted in this study. Energy efficiency measures that are not cost effective were excluded from the estimate of maximum achievable cost effective energy efficiency potential.

Potentially Obtainable scenario is a new output developed for this study and can be defined as an estimate of the potential for the *realistic penetration over time* of energy efficient measures that are cost effective according to the NH TRC, and would be adopted after consideration of customer behavior and given aggressive funding levels, and by determining the level of market penetration that can be achieved with a concerted, sustained campaign involving highly aggressive programs and market interventions. As demonstrated later in this report, the State of New Hampshire and its electric and natural gas utilities would need to continue to undertake, and perhaps aggressively expand its efforts to achieve these levels of savings.

Based on information collected through this project's telephone surveys and site visits, a Potentially Obtainable scenario was developed for each customer sector by electric and non-electric fuel types.

Figure 16 below shows the four stages of electric energy savings potential (this Venn diagram figure is for illustrative purposes only and does not reflect actual data for New Hampshire).

Figure 16. Venn Diagram of the Stages of Energy Savings Potential



3.5.3 General Methodological Approach

The GDS Team's analytical approach began with a careful assessment of the existing saturation of energy using equipment and penetration of energy efficiency measures that has already been achieved in New Hampshire. As discussed earlier in this section, this was accomplished through a combination of primary data collection and identification, review and documentation of secondary data sources. For each energy efficiency measure, this analysis assessed how much energy efficiency has already been accomplished as well as the remaining potential for energy efficiency savings. For example, if 100 percent of the homes in New Hampshire had electric lighting, and 30 percent of light sockets were already using high efficiency compact fluorescent bulbs (CFLs), then the remaining potential for energy efficiency savings is the 70 percent of light sockets in the residential sector that are not already using high efficiency fluorescent bulbs.

The general methodology used for estimating the potential for energy efficiency in the residential, commercial and industrial sectors in New Hampshire included the following steps:

1. Identification of energy efficiency measures to be included in the assessment.
2. Identification of data sources for determining costs and savings for all electric and non-electric energy efficiency measures.
3. Determination of the characteristics of each energy efficiency measure including its incremental or total cost, electric energy consumption and savings, demand and MMBTu savings, current saturation, the percent of installations that are already energy efficient, and the useful life of the measure (with care taken to document the sources for each characteristic and to recognize potential difference in values by sector, building type and/or time of installation – i.e., new construction, existing buildings, replace on burnout, retrofit). In addition, the determination of any technical limitations or barriers that may be present when attempting to install an energy efficient measure is also considered.
4. Calculation of cost-effectiveness screening metrics (e.g., the Total Resource Cost Test benefit cost ratio) and sorting of measures from least-cost to highest cost per kWh (or MMBTu) saved. Interactions between measures were not considered for determining measure specific benefit cost ratios.
5. Collection and analysis (where data was available) of the baseline and forecasted characteristics of the electric and non-electric end use markets, including equipment saturation levels and consumption, by market segment and end use over the forecast period.
6. Integration of measure characteristics and baseline data to produce estimates of cumulative costs and savings across all measures.
7. Determination of the cumulative technical and maximum achievable potentials using supply curves, by sector (separately for electric and non-electric measures).
8. Determination of the achievable cost effective potential for electric and non-electric energy savings over the forecast period.
9. Estimation of the likely obtainable potential for electric and non-electric energy savings over the forecast period.

A key element in this approach is the use of energy efficiency supply curves. The advantage of using an energy efficiency supply curve is that it provides a clear, easy-to-understand framework for summarizing a variety of complex information about energy efficiency technologies, their costs, and the potential for energy savings. Properly constructed, an energy-efficiency supply curve avoids the double counting of energy savings across measures by accounting for interactions between measures. The supply curve also provides a simplified framework to compare the costs of energy efficiency measures with the costs of energy supply resources.

The supply curve is typically built up across individual measures that are applied to specific base-case practices or technologies by market segment. Measures are sorted on a least-cost basis and total savings are calculated incrementally with respect to measures that precede them. Supply curves typically, but not always, end up reflecting diminishing returns, i.e., costs increase rapidly and savings decrease significantly at the end of the curve. There are a number of other advantages and limitations of energy-efficiency supply curves (see, for example, Rufo 2003).[35]

[35] Rufo, Michael, 2003. *Attachment V – Developing Greenhouse Mitigation Supply Curves for In-State Sources, Climate Change Research Development and Demonstration Plan,* prepared for the California Energy Commission, Public Interest Energy Research Program, P500-03-025FAV, April. http://www.energy.ca.gov/pier/reports/500-03-025fs.html

3.5.4 Energy Efficiency Potential Calculations - Core Equations

This section describes the calculations used to estimate the energy efficiency potential in the residential, commercial, and industrial sectors. There is a core equation, shown below, used to estimate the technical potential for each individual efficiency measure and it is essentially the same for each sector. However, for the residential sector, the equation is applied using a "bottom-up" approach where the equation inputs are displayed in terms of the number of homes or the number of high efficiency units (e.g., compact fluorescent light bulbs, high efficiency air conditioning systems, programmable thermostats, etc.). For the commercial and industrial (C&I) sectors, a "top-down" approach was used for developing the technical potential estimates. In this case, the data is displayed in terms of energy rather than number of units or square feet of floor area.[36] For the commercial and industrial sectors, GDS used New Hampshire-specific equipment saturation and end use data wherever such data was available. The core equations used by GDS are very similar to the equations used in prior energy efficiency potential studies.

3.5.4.1 Core Equations for Estimating Technical Potential

The core equation used to calculate the energy efficiency technical potential for each individual efficiency measure for the residential sector is shown below. Section 4 provides more details on how this core equation was applied within the residential sector's bottom-up modeling approach.

$$\text{Technical Potential of Efficient Measure} = \text{Total Number of Residential Households} \times \text{Base Case Equipment End Use Intensity (annual kWh use per home)} \times \text{Base Case Factor} \times \text{Remaining Factor} \times \text{Convertible Factor} \times \text{Savings Factor}$$

where:

- **Number of Households** is the number of residential customers in the market segment.
- **Base-case equipment end use intensity** is the energy used per customer per year by each base-case technology in each market segment. This is the consumption of the energy using equipment that the efficient technology replaces or affects. For example purposes only, if the efficient measure were a high efficiency light bulb (CFL), the base end use intensity would be the annual kWh use per bulb per socket associated with an incandescent light bulb that provides equivalent lumens to the CFL.
- **Base Case factor** is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for residential lighting, this would be the fraction of all residential electric customers that have electric lighting in their household.
- **Remaining factor** is the fraction of applicable dwelling units or lighting sockets that have not yet been converted to the energy efficiency measure; that is, one minus the fraction of households that already have the energy-efficiency measure installed.

[36] It is important to note that square-foot based saturation assumptions cannot be applied to energy use values without taking into account differences in energy intensity (e.g., an area covered by a unit heater may represent two percent of floor space but a larger percent of space heating energy in the building because it is likely to be less efficient than the main heating plant).

- **Convertible factor** is the fraction of the applicable dwelling units that is technically feasible for conversion to the efficient technology from an *engineering* perspective (e.g., it may not be possible to install CFLs in all light sockets in a home because the CFLs may not fit in every socket in a home).

- **Savings factor** is the percentage reduction in energy consumption resulting from application of the efficient technology.

The core equation used to calculate the electric energy efficiency technical potential for each individual efficiency measure for the commercial and industrial sectors is shown below. More information is presented in Sections 5 and 6 regarding how this core equation was applied within the commercial and industrial sectors using the top-down modeling approach.

$$\text{Technical Potential of Efficient Measure} = \text{Total End Use kWh Sales by Building or Industry Type} \times \text{Base Case Factor} \times \text{Remaining Factor} \times \text{Convertible Factor} \times \text{Savings Factor}$$

where:

- **Total end use kWh or MMBTu sales (by segment)** is the forecasted level of electric or natural gas sales for a given end-use (e.g., space heating) in a commercial or industrial market segment (e.g., office buildings).

- **Base Case factor** is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

- **Remaining factor** is the fraction of applicable kWh sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.
- **Convertible factor** is the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an *engineering* perspective (e.g., it may not be possible to install VFDs on all motors in a given market segment).

- **Savings factor** is the percentage reduction in energy consumption resulting from application of the efficient technology over the base technology.

Technical electric and non-electric energy efficiency savings potential was calculated in two steps. In the first step, all measures are treated *independently*; that is, the savings of each measure are not reduced or otherwise adjusted for overlap between competing or synergistic measures. By treating measures independently, their relative economics are analyzed without making assumptions about the order or combinations in which they might be implemented in customer buildings. However, the total technical potential across measures cannot be estimated by summing the individual measure potentials directly because some savings would be double-counted. For example, the savings from a weatherization measure, such as low-e ENERGY STAR® windows, are partially dependent on other measures that affect the efficiency of the system being used to cool or heat the building, such as high-efficiency space heating equipment or high efficiency air conditioning systems; the more efficient the space heating equipment or electric air conditioner, the less energy can be saved from the installation of low-e ENERGY STAR windows.

For the residential and commercial sectors, GDS addressed the new construction market as a separate market segment, with measures targeted specifically at the new construction market. In the residential new construction market segment, for example, detailed energy savings estimates for the ENERGY STAR Homes program were used as a basis for determining energy savings for this market segment in New Hampshire. For the commercial sector, in addition to end-use specific measures applicable to new construction projects, integrated design measures (e.g., for building shell, lighting design, etc.) were assessed. Within the new construction market segment for the commercial sector, an assumption was built into the model that ½ the commercial new construction sales were attributed to new construction projects, while the other half was directly attributable to growth of the existing commercial market segment. In the case of the industrial sector, the model functions very similarly but uses an all-inclusive factor which incorporates the four (4) factors discussed above into one multiplier to achieve the same approximate end result as the individual factor approach.

3.5.5 Rates of Implementation for Energy Efficiency Measures

For new construction, energy efficiency measures can be implemented when each new home or building is constructed, thus the rate of availability is a direct function of the rate of new construction. For existing buildings, determining the annual rate of availability of savings is more complex. Energy efficiency potential in the existing stock of buildings can be captured over time through two principal processes:

1. as equipment replacements are made normally in the market when a piece of equipment is at the end of its useful life (we refer to this as the “market-driven” or “replace-on-burnout” case); and,

2. at any time in the life of the equipment or building (which we refer to as the “retrofit” case).

Market-driven measures are generally characterized by incremental measure costs and savings (e.g., the incremental costs and savings of a high-efficiency versus a standard efficiency air conditioner); whereas retrofit measures are generally characterized by full costs and savings (e.g., the full costs and savings associated with retrofitting ceiling insulation into an existing attic). A specialized retrofit case is often referred to as “early replacement” or “early retirement”. This refers to a piece of equipment whose replacement is accelerated by several years, as compared to the market-driven assumption, for the purpose of capturing energy savings earlier than they would otherwise occur.

For the market driven measures, existing equipment is assumed to be replaced with high efficiency equipment at the time a consumer is shopping for a new appliance or other energy using equipment, or if the consumer is in the process of building or remodeling. Using this assumption, equipment that needs to be replaced (replaced on burnout) in a given year is eligible to be upgraded to high efficiency equipment. For the retrofit measures, savings can theoretically be captured at any time; however, in practice it takes many years to retrofit an entire stock of buildings, even with the most aggressive of efficiency programs.

As noted above, a special retrofit case is “early retirement” of energy equipment that is still functioning well, and replacing such equipment with high efficiency equipment. For this project, early retirements were considered only for a small number of measures (e.g., insulation/weatherization). For these early retirement energy efficiency measures, GDS assumed the same measure life for the measure that was replaced early as a time of replacement measure. In addition, savings were based on the whole measure life for retrofit / early replacement type measures.

3.5.6 Benefit/Cost (Cost-Effectiveness) Modeling

To determine maximum achievable cost effective potential GDS has used its existing energy efficiency measure and program screening tool. The GDS screening tool is user friendly, well documented, and provides the following benefit/cost ratio calculations: Total Resource Cost Test, Utility Cost Test, Participant Test, Rate Impact Measure Test, and Societal Test. For this Report, only the Total Resource Cost Test was used for screening purposes (consistent with New Hampshire utility and Commission procedures). The annual discount rate assumed for this test to determine net present values (NPV) is 5.0%.

The model is comprehensive and uses the following types of data as input: costs, useful lives and energy savings of energy efficiency, load management or demand response measures, load shape impacts of electric or natural gas energy efficiency measures, avoided costs of electricity for generation, transmission and distribution, avoided costs of natural gas and other fuels (propane, fuel oil, etc.), avoided water costs, projected or actual measure or program penetration assuming no program, projected or actual measure or program penetration with a program, participant costs, energy efficiency organization or utility costs (including rebates or financial incentives), non-energy benefits of measures or programs, electric line losses, discount rate, and inflation rate.

As noted above, the model provides calculations of five benefit/cost ratios as well as year-by-year and cumulative energy savings, dollar costs and dollar benefits. The GDS screening tool provides the flexibility to vary assumptions in the analysis to reflect uncertainty, changing market circumstance, statutory change or other factors that influence assessment of reasonably available potential through the efficiency utility. The GDS measure and program screening tool allows for the incorporation of changes to reflect real world circumstances and a dynamic environment. The GDS tool exists in a single Microsoft Excel file, and includes several linked worksheets that present clearly documented inputs and outputs. More information on the model and key input assumptions being used for this report is included in Appendix H.

3.6 Assessment of Past and Current Program Capture and Recommendations

For this task, the GDS Team evaluated the penetration of energy efficiency savings (electric and natural gas) resulting from past and current utility-sponsored program activities. A review of the utilities' annual Core New Hampshire Program Highlights reports formed the basis for this evaluation and results are presented from both a cumulative savings as a percent of sales and number of customers served as a percent of population basis. Recommendations for potential modifications to program and measure offerings that could increase the likelihood of achieving identified potentials are made and have been developed mainly through information on barriers collected directly from New Hampshire utility customers (through this project's telephone surveys and site visits) and supplemented by the GDS Team's experience with looking at programs from a logic-modeling perspective, and extensive knowledge of other local, regional and national programs and best practices.[37] Results from these analysis and assessments are presented in Section 8 of this report.

[37] Assessments based on a logic-modeling perspective recognize current program resources (dollars, staffing, etc.) and activities (measure installations, promotional rebates/incentives, marketing/outreach, education/training, etc.)

Section 4: Residential Sector Energy Efficiency Potential

This section of the report presents the estimates of electric and non-electric technical (best), technical (traditional), maximum achievable, maximum achievable cost effective, and potentially obtainable energy efficiency potential for the existing and new construction market segments of the residential sector in New Hampshire. More information regarding how these potentials were derived is also presented.

According to this analysis, there is still a large remaining potential for electric and non-electric energy efficiency savings in the residential sector. Table 42 and Table 43 below summarize the savings by potential type by the year 2018 for residential electric and non-electric measures respectively. The estimated total costs to achieve each level of savings by 2018 are also presented in these tables. In addition, Table 42 presents peak demand savings for each potential level of savings associated with the electric energy efficiency measures.

Table 42. Summary of Residential Electric Energy Efficiency Savings Potential

	Estimated Cumulative Annual Savings by 2018 (MWh)	Savings in 2018 as a Percent of Total 2018 Residential Sector Electric Energy Consumption	Estimated Summer MW*	Estimated Total Cost to Achieve (Cummulative)	Estimated Total Cost to Achieve (Annual)
Technical Potential (Best Only)	1,770,861	31.7%	66.7	$ 2,554,517,348	$ 255,451,735
Technical Potential (Good, Better, Best)	1,489,861	26.7%	56.1	$ 2,149,167,880	$ 214,916,788
Max Achievable Potential	1,217,145	21.8%	45.9	$ 1,214,926,125	$ 121,492,613
Max Achievable Cost Effective Potential	1,170,398	20.9%	44.1	$ 632,287,942	$ 63,228,794
Potentially Obtainable	698,069	12.5%	26.3	$ 383,050,068	$ 38,305,007

33% * Estimated Summer Load Factor

Table 43. Summary of Residential Non-Electric Energy Efficiency Savings Potential

	Estimated Cumulative Annual Savings by 2018 (MMBTU)	Savings in 2018 as a Percent of Total 2018 Residential Sector Other Fuels Energy Consumption	Estimated Total Cost to Achieve (Cummulative)	Estimated Total Cost to Achieve (Annual)
Technical Potential (Best Only)	16,918,392	50.4%	$ 3,220,297,934	$ 322,029,793
Technical Potential (Good/Better/Best)	12,099,639	35.7%	$ 2,277,404,262	$ 227,740,426
Max Achievable Potential	7,463,743	22.0%	$ 1,206,916,417	$ 120,691,642
Max Achievable Cost Effective Potential	6,313,954	18.6%	$ 456,169,489	$ 45,616,949
Potentially Obtainable	3,633,554	10.7%	$ 200,483,725	$ 20,048,372

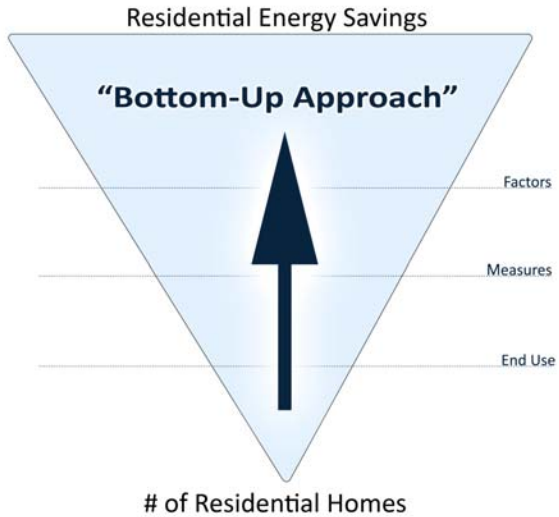
On the electric side, the maximum achievable cost effective potential in the residential sector is over 1.1 million MWh, approximately 21 percent of the New Hampshire residential sector sales forecast in 2018. With regard to non-electric end uses, the maximum achievable cost effective potential in the residential sector is more than 6.3 million MMBTu, just under 19 percent of New Hampshire's residential sector fossil fuel (natural gas, oil and propane) sales forecast in 2018. The lists of measures that make up the savings for each of these levels are shown in Table 44 and Table 45 in Section 4.2.1 below.

and seek to identify their causal links to anticipated outputs (measures installed, in-program energy and capacity savings, # of customers served, market actors trained, etc.), short-, intermediate- and long-term outcomes (changes in awareness and behavior, market-wide/sustainable energy, economic and environmental benefits, etc.). In addition, logic models recognize the existence and potential impacts of external influences (price of energy, state of the local and regional economy, federal tax incentives, other non-program sponsored activities, etc.).

4.1 Residential Sector Savings Methodology Overview

The residential sector analysis was modeled using what is considered a "bottom-up approach". This methodology, shown visually in Figure 17 below:

Figure 17. Residential Sector Savings Methodology – Bottom Up Approach



As shown in this figure, the methodology started at the bottom based on the number of residential customers (splitting them into single-family and multi-family customers as well as existing vs. new construction). From that point, each home was then broken into a series of end-uses depending on whether the home fits the single-family or multi-family profile. An example of an end-use might be "Single-Family Water Heating". From that point, a series of measures are identified that belong to that end-use. To keep with our example, we would then create a series of measures such as "Energy Star Clothes Washer", "Energy Star Dishwasher", "Pipe-Wrap", etc – all these measures fit into that end use category of Single-Family Water Heating.

The next step in our bottom up approach was to determine how many of the homes in the profile we are looking at (single-family or multi-family) have each of those measures within each of those end uses. This is one of the multiple applicability factors that were used to screen each measure to determine savings. The applicability factors include the base case factor, the remaining factor, the convertible factor, and the savings factor. The full formula to determine savings at the measure level is shown below.

Technical Potential of Efficient Measure = Total Number of Residential Households x Base Case Equipment End Use Intensity (annual kWh use per home) x Base Case Factor x Remaining Factor x Convertible Factor x Savings Factor

The goal of the formula is to determine how many households this measure applies to (base case factor), then of that group, how many already have the efficient version of the measure we are installing (remaining factor). From there, we looked to make sure there were not any technical reasons why the measure cannot be installed, and if so, made a correction (convertible factor) for that reason. The last factor which needed to be applied was the savings factor, which is the percentage savings achieved from installing the efficient measure over a standard measure. In cases where multiple measures could interact within the same end use, a "more than one choice" factor was also included in the model to avoid double counting of potential savings. In addition, the model ranks measures by levelized cost in order to make assumptions about which measures will be installed in what order. This ranking also takes into account measure interactions where applicable so that savings are not over-stated due to double-counting. For example, if you install insulation and air seal, and then install a programmable thermostat, the savings potential for the thermostat is reduced to account for the reality that insulation has already been improved thus reducing the potential for higher levels of savings. This type of scenario is done throughout the residential model among a variety of scenarios within the models.

Another example to help illustrate the functionality of the model is single family homes with gas fired boilers. This measure would have space heating and space cooling measures installed in the following levelized cost order: programmable thermostats, energy efficient windows, and high efficiency boiler. The base use for space heating and space cooling would be adjusted based on savings from each measure. The full base use would have programmable thermostat savings applied. This new adjusted base use would then be used for the energy efficient window savings and finally the further adjusted base use would then be used for the high efficiency boiler savings.

One other example is single family homes with electric water heaters. In this case, the measure includes more than one choice for dishwasher upgrades and efficient electric water heaters upgrades. The electric water heating measures are in the following levelized cost order: low flow shower showerhead/faucets, Energy Star Dishwasher, efficient water heater, beyond Energy Star dishwasher, pipe wrap, high efficiency water heater, water heater blanket, Energy Star clothes washer, heat pump water heater, whole-house tankless water heater, and solar water heating. In this case the adjusted domestic hot water base use for calculated savings is more complicated. Where a second measure for the same use would be installed the base usage would not be reduced by the earlier measure. The most direct path for base usage reduction is the following: initial base usage is used for the low flow showerhead/faucets; then the Energy Star dishwasher reduces the domestic hot water base use by the percentage of this measure's electric savings that is associated with water heating; then the low flow and dishwasher reductions are used for the base usage for efficient water heater savings, then pipe wrap, then water heater blanket, then Energy Star Clothes Washer and finally solar water heating. In the case of high efficiency water heater- the base usage is decreased by low flow showerhead/faucets, Energy Star dishwasher water heating savings and pipe wrap before the high efficiency water heater savings are applied.

This type of process was run on every measure within all measure end-use categories and for all customer groups (single-family, multi-family, new construction, existing-construction – and blends thereof). This process, while described here at a very high level, was run within the confines of a complicated model under various scenarios to determine the varying savings potential levels.

In addition to the modeling technique described above, custom measures were included for the residential sector to achieve "Good, Better, Best" scenarios for weatherization (split further by each fuel type) and integrated building design (for each fuel type as well). All of these scenarios were reality-based through use of building simulation software to achieve targeted savings and cost levels for each distinct scenario level. This process required a mix of measures from lower cost and complexity to higher cost and complexity. The weatherization packages were designed to allow a degree of residential customers to follow a "good, better, or best" approach for insulating their existing home. For each of the weatherization approaches, a set of costs and savings assumptions were developed, as well as assumptions regarding current market penetration.

For the new home stock, a good, better, best approach was also created along with assumptions regarding the percentage of new home customers who would be likely to follow each approach. The assumption made was that 80% of new homes would do one of the three (3) packages, while the remaining 20% would not participate in efficiency programs or install efficiency measures. More information regarding the specific measures and associated costs included within each good, better, best scenario is presented in Appendix I.

The costs to achieve savings potential estimates within the residential sector are calculated on a measure by measure basis using the levelized cost ($/kWh in the electric model and $/MMBTu within the non-electric model) for each measure. These figures (levelized costs) represent the cost to save a unit of energy. These levelized costs are then taken and multiplied (again at the measure level) by the 2018 annual savings associated with the potential level being addressed (technical potential, maximum achievable, etc.). A net present value (NPV) formula is then used in conjunction with each measure's measure life along with an overall discount rate to determine the $ cost per /first year kWh (or MMBTu) saved for each measure. The cost per first year savings figure is then multiplied by the savings potential estimate being evaluated in order to yield the cost to achieve the savings potential in the year 2018 at the measure level. Each measure is then summed up at each potential level to yield the total cost to achieve savings in the residential sector (within the potential level being analyzed) to represent the cost to achieve the potential savings level by the year 2018. This number can then be divided by the study length (10 years) in order to yield an estimate of annual spending needed to reach the potential level target in question.

4.2 Residential Sector – Energy Efficiency Potential Results

Eighty-seven (87) residential electric, and one-hundred-ten (110) residential non-electric energy efficiency measures or programs were included in the analysis for the residential sector. In order to develop the list of energy efficiency measures to be examined, GDS worked closely with project sponsors and reviewed recent measure life, savings and cost assumptions studies including a Measure Life Report prepared by GDS for the New England State Program Working Group in June 2007 and a GasNetworks measures assumptions update project completed by GDS during the summer 2008. In addition, GDS reviewed other related electric and non-electric residential energy efficiency measure-specific data sources and technical potential studies that have been conducted recently in the US. Focus was for comprehensiveness on the electric and natural gas measures, less so for fuel oil and propane. Even within electric and natural gas some measures were not analyzed due to a combination of measure-specific-limitations, and unavailability of reliable data (e.g., A/C peak demand savings from off peak cooling with thermal energy storage, more advanced windows than double pane with low-E, super high efficient gas hot water heaters/boilers and combo systems, air drying of laundry, etc.).

The set of energy efficiency measures considered was pre-screened to include mainly those measures that are currently commercially available and cost effective (i.e., achieving a TRC benefit/cost ratios equal to or greater than 1.0 – although measures with TRC ratios between 0.9 and 1.0 were also included). Thus, emerging technologies not currently in the marketplace that had benefit cost ratios below 0.9 were not included in the analysis. The portfolio of measures includes retrofit and replace on burnout programmatic approaches to achieve energy efficiency savings.

4.2.1 Characteristics of Energy Efficiency Measures

GDS collected data on the energy savings, incremental costs, useful lives and other key “per unit” characteristics of each of the residential electric and non-electric energy efficiency measures. Estimates of the size of the eligible market were also developed for each efficiency measure. For example, electric water heater efficiency measures are only applicable to those homes in New Hampshire that have electric water heaters. More information regarding measure-specific savings, cost and measure life assumptions can be found in Appendix E.

For the residential new construction market segment, GDS calculated a forecast of the number of new homes estimated to be built each year based on NH new housing permits as reported by the US census bureau[38] The sizes of various end-use market segments were informed based on project primary data collection efforts. This analysis is based on the most recent residential electric sales forecast for New Hampshire for the years 2009 to 2018.[39] Energy-efficiency measures were analyzed for the most important electric and non-electric consuming end uses in the residential sector.

Tables[40] 44 and 45 below list the residential sector electric and non-electric energy efficiency measures included in the technical (best), technical (traditional), maximum achievable, maximum achievable cost effective, and potentially obtainable potential analyses.

[38] The source of this economic/demographic forecast for NH is the US Census Bureau’s reporting of new building permits. http://www.census.gov/const/www/permitsindex.html
[39] This residential sector load forecast was provided to GDS by project sponsors.

Table 44. Residential Electric Energy Efficiency Savings Potential by Measure

Measure Name	Tech. Potential	Max. Achievable	Max. Achievable C.E.	% of MACE	Pot. Obtainable
CFL Bulbs (Homes w/ partial CFL installation)-High Use	205,995,520	205,995,520	205,995,520	17.6%	150,376,729
Timers/Motion/Photocell controlled outdoor lighting	165,140,752	165,140,752	165,140,752	14.1%	60,276,374
CFL Bulbs (Homes w/ no CFL bulbs installed)-High Use	127,335,921	127,335,921	127,335,921	10.9%	92,955,222
Phantom Power	107,603,656	107,603,656	107,603,656	9.2%	39,275,334
Second Refrigerator Turn In	91,805,345	91,805,345	91,805,345	7.8%	67,017,902
CFL Bulbs (Homes w/ partial CFL installation)-Low Use	74,907,462	62,422,885	62,422,885	5.3%	45,568,706
Energy Star Clothes Washer (w/ Electric DWH)	44,725,994	40,659,995	40,659,995	3.5%	29,681,796
Energy Star office equipment including monitors, copiers, multi-function machines.	39,473,144	39,473,144	39,473,144	3.4%	28,815,395
CFL Bulbs (Homes w/ no CFL bulbs installed)-Low Use	46,303,971	38,586,643	38,586,643	3.3%	28,168,249
Efficient Furnace Fan (Non-Electric Furnace)	58,906,077	32,725,599	32,725,599	2.8%	11,944,843
Integrated Building Design - Good (ENERGY STAR Home ~ 20% Savings) - Oil Heat	48,692,079	19,476,832	19,476,832	1.7%	14,218,087
Energy Star Compliant Top Freezer Refrigerator	21,277,584	16,367,372	16,367,372	1.4%	11,948,182
Integrated Building Design - Better (ENERGY STAR Home ~35% Savings) -Oil Heat	39,392,813	15,757,125	15,757,125	1.3%	6,188,189
Low Flow Showerhead/Faucets	11,734,228	11,734,228	11,734,228	1.0%	8,565,987
Insulation/weatherization package - Good (Improved Base Home) - Oil Heat + Central Air	21,746,630	10,873,315	10,873,315	0.9%	3,960,640
LED options, inc. MR 16, R16, R20, R30, R38 & G25	21,171,891	10,585,946	10,585,946	0.9%	3,863,870
Programmable Thermostats (Electric Heat)	9,418,498	9,418,498	9,418,498	0.8%	6,875,503
Second Freezer Turn In	8,651,053	8,651,053	8,651,053	0.7%	6,315,269
Energy Star Compliant Side by Side Refrigerator	9,482,762	7,294,433	7,294,433	0.6%	5,324,936
TVs - Energy Star over standard	7,026,645	7,026,645	7,026,645	0.6%	5,129,451
Energy Star Dehumidifer	8,424,392	7,020,326	7,020,326	0.6%	5,124,838
Energy Star Room A/C	8,236,565	6,863,804	6,863,804	0.6%	5,010,577
Energy Star Dishwasher (w/ Electric DHW)	7,098,605	6,453,277	6,453,277	0.6%	4,710,892
Insulation/weatherization package - Better (Improved Base Home to Current NH Code) - Oil Heat + Central Air	12,684,414	6,342,207	6,342,207	0.5%	51,140
Energy Efficient Windows (Room AC)	15,369,234	6,147,694	6,147,694	0.5%	2,243,908
Energy Efficient Windows - oil (Heating + Central Air)	15,172,710	6,069,084	6,069,084	0.5%	2,215,216
Integrated Building Design - Best (ENERGY STAR Home ~ 50% Savings) - Oil Heat	13,622,813	5,449,125	5,449,125	0.5%	2,151,414
Beyond Energy Star Dishwasher (w/Electric DHW)	5,237,876	4,761,706	4,761,706	0.4%	3,476,045
Energy Efficient Windows (Electric Heat)	10,532,367	4,212,947	4,212,947	0.4%	3,075,451
Insulation/weatherization package - Best (Major Renovation to ES Home Levels) - LPG Heat + Central Air	8,372,210	4,186,105	4,186,105	0.4%	0
Heat Pump Water Heater	4,181,204	4,181,204	4,181,204	0.4%	1,526,140
Energy Star Dishwasher (w/Oil DHW)	4,572,751	4,157,046	4,157,046	0.4%	3,034,644
Insulation/weatherization package - Good (Improved Base Home) - Gas Heat + Central Air	7,976,442	3,988,221	3,988,221	0.3%	1,455,701
High Efficiency Heat Pump (Tier 2)	6,466,816	3,592,676	3,592,676	0.3%	1,658,075
Energy Star Dishwasher (w/Gas DHW)	3,880,464	3,527,695	3,527,695	0.3%	2,575,217
Insulation & Weatherization Package (Electric Heat) Good	6,507,879	3,253,939	3,253,939	0.3%	1,187,688
Beyond Energy Star Dishwasher (w/Oil DHW)	3,363,504	3,057,731	3,057,731	0.3%	2,232,143
Energy Star Dishwasher (w/Propane DHW)	2,995,915	2,723,559	2,723,559	0.2%	1,604,550
Energy Star Compliant Chest Freezer	3,524,694	2,711,303	2,711,303	0.2%	1,979,251
Duct Sealing (Electric Heat)	5,401,970	2,700,985	2,700,985	0.2%	1,971,719
Beyond Energy Star Dishwasher (w/Gas DHW)	2,854,290	2,594,809	2,594,809	0.2%	1,894,211
Insulation/weatherization package - Good (Improved Base Home) - LPG Heat + Central Air	5,113,583	2,556,791	2,556,791	0.2%	922,897
Energy Star Compliant Upright Freezer	3,290,681	2,531,293	2,531,293	0.2%	1,847,844
High Efficiency Heat Pump (Tier 1)	4,514,842	2,508,246	2,508,246	0.2%	915,510

Table 44. Residential Electric Energy Efficiency Savings Potential by Measure - Continued

Measure Name	Tech. Potential	Max. Achievable	Max. Achievable C.E.	% of MACE	Pot. Obtainable
Insulation & Weatherization Package (Electric Heat) Better	4,898,758	2,449,379	2,449,379	0.2%	894,023
Tree Shading (Room AC)	6,976,963	2,325,654	2,325,654	0.2%	848,864
Duct Sealing - oil (Heating + Central Air)	4,570,466	2,285,233	2,285,233	0.2%	834,110
Energy Star Clothes Washer (w/ Oil DHW)	2,489,692	2,263,357	2,263,357	0.2%	826,125
Pipe Wrap	3,277,927	2,185,285	2,185,285	0.2%	1,595,258
High efficiency water heater (EF=0.95)	2,736,087	2,104,682	2,104,682	0.2%	1,536,418
Water Heater Blanket	2,077,424	2,077,424	2,077,424	0.2%	1,516,520
Efficient Water Heater (EF=0.93)	2,678,040	2,060,031	2,060,031	0.2%	1,503,822
Energy Star Compliant Bottom Freezer Refrigerator	2,661,458	2,047,276	2,047,276	0.2%	1,494,511
Insulation/weatherization package - Better (Improved Base Home to Current NH Code) - Gas Heat + Central Air	4,015,396	2,007,698	2,007,698	0.2%	166,232
Beyond Energy Star Dishwasher (w/Propane DHW)	2,203,656	2,003,324	2,003,324	0.2%	1,462,427
Energy Efficient Windows - gas (Heating + Central Air)	3,538,338	1,415,335	1,415,335	0.1%	516,597
Energy Star Clothes Washer (w/ Propane DHW)	1,519,589	1,381,445	1,381,445	0.1%	504,227
Integrated Building Design - Better (ENERGY STAR Home ~35% Savings) - Gas Heat	3,363,578	1,345,431	1,345,431	0.1%	491,082
Energy Star Clothes Washer (w/ Gas DHW)	2,038,750	1,853,409	1,170,851	0.1%	427,361
High Efficiency Central AC (Tier 1)	2,515,680	1,397,600	1,144,235	0.1%	0
Integrated Building Design - Better (ENERGY STAR Home ~35% Savings) - LPG Heat	2,838,541	1,135,416	1,135,416	0.1%	414,427
Pool Pump and Motor	1,659,631	1,106,421	1,106,421	0.1%	807,687
Programmable Thermostats - oil (Heating + Central Air)	846,592	812,980	812,980	0.1%	296,738
Programmable Thermostats - gas (Heating + Central Air)	751,225	751,225	751,225	0.1%	357,694
Insulation & Weatherization Package (Electric Heat) Best	1,416,236	708,118	708,118	0.1%	212,950
Integrated Building Design - Better (ENERGY STAR Home ~35% Savings) - Electric Heat	1,745,380	698,152	698,152	0.1%	254,825
Duct Sealing - gas (Heating + Central Air)	1,355,776	677,888	677,888	0.1%	247,429
Energy Star Compliant Upright Freezer	874,682	672,832	672,832	0.1%	491,167
Integrated Building Design - Best (ENERGY STAR Home ~ 50% Savings) -Gas Heat	1,346,178	538,471	538,471	0.0%	196,542
Integrated Building Design - Good (ENERGY STAR Home ~ 20% Savings) - Electric Heat	1,149,297	459,719	459,719	0.0%	301,158
Tree Shading - gas (Heating + Central Air)	1,325,456	441,819	441,819	0.0%	161,264
Insulation/weatherization package - Better (Improved Base Home to Current NH Code) - LPG Heat + Central Air	864,447	432,223	432,223	0.0%	38,072
Integrated Building Design - Best (ENERGY STAR Home ~ 50% Savings) - LPG Heat	1,018,369	407,348	407,348	0.0%	148,682
Integrated Building Design - Best (ENERGY STAR Home ~ 50% Savings) - Electric Heat	935,329	374,132	374,132	0.0%	136,558
Integrated Building Design - Good (ENERGY STAR Home ~ 20% Savings) - Gas Heat	520,330	208,132	208,132	0.0%	26,509
Integrated Building Design - Good (ENERGY STAR Home ~ 20% Savings) - LPG Heat	333,721	133,488	133,488	0.0%	7,247
Tree Shading - oil (Heating + Central Air)	138,851	46,284	46,284	0.0%	16,894
Insulation/weatherization package - Best (Major Renovation to ES Home Levels) - Oil Heat + Central Air	7,895,202	3,947,601	0	0.0%	0
Insulation/weatherization package - Best (Major Renovation to ES Home Levels) - Gas Heat + Central Air	2,082,545	1,041,272	0	0.0%	0
Ground Source Heat Pump	6,446,371	3,503,462	0	0.0%	0
Whole-House Tankless Water Heater - Electric <=12 kW	1,638,636	819,318	0	0.0%	0
HVAC Tune-Up	1,722,490	1,722,490	0	0.0%	0
High Efficiency Central AC (Tier 2)	3,130,624	1,739,235	0	0.0%	0
Solar Water Heating	28,785,190	14,392,595	0	0.0%	0
Insulation & Weatherization Package (Room AC)	3,290,327	1,645,164	0	0.0%	0
Induction Cooktop vs Electric Coil Cooktop	33,999,845	16,999,922	0	0.0%	0
Grand Total	**1,489,861,317**	**1,217,144,947**	**1,170,397,964**	**100.0%**	**698,069,156**

Table 45. Residential Non-Electric Energy Efficiency Savings Potential by Measure

Measure Name	Tech. Potential	Max. Achievable	Max. Achievable C.E.	% of MACE	Potentially Obtainable
Programmable Thermostats (SF) - oil boiler (Heating only)	605,009	605,009	605,009	9.6%	441,656
High Efficiency Water Heater - Oil (EF=0.66)	434,489	434,489	434,489	6.9%	158,589
High Efficiency Furnace - Natural Gas	621,946	310,973	310,973	4.9%	227,010
Insulation/weatherization package - single family - Good (Improved Base Home) - Oil Heat + Central Air	571,525	285,763	285,763	4.5%	208,607
Insulation/weatherization package - single family - Better (Improved Base Home to Current NH Code) - Oil Heat + Central Air	539,052	269,526	269,526	4.3%	98,377
Energy Efficient Windows (SF) - oil heat	551,014	220,406	220,406	3.5%	160,896
Programmable Thermostats (SF) - oil furnace (Heating only)	209,283	209,283	209,283	3.3%	152,777
High Efficiency Boiler - Oil	350,960	175,480	169,331	2.7%	61,806
HVAC Tune-Up (Gas Heat)	160,093	160,093	160,093	2.5%	58,434
HVAC Tune-Up (Oil Heat)	153,010	153,010	153,010	2.4%	55,849
High Efficiency Furnace - Propane	279,335	139,667	139,667	2.2%	101,957
Duct Sealing - oil	276,937	138,468	138,468	2.2%	101,082
Energy Star Dishwasher (w/Oil DHW)	143,164	130,149	130,149	2.1%	95,009
High Efficiency Water Heater - Propane (EF=0.67)	126,173	126,173	126,173	2.0%	46,053
Gas-Condensing Water Heater - Propane (EF=0.80)	168,449	112,299	112,299	1.8%	40,989
Energy Star Clothes Washer (w/ Gas DHW)	113,205	102,914	102,914	1.6%	37,564
High Efficiency Water Heater - Natural Gas (EF=0.62)	100,211	100,211	100,211	1.6%	73,154
High Efficiency Boiler - Natural Gas	192,623	96,312	96,312	1.5%	35,154
Energy Star Dishwasher (w/Gas DHW)	103,568	94,153	94,153	1.5%	68,731
Energy Star Clothes Washer (w/ Oil DHW)	101,425	92,205	92,205	1.5%	33,655
Beyond Energy Star Dishwasher (w/Oil DHW)	97,481	88,619	88,619	1.4%	64,692
Insulation/weatherization package - multi family - Good (Improved Base Home) - Gas Heat + Central Air	155,600	77,800	77,800	1.2%	28,397
Integrated Building Design - Good (ENERGY STAR Home ~ 20% Savings) - Oil Heat	189,676	75,870	75,870	1.2%	55,385
Integrated Building Design - Better (ENERGY STAR Home ~35% Savings) -Oil Heat	188,754	75,501	75,501	1.2%	27,558
Insulation/weatherization package - multi family - Better (Improved Base Home to Current NH Code) - Gas Heat + Central Air	146,917	73,459	73,459	1.2%	26,812
High Efficiency Furnace - Oil	145,664	72,832	72,832	1.2%	26,584
Insulation/weatherization package - single family - Good (Improved Base Home) - Gas Heat + Central Air	143,455	71,727	71,727	1.1%	52,361
Insulation/weatherization package - single family - Good (Improved Base Home) - LP Heat + Central Air	139,226	69,613	69,613	1.1%	50,817
Programmable Thermostats (MF) - oil furnace (Heating only)	68,593	68,593	68,593	1.1%	50,073
High Efficiency Boiler - Propane	134,939	67,470	67,470	1.1%	24,626
Insulation/weatherization package - single family - Better (Improved Base Home to Current NH Code) - LP Heat + Central Air	133,258	66,629	66,629	1.1%	24,320
Programmable Thermostats (MF) - gas boiler (Heating only)	66,583	66,583	66,583	1.1%	48,606
Beyond Energy Star Dishwasher (w/Gas DHW)	70,520	64,109	64,109	1.0%	46,800
Insulation/weatherization package - single family - Better (Improved Base Home to Current NH Code) - Gas Heat + Central Air	125,400	62,700	62,700	1.0%	22,885
Programmable Thermostats (SF) - oil furnace (Heating + Central Air)	61,041	61,041	61,041	1.0%	44,560
Integrated Building Design - Better (ENERGY STAR Home ~35% Savings) - Gas Heat	147,142	58,857	58,857	0.9%	32,935
Energy Star Dishwasher (w/Propane DHW)	62,189	56,536	56,536	0.9%	41,271
Low Flow Showerhead/Faucets -Oil	53,708	53,708	53,708	0.9%	39,207
Energy Efficient Windows (SF) - gas heat	133,249	53,300	53,300	0.8%	38,909
Programmable Thermostats (SF) - oil boiler (Heating + Central Air)	52,609	52,609	52,609	0.8%	38,405
Integrated Building Design - Good (ENERGY STAR Home ~ 20% Savings) - Gas Heat	128,988	51,595	51,595	0.8%	37,665
Programmable Thermostats (MF) - gas furnace (Heating only)	50,416	50,416	50,416	0.8%	36,804
Energy Efficient Windows (SF) - propane heat	120,994	48,398	48,398	0.8%	35,330
Duct Sealing - gas	92,746	46,373	46,373	0.7%	33,852
Gas-Condensing Water Heater - Natural Gas (EF=0.80)	68,060	45,374	45,374	0.7%	16,561
Programmable Thermostats (MF) - gas furnace (Heating + Central Air)	40,963	40,963	40,963	0.6%	29,903
Energy Efficient Windows (MF) - gas heat	100,748	40,299	40,299	0.6%	29,418
Integrated Building Design - Best (ENERGY STAR Home ~ 50% Savings) - Oil Heat	99,121	39,649	39,649	0.6%	14,472
Energy Star Clothes Washer (w/ Propane DHW)	42,478	38,617	38,617	0.6%	14,095
Beyond Energy Star Dishwasher (w/Propane DHW)	42,345	38,496	38,496	0.6%	28,102
Integrated Building Design - Better (ENERGY STAR Home ~35% Savings) - LPG Heat	93,662	37,465	37,465	0.6%	16,426
Insulation/weatherization package - multi family - Good (Improved Base Home) - Oil Heat + Central Air	70,647	35,324	35,324	0.6%	12,893
Programmable Thermostats (SF) - propane boiler (Heating only)	32,551	32,551	32,551	0.5%	23,762
Duct Sealing - Propane	64,857	32,429	32,429	0.5%	11,836
Low Flow Showerhead/Faucets - Natural Gas	32,090	32,090	32,090	0.5%	11,713

Table 45. Residential Non-Electric Energy Efficiency Savings Potential by Measure - Continued

Measure Name	Tech. Potential	Max. Achievable	Max. Achievable C.E.	% of MACE	Potentially Obtainable
Integrated Building Design - Good (ENERGY STAR Home ~ 20% Savings) - LPG Heat	79,145	31,658	31,658	0.5%	23,110
Programmable Thermostats (SF) - propane furnace (Heating only)	30,047	30,047	30,047	0.5%	21,934
Insulation/weatherization package - multi family - Better (Improved Base Home to Current NH Code) - Oil Heat + Central Air	54,490	27,245	27,245	0.4%	9,944
Integrated Building Design - Best (ENERGY STAR Home ~ 50% Savings) -Gas Heat	62,247	24,899	24,899	0.4%	13,694
Whole-House Tankless Water Heater - Nat Gas <=200 kBTUH	36,691	24,461	24,461	0.4%	8,928
Programmable Thermostats (MF) - oil boiler (Heating only)	23,928	23,928	23,928	0.4%	17,467
Insulation/weatherization package - single family - Best (Major Renovation to ES Home Levels) - LP Heat + Central Air	45,444	22,722	22,722	0.4%	8,293
Programmable Thermostats (SF) - gas furnace (Heating only)	22,345	22,345	22,345	0.4%	16,312
Energy Efficient Windows (MF) - oil heat	49,510	19,804	19,804	0.3%	14,457
Insulation/weatherization package - multi family - Good (Improved Base Home) - LP Heat + Central Air	38,286	19,143	19,143	0.3%	6,987
Low Flow Showerhead/Faucets - LP Gas	18,185	18,185	18,185	0.3%	6,637
Insulation/weatherization package - multi family - Better (Improved Base Home to Current NH Code) - LP Heat + Central Air	34,424	17,212	17,212	0.3%	6,282
Integrated Building Design - Best (ENERGY STAR Home ~ 50% Savings) - LPG Heat	41,079	16,432	16,432	0.3%	7,112
Programmable Thermostats (SF) - gas boiler (Heating only)	14,897	14,897	14,897	0.2%	10,875
Programmable Thermostats (SF) - gas furnace (Heating + Central Air)	13,035	13,035	13,035	0.2%	9,515
Programmable Thermostats (SF) - propane furnace (Heating + Central Air)	12,520	12,520	12,520	0.2%	9,139
Programmable Thermostats (MF) - oil furnace (Heating + Central Air)	11,432	11,432	11,432	0.2%	8,346
Improved Steam Vents (SF) - oil	22,574	11,287	11,287	0.2%	8,239
Energy Efficient Windows (MF) - Propane heat	25,226	10,090	10,090	0.2%	7,366
Pipe Wrap - oil DHW	12,853	8,569	8,569	0.1%	3,128
Insulation/weatherization package - multi family - Best (Major Renovation to ES Home Levels) - LP Heat + Central Air	12,671	6,336	6,336	0.1%	2,313
Programmable Thermostats (SF) - propane boiler (Heating + Central Air)	5,008	5,008	5,008	0.1%	3,656
Programmable Thermostats (MF) - propane boiler (Heating only)	4,711	4,711	4,711	0.1%	3,439
Efficient Steam Boiler (SF) - oil	8,486	3,394	3,394	0.1%	1,239
Programmable Thermostats (MF) - gas boiler (Heating + Central Air)	3,171	3,171	3,171	0.1%	2,315
Improved Steam Vents (SF) - Propane	5,958	2,979	2,979	0.0%	1,087
Programmable Thermostats (MF) - propane furnace (Heating only)	2,809	2,809	2,809	0.0%	2,051
Programmable Thermostats (MF) - propane furnace (Heating + Central Air)	2,809	2,809	2,809	0.0%	2,051
Improved Steam Vents (SF) - gas	2,980	1,490	1,490	0.0%	544
Mainline Air vent (MF) - gas	4,112	1,371	1,371	0.0%	1,001
Thermostatic vents (MF) - gas	2,122	1,061	1,061	0.0%	387
Efficient Steam Boiler (SF) - Propane	2,197	879	879	0.0%	321
Insulation/weatherization package - single family - Best (Major Renovation to ES Home Levels) - Gas Heat + Central Air	41,827	20,913	0	0.0%	0
Efficient Steam Boiler (MF) - Propane	0	0	0	0.0%	0
Programmable Thermostats (MF) - propane boiler (Heating + Central Air)	0	0	0	0.0%	0
Efficient Steam Boiler (MF) - gas	749	299	0	0.0%	0
Insulation/weatherization package - multi family - Best (Major Renovation to ES Home Levels) - Oil Heat + Central Air	14,063	7,031	0	0.0%	0
Solar Water Heating - Active, w/ Gas Backup	612,919	306,459	0	0.0%	0
Indirect-fired domestic water heater - NG boiler w/ EF = 0.65	27,384	18,256	0	0.0%	0
Efficient Steam Boiler (SF) - gas	1,099	440	0	0.0%	0
Insulation/weatherization package - single family - Best (Major Renovation to ES Home Levels) - Oil Heat + Central Air	152,847	76,424	0	0.0%	0
High Efficiency Water Heater - Natural Gas (EF=0.67)	80,520	80,520	0	0.0%	0
Programmable Thermostats (SF) - gas boiler (Heating + Central Air)	0	0	0	0.0%	0
Insulation/weatherization package - multi family - Best (Major Renovation to ES Home Levels) - Gas Heat + Central Air	52,375	26,187	0	0.0%	0
Mainline Air vent (MF) - Propane	0	0	0	0.0%	0
Programmable Thermostats (MF) - oil boiler (Heating + Central Air)	0	0	0	0.0%	0
Pipe Wrap - gas DHW	3,854	2,570	0	0.0%	0
Solar Water Heating - Active, w/ Oil Backup	897,169	448,584	0	0.0%	0
Solar Water Heating - Active, w/ Propane Backup	309,452	154,726	0	0.0%	0
Thermostatic vents (MF) - oil	0	0	0	0.0%	0
Pipe Wrap - LPG DHW	507	338	0	0.0%	0
Thermostatic vents (MF) - Propane	0	0	0	0.0%	0
Efficient Steam Boiler (MF) - oil	0	0	0	0.0%	0
Pipe Wrap - Propane DHW	1,337	891	0	0.0%	0
Mainline Air vent (MF) - oil	0	0	0	0.0%	0
Grand Total	**12,099,639**	**7,463,743**	**6,313,954**	**100.0%**	**3,633,554**

4.2.2 Residential Energy Efficiency Potential Comparisons and Savings By Measure Type

Figure 18 and Figure 19 display a graphical comparison of the varying degrees of potential results for both the electric and non-electric sector.

Figure 18. Residential Electric Savings Potential Results Comparison

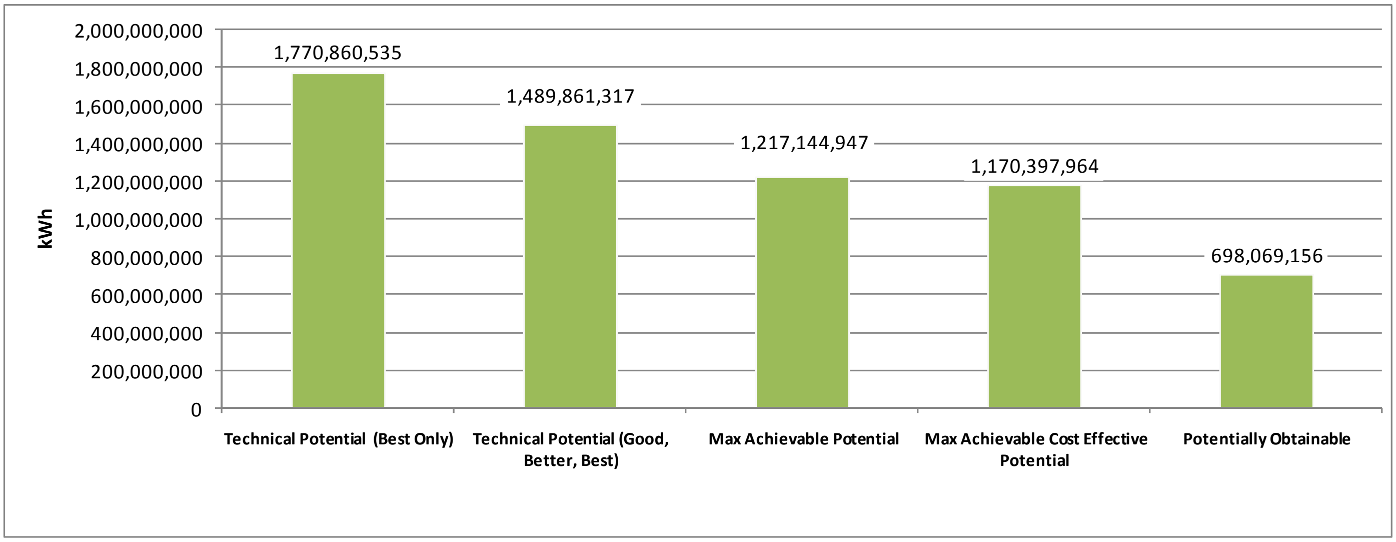


Figure 19. Residential Non-Electric Savings Potential Results Comparison

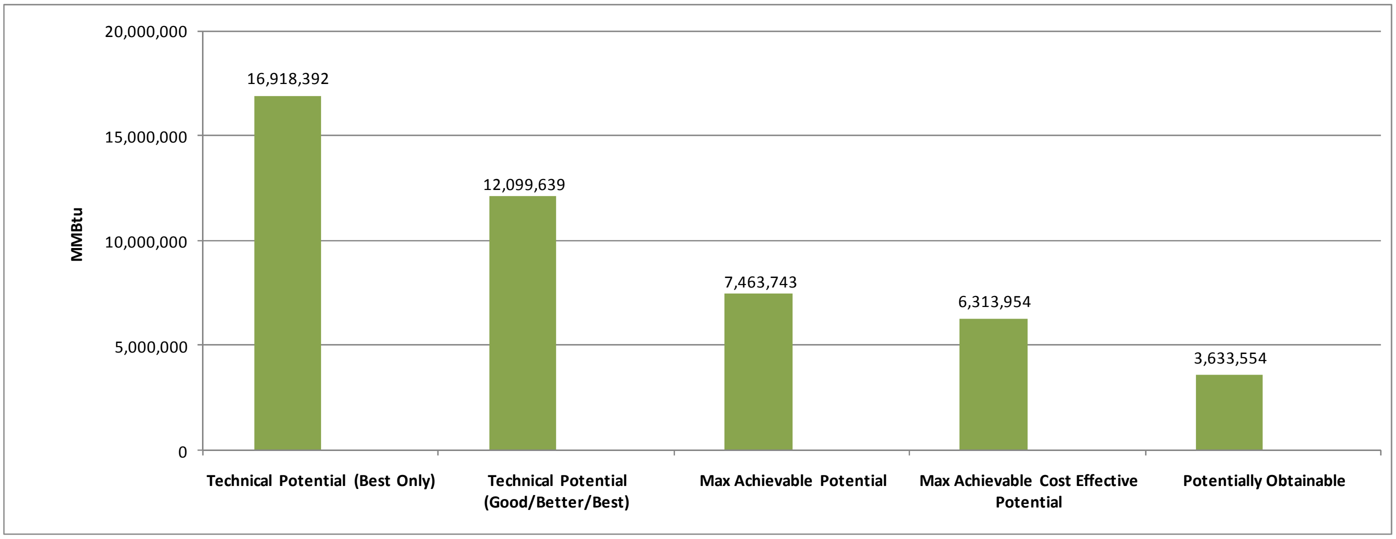


Figure 20 displays a graphical comparison of the varying electrical end-uses within the residential sector. As shown, lighting single-family and lighting multi-family make up the greatest savings potential focus areas (52% combined), followed by electric appliances at 16 percent (SF and MF combined), space heating and cooling (10% combined SF and MF), standby (phantom-load) power and water heating at nine percent each (SM/MF combined).

Figure 20. Residential Max. Achievable Cost Effective Electric Savings Potential by End Use

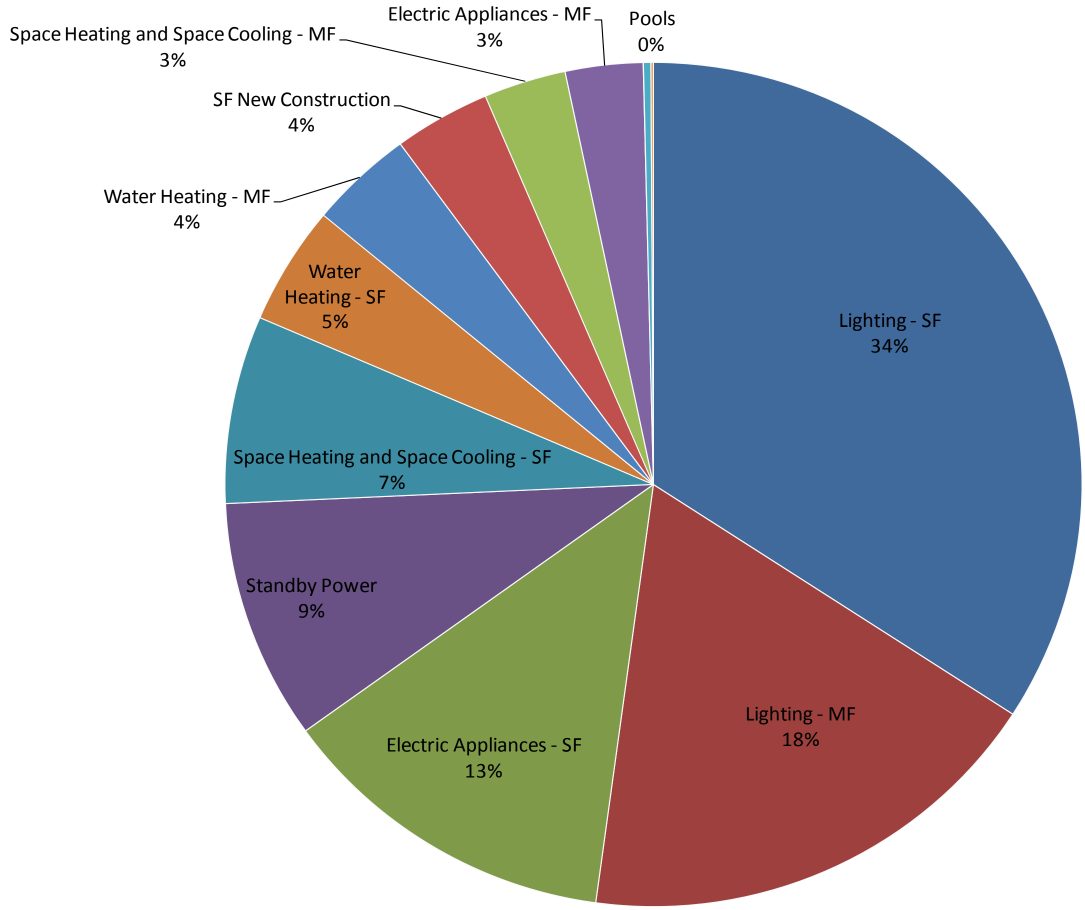


Figure 21 displays a graphical comparison of the varying non-electric end-uses within the residential sector. As shown, single-family home oil heating measures represent the largest area of savings potential at 25%, followed by single-family water heating at 18%, and then single-family weatherization packages at 12%. The remainder is comprised mostly of multi-family water heating, gas-heating measures for single and multi-family, and home propane heating measures.

Figure 21. Residential Max Achievable Cost Effective Non- Electric Savings Potential by End Use

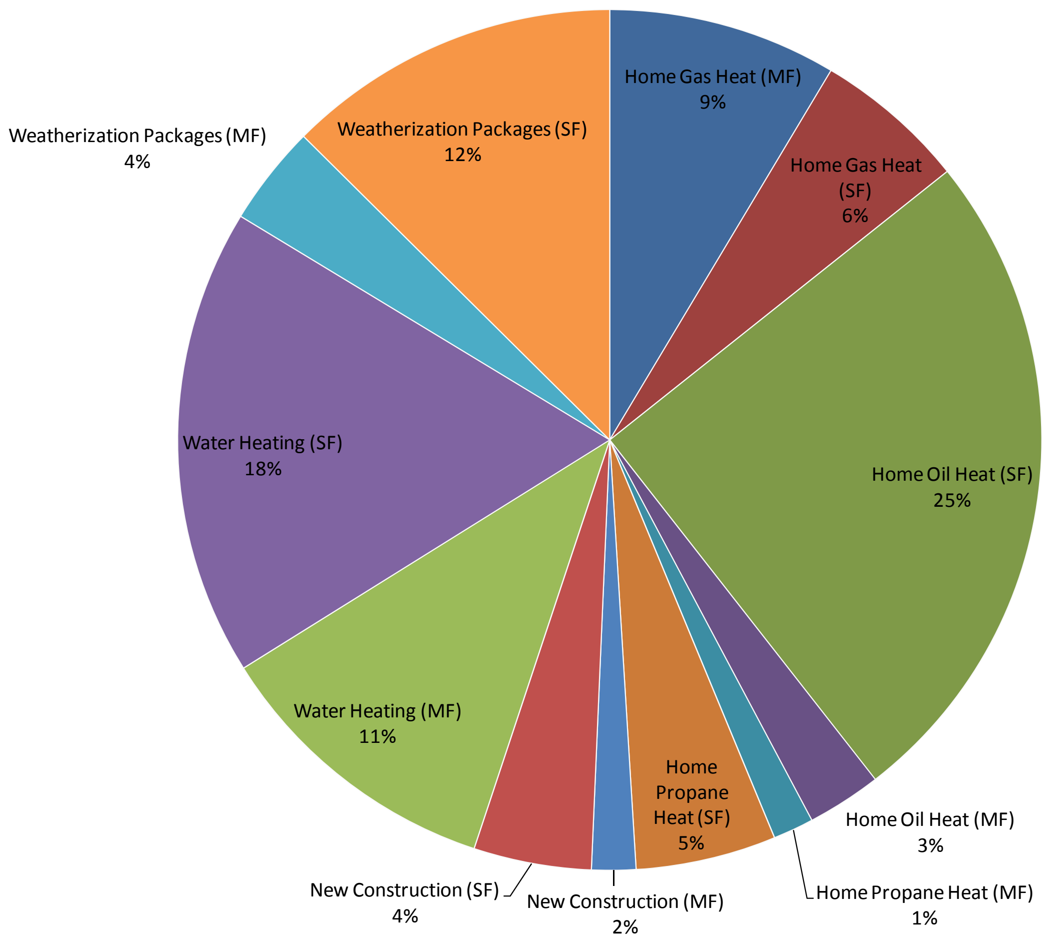
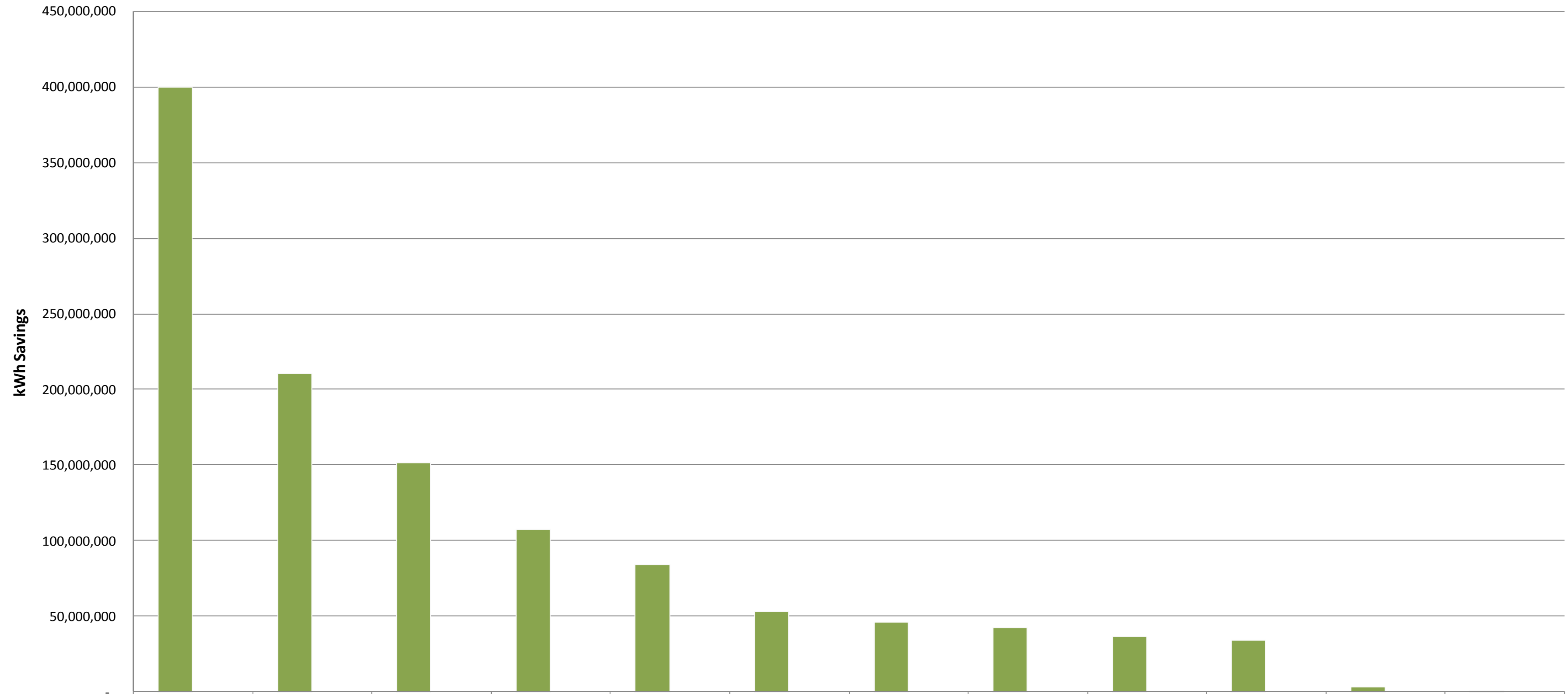


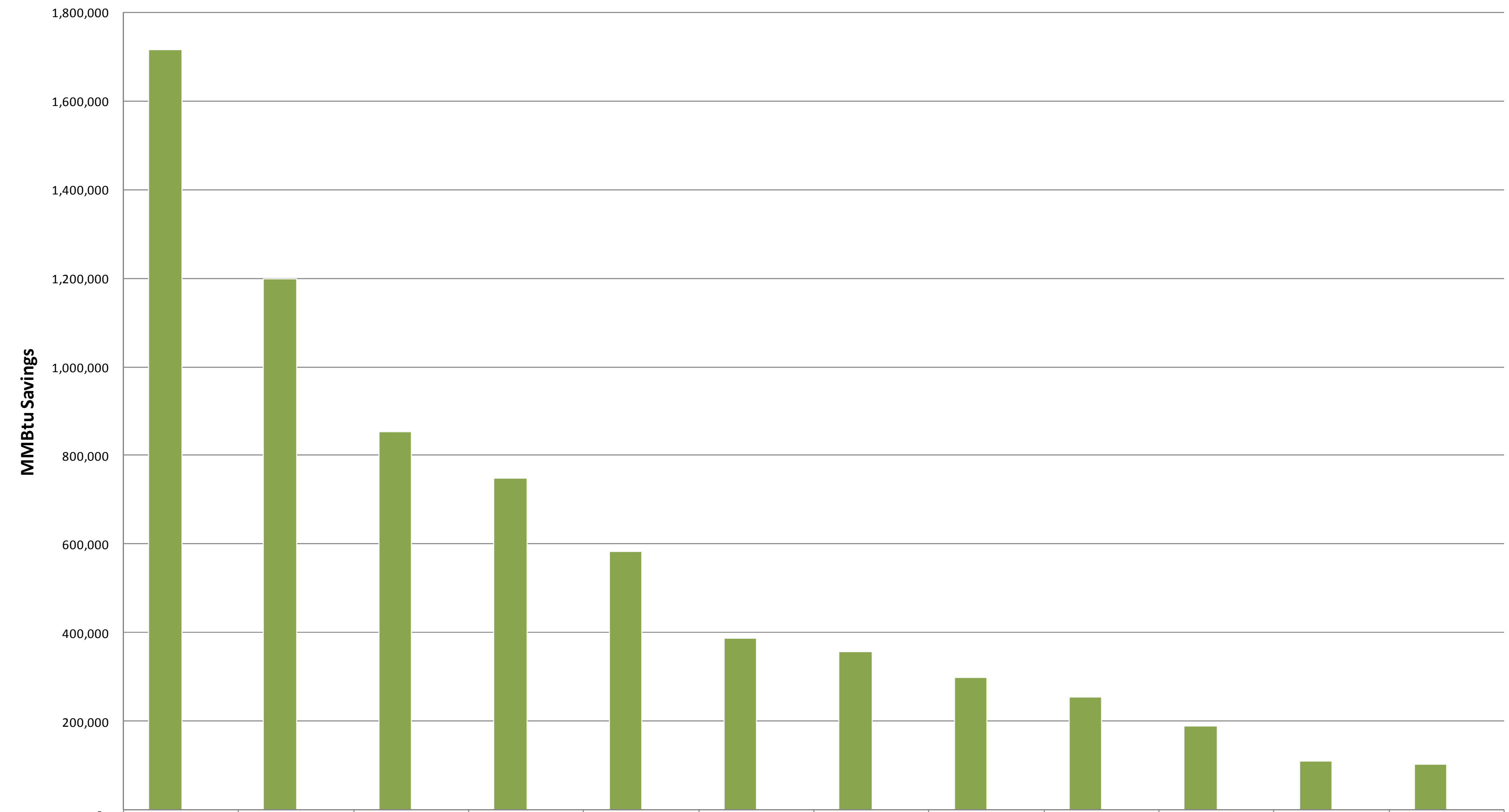
Figure 22 and Figure 23, displayed below, show a graphical comparison of the varying maximum achievable cost effective electric and non-electric savings by end use within the residential sector. While Figure 20 and Figure 21 show relative percent comparisons only, Figure 22 and Figure 23 show both relative and absolute (kWh and MMBTu) comparisons of the savings coming from each end use.

Figure 22. Residential Electric Savings Potential by End Use (with kWh values)



	Lighting - SF	Lighting - MF	Electric Appliances - SF	Standby Power	Space Heating and Space Cooling - SF	Water Heating - SF	Water Heating - MF	SF New Construction	Space Heating and Space Cooling - MF	Electric Appliances - MF	MF New Construction	Pools
Max. Achievable Cost Effective	399,588,082	210,479,584	151,300,008	107,603,656	84,066,189	53,160,336	45,937,312	42,689,666	36,320,508	34,301,015	3,293,705	1,106,421
% of MACE	34.2%	18.0%	12.9%	9.2%	7.2%	4.5%	3.9%	3.6%	3.1%	2.9%	0.3%	0.1%

Figure 23. Residential Non-Electric Savings Potential by End Use (with MMBTu values)



	Home Oil Heat (SF)	Water Heating (SF)	Weatherization Packages (SF)	Water Heating (MF)	Home Gas Heat (MF)	Home Gas Heat (SF)	Home Propane Heat (SF)	New Construction (SF)	Weatherization Packages (MF)	Home Oil Heat (MF)	New Construction (MF)	Home Propane Heat (MF)
MACE	1,714,121	1,197,354	852,973	750,121	582,691	388,745	357,869	299,594	256,518	189,906	112,332	103,348
% of MACE	25.19%	17.59%	12.53%	11.02%	8.56%	5.71%	5.26%	4.40%	3.77%	2.79%	1.65%	1.52%

4.2.3 Residential Energy Efficiency Measure Supply Curves

This report also presents results in the form of electric and non-electric energy efficiency supply curves. As noted previously, the advantage of using an energy efficiency supply curve is that it provides a clear, easy-to-understand framework for summarizing a variety of complex information about energy efficiency technologies, their costs, and the potential for energy savings. Properly constructed, an energy-efficiency supply curve avoids the double counting of energy savings across measures by accounting for interactions between measures. The supply curve also provides a simplified framework to compare the costs of energy efficiency measures with the costs of energy supply resources.

The supply curves for residential electric energy efficiency savings are shown in Figure 24 through Figure 29. Supply curves for residential non-electric energy efficiency savings are shown in Figure 30 through Figure 35. These supply curves were built up across individual measures and were sorted on a lowest to highest cost basis per unit of energy saved. As shown in these figures, nearly 12 percent of the projected 2018 residential sector kWh sales could be offset by installing electric efficiency measures at a levelized cost of less than two cents per/kWh (see Figure 29). Nearly eight percent of the projected maximum achievable cost effective savings potential from non-electric efficiency measures could be obtained at a levelized cost of less than three dollars per/MMBTu (see Figure 35).

Figure 24. Residential Electric Energy Efficiency Supply (< $1.10/kWh) Curve for NH – Technical Potential

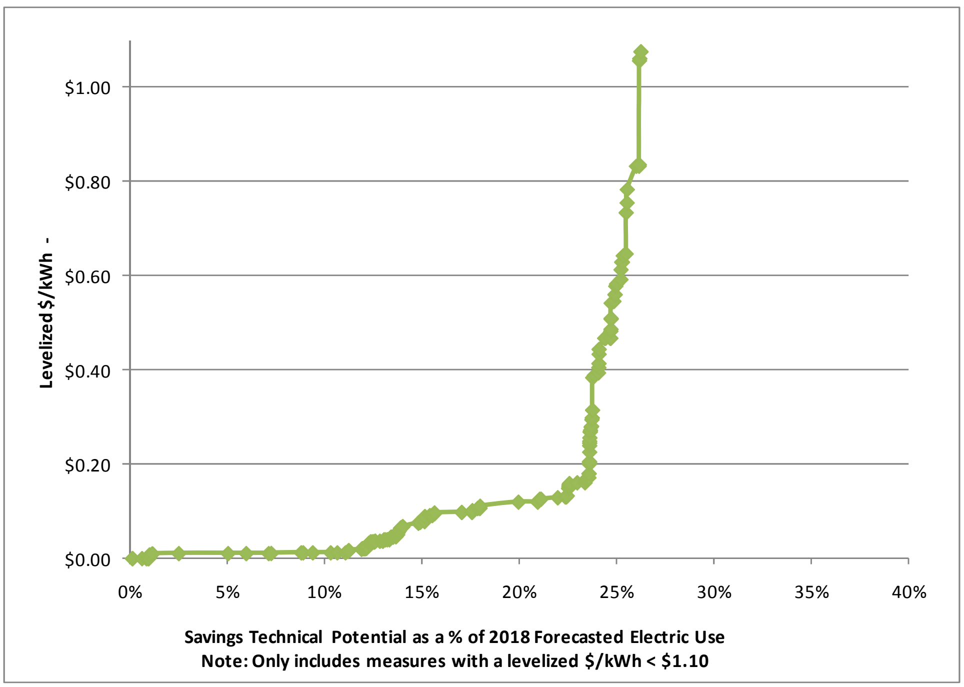


Figure 25. Residential Electric Energy Efficiency Supply (< $0.10/kWh) Curve for NH – Technical Potential

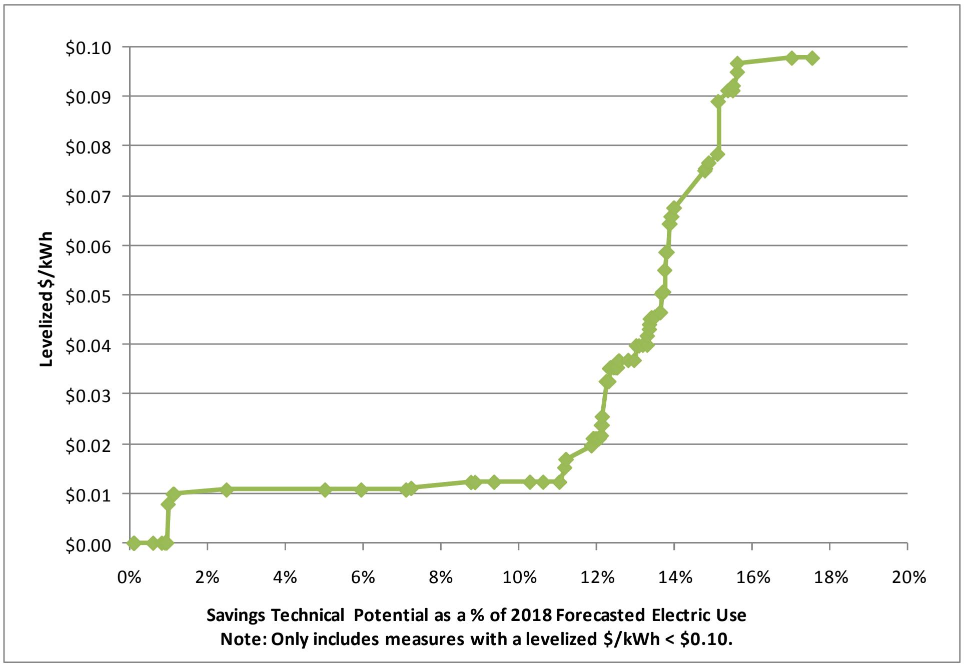


Figure 26. Residential Electric Energy Efficiency Supply (< $1.10/kWh) Curve for NH – Max Achievable

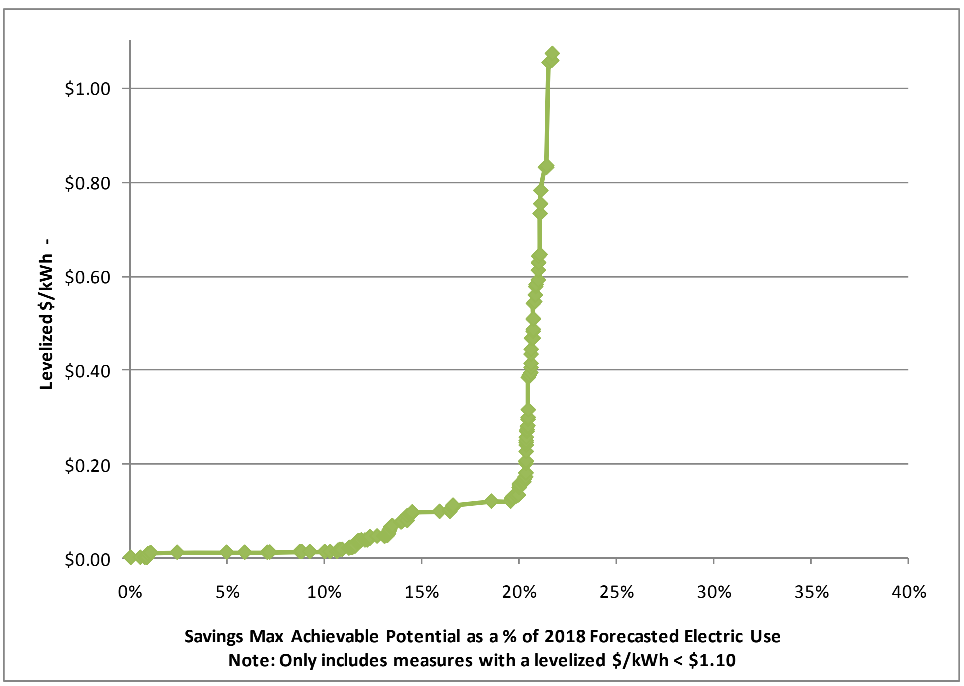


Figure 27. Residential Electric Energy Efficiency Supply (< $0.10/kWh) Curve for NH – Max Achievable

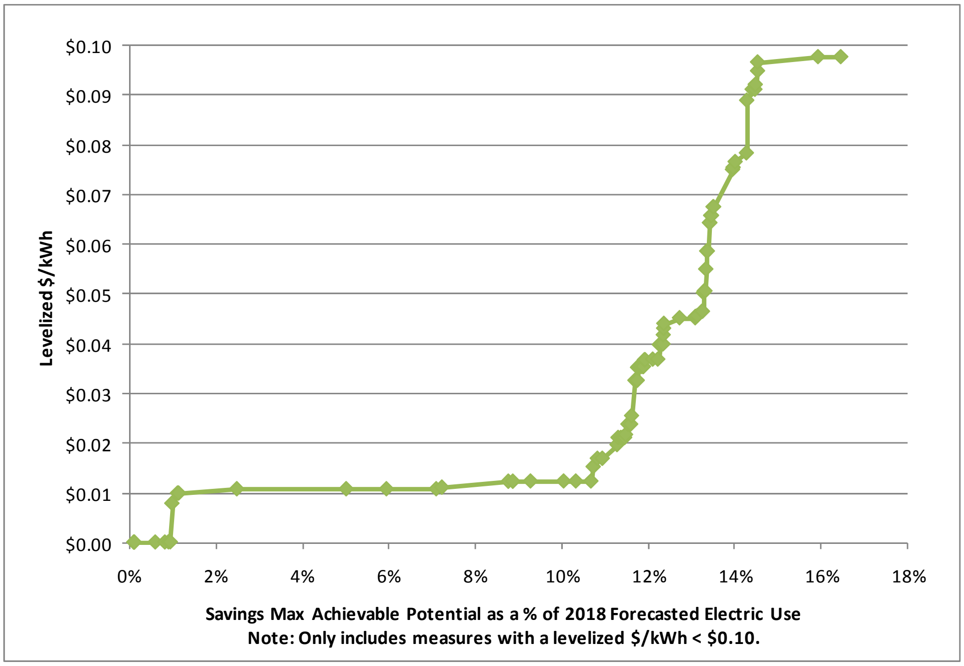


Figure 28. Residential Electric Energy Efficiency Supply (< $1.10/kWh) Curve for NH – M.A.C.E

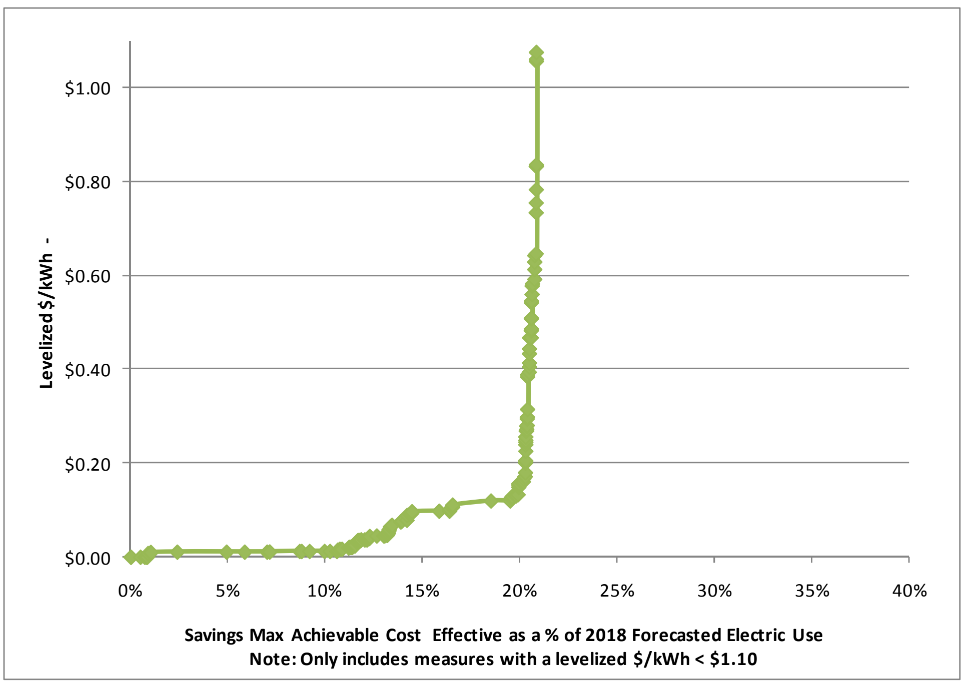


Figure 29. Residential Electric Energy Efficiency Supply (< $0.10/kWh) Curve for NH – M.A.C.E.

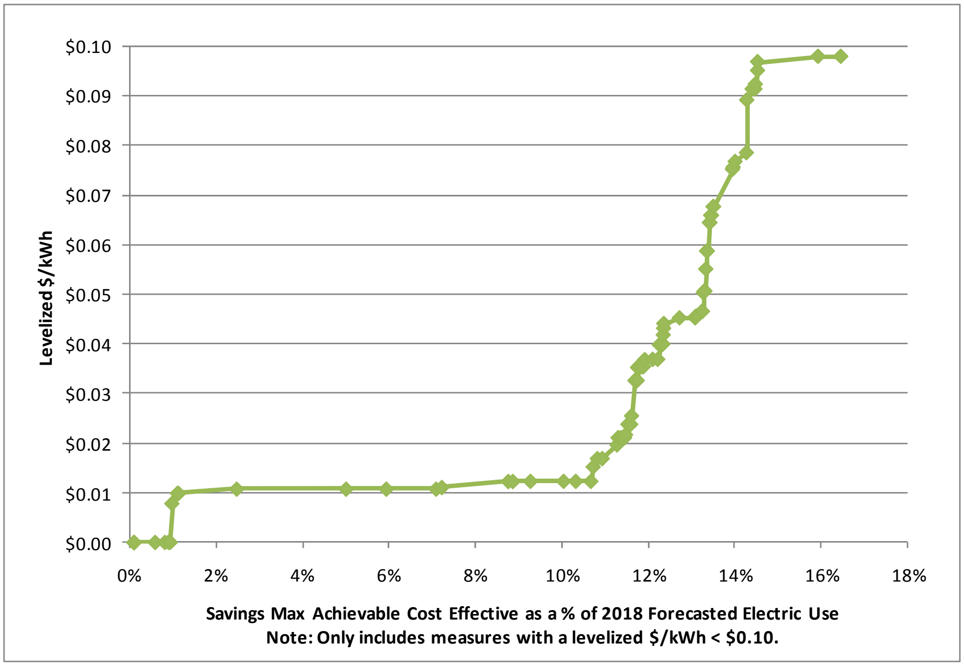


Figure 30. Residential Non-Electric Energy Efficiency Supply (< $10/MMBTu) Curve for NH – Technical

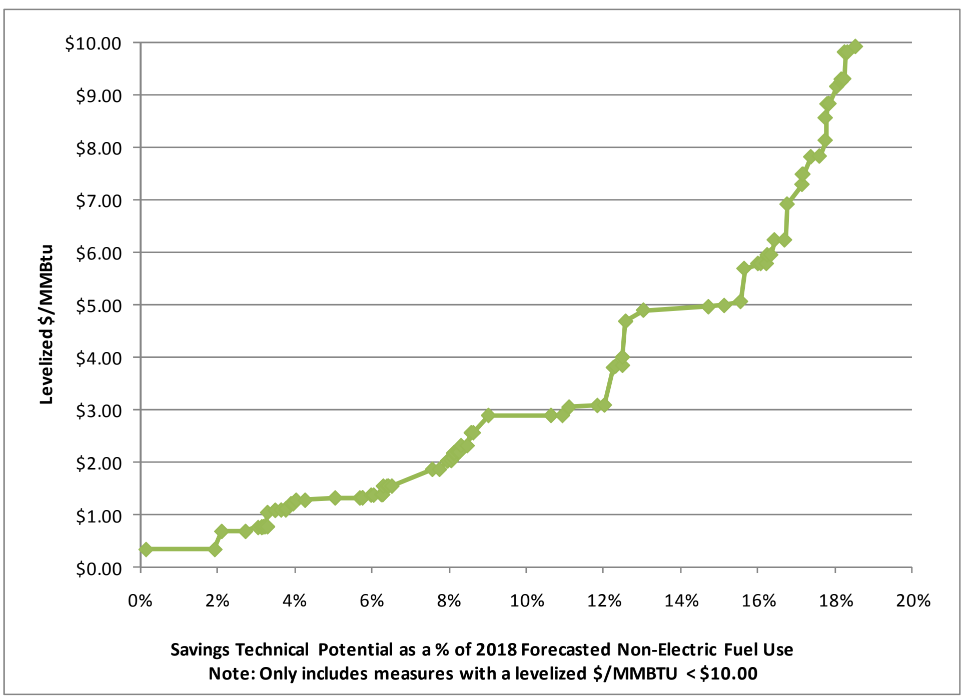


Figure 31. Residential Non-Electric Energy Efficiency Supply (< $5/MMBTu) Curve for NH – Technical

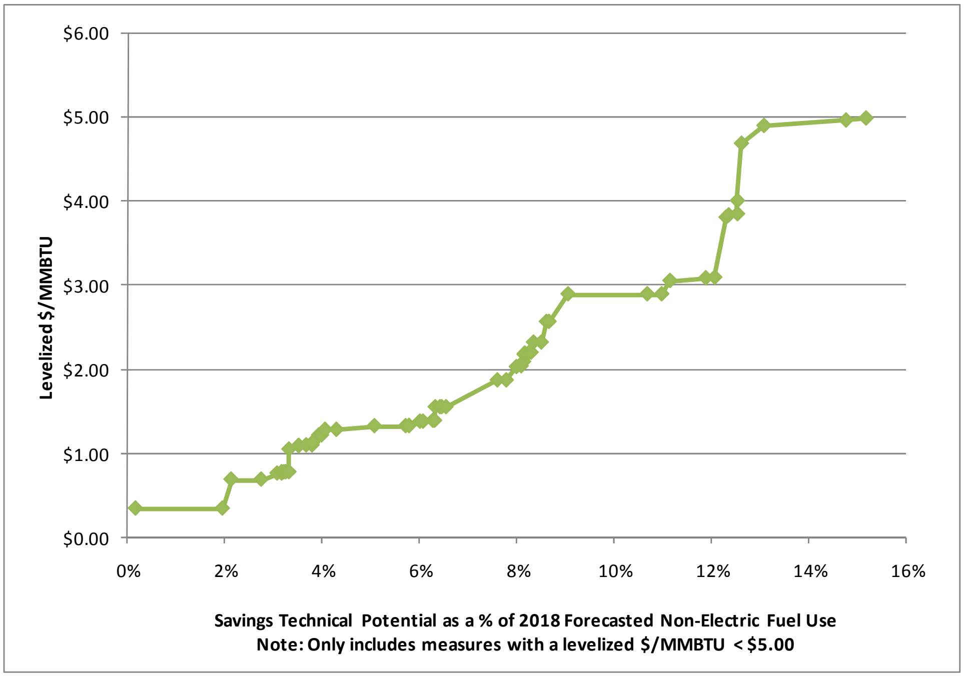


Figure 32. Residential Non-Electric Efficiency Supply (< $10/MMBTu) Curve for NH – Max Achievable

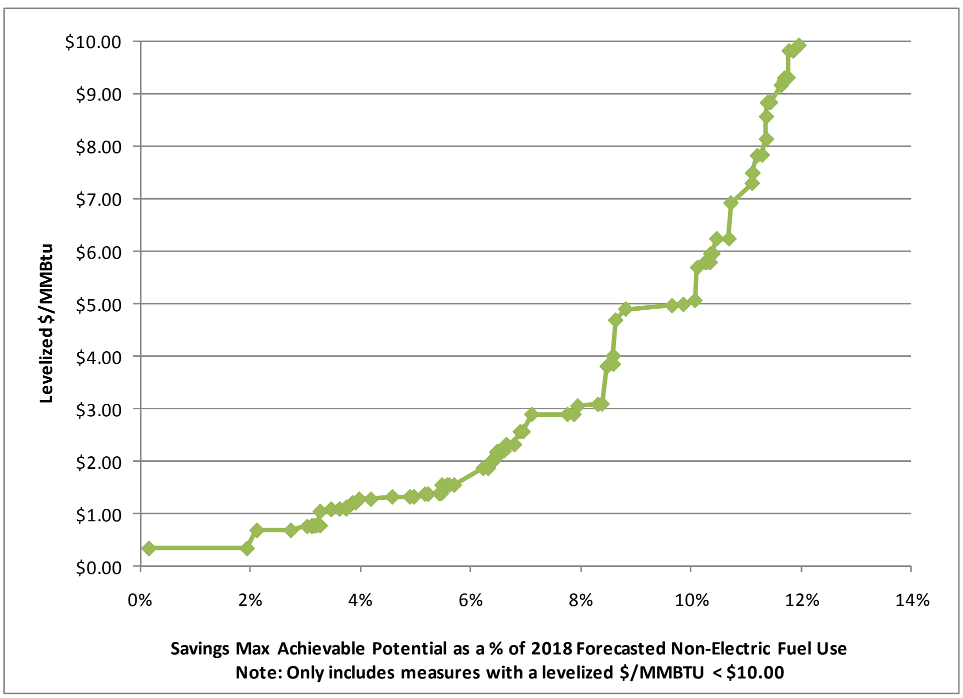


Figure 33. Residential Non-Electric Efficiency Supply (< $5/MMBTu) Curve for NH – Max Achievable

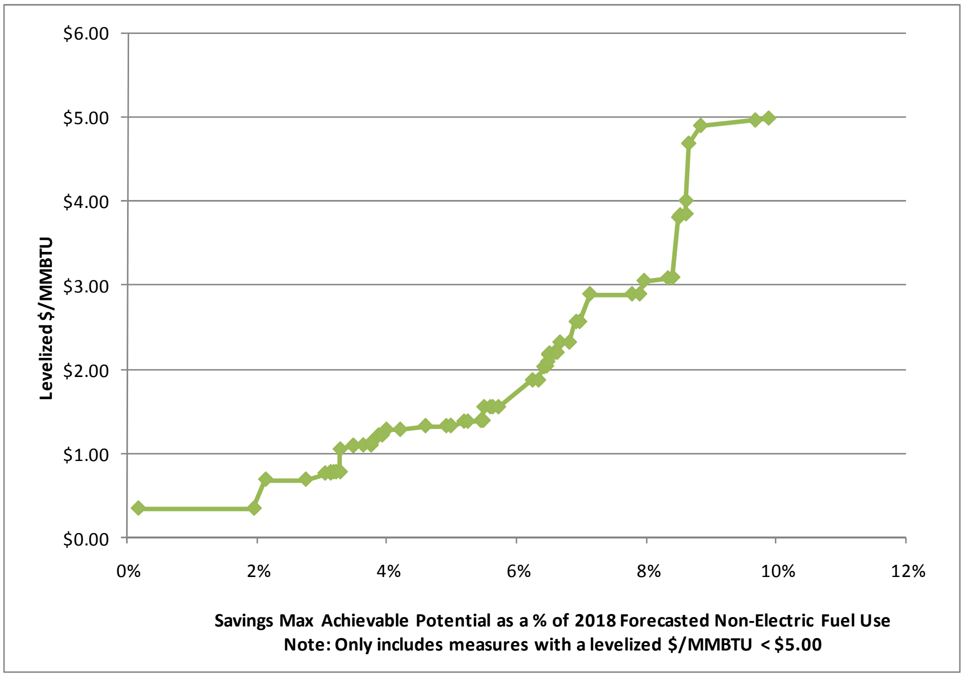


Figure 34. Residential Non-Electric Energy Efficiency Supply (< $10/MMBTu) Curve for NH – M.A.C.E

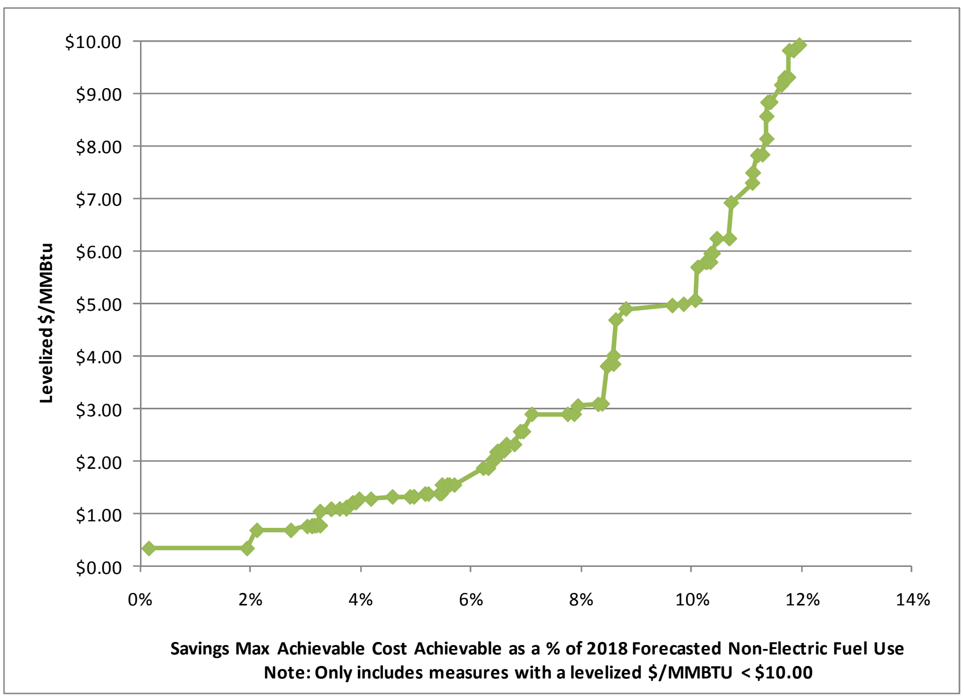
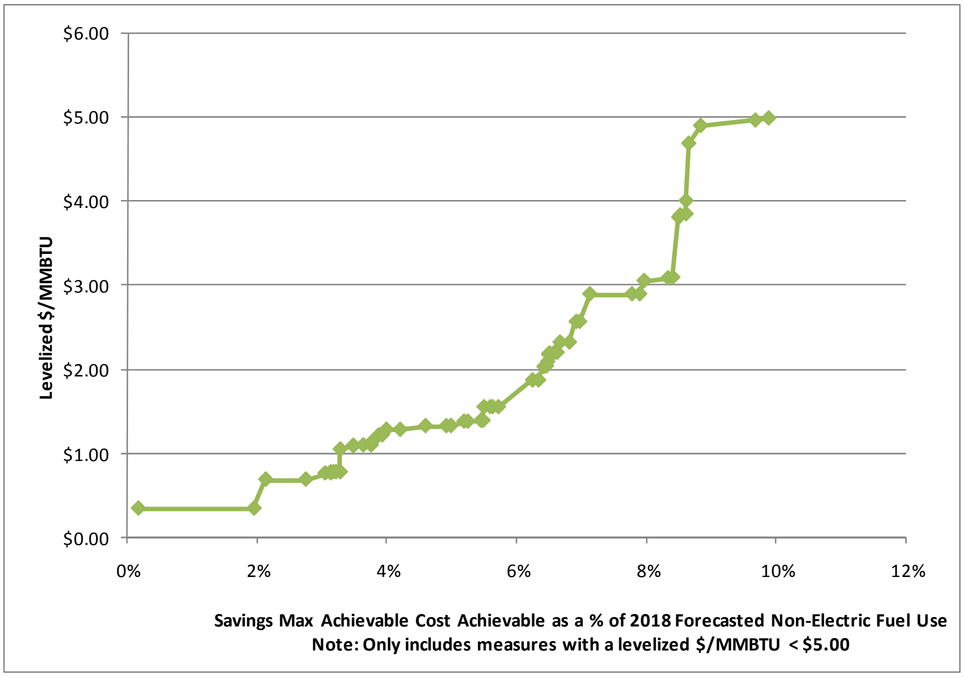


Figure 35. Residential Non-Electric Energy Efficiency Supply (< $5/MMBTu) Curve for NH – M.A.C.E.



It is important to note that these levelized costs per unit of energy saved values exclude the costs for potential marketing, program design, administration and evaluation that would be required to encourage customer participation and to ultimately achieve any portion of this sectors savings potential.

Section 5: Commercial Sector Energy Efficiency Potential

This section of the report presents the estimates of electric and non-electric technical (traditional), maximum achievable, maximum achievable cost effective, and potentially obtainable energy efficiency potential for the existing and new construction market segments of the commercial sector in New Hampshire. More information regarding how these potentials were derived is also presented.

According to this analysis, there is still a large remaining potential for electric and non-electric energy efficiency savings in the commercial sector. Table 46 and Table 47 below summarize the savings by potential type by the year 2018 for commercial electric and non-electric measures respectively (separate potentials are shown for new construction, existing buildings and combined within each table).[40] The estimated total costs to achieve each level of savings by 2018 are also presented in these tables. In addition, Table 46 presents peak demand savings for each potential level of savings associated with the electric energy efficiency measures.[41]

Table 46. Summary of Commercial Sector Electric Energy Efficiency Savings Potential

	Estimated Cumulative Annual Sales by 2018 (kWh)	Estimated Cumulative Annual Savings by 2018 (kWh)	Savings in 2018 as % of Total 2018 Electric Consumption	Estimated Cumulative Annual Demand Savings by 2018 By Sector (MW)	Estimated % of Peak Demand Savings by 2018	Estimated Costs to Achieve 2018 Cummulative Annual Savings ($ 2008 NPV)
COMMERCIAL SECTOR - NEW CONSTRUCTION						
Technical Potential (Traditional)	383,672,438	146,116,211	38.1%	54.0	1.8%	$56,524,486
Max. Achievable Potential		99,371,416	25.9%	36.7	1.2%	$44,385,181
Max. Achievable Cost Effective		81,088,647	21.1%	30.0	1.0%	$22,010,481
Potentially Obtainable		37,713,403	9.8%	13.9	0.5%	$8,926,584
COMMERCIAL SECTOR - EXISTING BUILDINGS						
Technical Potential (Traditional)	4,970,126,508	1,451,916,034	29.2%	422.9	14.2%	$914,692,446
Max. Achievable Potential		1,198,691,188	24.1%	349.1	11.7%	$806,498,673
Max. Achievable Cost Effective		985,683,305	19.8%	287.1	9.6%	$289,826,583
Potentially Obtainable		454,309,206	9.1%	132.3	4.4%	$115,897,185
COMMERCIAL SECTOR - TOTAL						
Technical Potential (Traditional)	5,353,798,946	1,598,032,244	29.8%	476.9	16.0%	$971,216,931
Max. Achievable Potential		1,298,062,604	24.2%	385.9	12.9%	$850,883,854
Max. Achievable Cost Effective		1,066,771,952	19.9%	317.1	10.6%	$311,837,064
Potentially Obtainable		492,022,609	9.2%	146.3	4.9%	$124,823,769

[40] The commercial sector sales forecast for the year 2018 was not available in terms of new and existing construction. As a result, in order to derive the split between new and existing construction, the growth of the sector over the ten (10) year study period was divided in half, and half was attributed to new construction sales, and the remaining half was attributed to growth in the existing sector.

[41] For purposes of this study, a simplifying assumption was used to estimate peak demand savings. Percentage sector peak demand savings are calculated to show savings over the summer coincident peak demand period only and are not broken out separately for summer and winter peak periods.

Table 47. Summary of Commercial Non-Electric Energy Efficiency Savings Potential

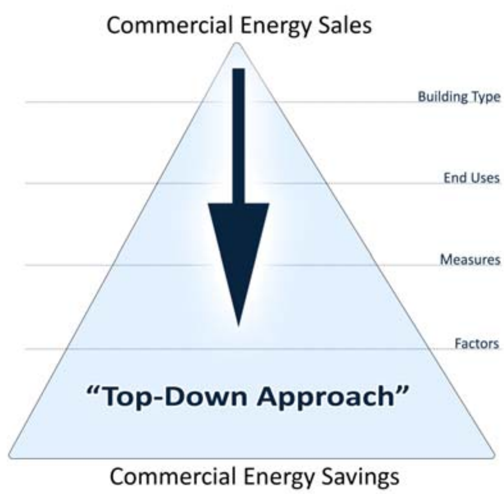
	Estimated Cumulative Annual Sales by 2018 (MMBtu)	Estimated Cumulative Annual Savings by 2018 (MMBtu)	Savings in 2018 as % of Total 2018 Gas Consumption	Estimated Costs to Achieve 2018 Cummulative Annual Savings ($ 2008 NPV)
COMMERCIAL SECTOR - NEW CONSTRUCTION				
Technical Potential	5,793,062	1,696,543	29%	$174,415,757
Achievable Potential		1,143,559	20%	$109,001,402
Achievable Cost Effective Potential		992,356	17%	$58,593,673
Potentially Obtainable		401,855	7%	$18,382,602
COMMERCIAL SECTOR - EXISTING BUILDINGS				
Technical Potential	39,536,853	10,284,474	26%	$1,047,661,444
Achievable Potential		8,932,119	23%	$927,481,632
Achievable Cost Effective Potential		6,717,981	17%	$266,103,608
Potentially Obtainable		2,850,349	7%	$83,851,626
COMMERCIAL SECTOR - TOTAL				
Technical Potential	45,329,915	11,981,017	26%	$1,222,077,201
Achievable Potential		10,075,678	22%	$1,036,483,035
Achievable Cost Effective Potential		7,710,337	17%	$324,697,281
Potentially Obtainable		3,252,204	7%	$102,234,228

On the electric side, the combined existing and new buildings maximum achievable cost effective potential in the commercial sector in 2018 is nearly 1 million kWh, just under 20 percent of the New Hampshire commercial sector sales forecast in 2018. With regard to non-electric potential for new and existing buildings combined, the maximum achievable cost effective potential in the commercial sector is over 7.7 million MMBTu, or 17% of the New Hampshire commercial sector fossil fuel (natural gas, oil and propane) sales forecast in 2018. The lists of measures that make up the savings for each of these levels are shown in Table 52 through Table 55 in Section 5.2.1 below.

5.1 Commercial Sector Savings Methodology Overview

The commercial sector analysis was modeled using what is considered a “top-down approach”. This methodology, shown visually in Figure 36 below:

Figure 36. Commercial Sector Savings Methodology – Top Down Approach



As shown in this figure, the methodology is started at the top with the total projected 2018 kWh sales for the commercial sector. Those sales are then split up by building type using SIC codes of actual customer data (provided to us by project sponsors). After the sales are distributed across the building types, they are broken down further to end-uses (e.g. lighting, space heating, appliances) within each of the building types. From the end-use level, the energy is then applied to each of the measures using applicability factors. The base case factor is applied first, to inform the model regarding how much of the sales in a particular end use was applicable to the specific measure in question. After identifying how much energy each measure uses within that end use (i.e., what degree of the end use sales is going to each measure), then models then look at the remaining factor. As discussed in Section 3, the remaining factor identifies what percentage of the building type in question already has the efficient measure. The remaining factor is then one minus that penetration – resulting in the percentage, by building type, of each measure that can still be installed in within the commercial sector. The model then considers the savings factor, which is defined is the percentage savings achievable from moving from a standard efficiency measure to a high efficiency measure. Finally, adjustments are made for any technical limitations that would prevent the measure from being installed in certain applications via the convertible factor (engineering adjustment). This scenario is repeated for every measure within every building type, for new and existing construction, and for electric measures, and non-electric measures. The formula that has just been explained to calculate savings at the measure level is displayed below graphically.

Technical Potential of Efficient Measure = **Total End Use kWh Sales by Building Type** X **Base Case Factor** X **Remaining Factor** X **Convertible Factor** X **Savings Factor**

Measure interactivity is also considered so as to prevent overstating (double-counting) of savings. To better illustrate this point, in the case of lighting, consider the upgrade of a T-12 fixture to a T-8, and then the installation of an occupancy control. In such a case, the occupancy control is only able to save the amount of energy left after the upgrade has taken place. Through functionality included within the GDS supply curve model, measures are ranked by benefit cost ratio (highest to lowest) as a proxy to determine the order by which measures are installed. Through a combination of the proper classification of the base case factors, and the rankings in the supply curve model, the potential for double-counting is methodically eliminated.

The supply curve model is designed in a manner that allows for each measure to have independent base, remaining, savings, and convertible factors for all of the nine (9) building types. In addition, every building type has its own energy consumption profile that defines how energy consumption within that building type is distributed among the end uses (e.g. lighting, water heating, appliances, etc) within the building type. This allows the model to run savings analyses on building specific energy consumption profiles and building specific energy savings profiles simultaneously in order to yield the most accurate and realistic savings potential estimates possible. In addition, individual models are run for commercial existing construction, and commercial new-construction for both electric and non-electric yielding a total of four unique (4) commercial supply curve models. The commercial electric models (existing and new construction) were based on kWh sales in the year 2018, while the commercial non-electric model used 2018 MMBTu sales for natural gas, oil, and propane combined.[42]

The measures within each building type are organized and grouped by the end use energy consumption pools that they have the ability to potentially save energy from. Lighting measures for instance are all working off of the lighting energy sales in the year 2018 as a basis or starting point for the energy savings potential within a particular building type. The ordering of the lighting related measures within this grouping is determined by benefit cost ratio. Measures with higher benefit cost ratios are assumed to be installed first, and then ranked in descending order on down the line. As a measure is installed, the model reduces the remaining sales left to be saved for the next measure (the actual algorithm for how this happens within the model on a measure to measure basis is more complex than what is being described here). So if a lighting fixture is upgraded, and then a control is installed, the control has less potential energy to save since the light it is controlling has already been upgraded to a more efficient version. This process is repeated until all measures within each end use are exhausted in order to yield the savings potential at the measure level, end-use level, and the building-type level.

The costs to achieve savings potential estimates within the commercial sector are calculated on a measure by measure basis using the levelized cost ($/kWh in the electric model and $/MMBTu within the non-electric model) for each measure. These levelized costs represent the cost to save a unit of energy. These levelized costs are then taken and multiplied (again at the measure level) by the 2018 annual savings associated with the potential level we are attempting to capture (technical potential, maximum achievable, etc.). A net present value (NPV) formula is then used in conjunction with each measure's measure life and an overall discount rate to determine the $ cost per first year kWh (or MMBTu) saved for each measure. The cost per first year savings figure is then multiplied by the savings potential estimate being evaluated in order to yield the cost to achieve the savings potential being quoted in the year 2018 at the measure level. Each measure is then summed up at each potential level to yield the total cost to achieve savings in the commercial sector (within the potential level being analyzed) to represent the cost to achieve the potential savings level by the year 2018. This number can then be divided by the study length (10 years) in order to yield an estimate of annual spending needed to reach the potential level target in question.

In addition, the model includes a number of measures that save energy across multiple end-use categories. Examples include retrocommissioning which can saves heating, cooling, and ventilation energy, and insulation which can provide both heating and cooling savings. As a result, these types of measure are placed within the model in a manner so that they can claim their proper savings within each one of the appropriate end-uses. A complexity occurs when attempting to properly estimate the cost for these measures. In order to avoid overstating the cost to install a measure like retrocommissioning, the cost needs to be divided across the different end-uses it affects. To simplify the modeling, it is assumed that the costs would be divided by the number of end-uses the measure effects. If the full cost for each end-use is applied, it would be inaccurate (i.e., for retrocommissioning, if the end-user is only paying for an engineer to walk-through the facility and assess and assist with implementation of identified savings opportunities in a single visit; the end-user will typically receive a single invoice for the combined retrocommissioning service, as opposed to multiple invoices being sent for implementation of each type of savings identified by the engineer). This approach is also used

[42] We were only provided actual sales forecasts through 2018 from the natural gas utilities. In order to determine the projected forecasts for oil and propane in MMBTu, we extrapolated based on the results of the commercial telephone survey (Question #16: What is the main energy source for heating?). The results of which yielded commercial customers in NH using natural gas to be 28%, oil at 46%, and bottled gas/propane at 26%. This allowed us to accurately estimate the year by year forecasts (particularly 2018) for all non-electric fuels combined.

in the model for many of the building envelope and HVAC controls measures, as they often affect more than one end-use when installed. This approach is due mainly to GDS's technical potential model's functionality. The description above, is provided to explain to readers how the model, within its existing framework, has been used to ensure that double counting of costs is avoided for these types of measures.

Table 48 and Figure 37 illustrate the commercial sector electricity sales based segmentation. This segmentation is based on 2009 commercial sales data by SIC code as provided by project sponsors.

Table 48. Commercial Sector Segmentation by Industry Type - Electric

	Industry Type	Commercial kWh	Percent of kWh Sales*	Business Categories
1	Warehouse	22,943,600	0.46%	Wholesale Trade & Warehouse
2	Retail	1,305,235,571	26.26%	Other Retail Trade
3	Grocery	843,032,754	16.96%	Food/Grocery
4	Office	1,175,866,515	23.66%	Business/Financial Services, Social Services, US Post Office, Government, Communications, Utilities, Transportation
5	Lodging	280,529,174	5.64%	Lodging
6	Health	437,017,809	8.79%	Hospitals, Other Nursing & Care, Medical Offices & Other
7	Education	536,887,562	10.80%	Elementary & Secondary Schools, Colleges & Education - Other
8	Restaurant	96,579,427	1.94%	Restaurants, Eating & Drinking Establishments
9	Other	272,034,096	5.47%	Agriculture, Forestries & Fishing, Mining & Construction, Water & Wastewater, Entertainment
	Total	4,970,126,508	100.00%	

** Based on NH Utilities 2008 - 2017 Forecast and allocations from actual Sales Data by SIC code categories*

Figure 37. Commercial Sector Segmentation by Industry Type - Electric

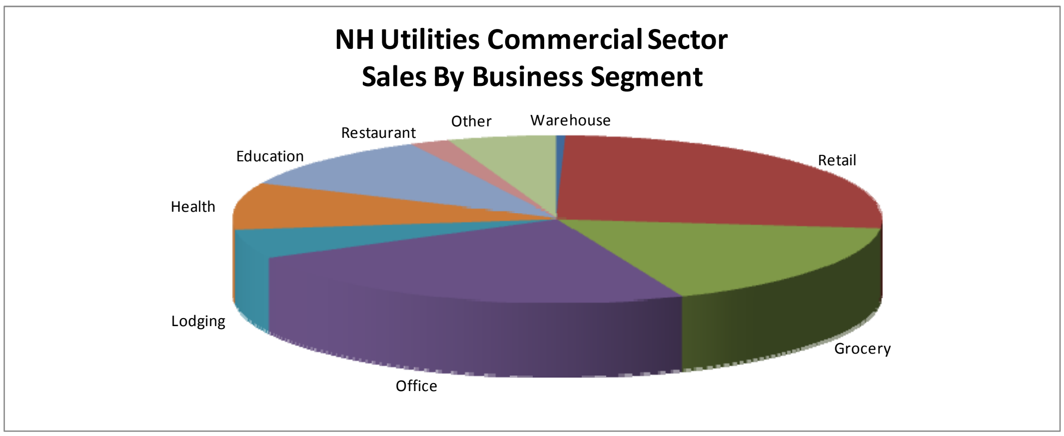


Table 49 and Figure 38 illustrate the commercial sector non-electric sales based segmentation. This segmentation is based on 2009 commercial sales data by SIC code as provided by project sponsors.

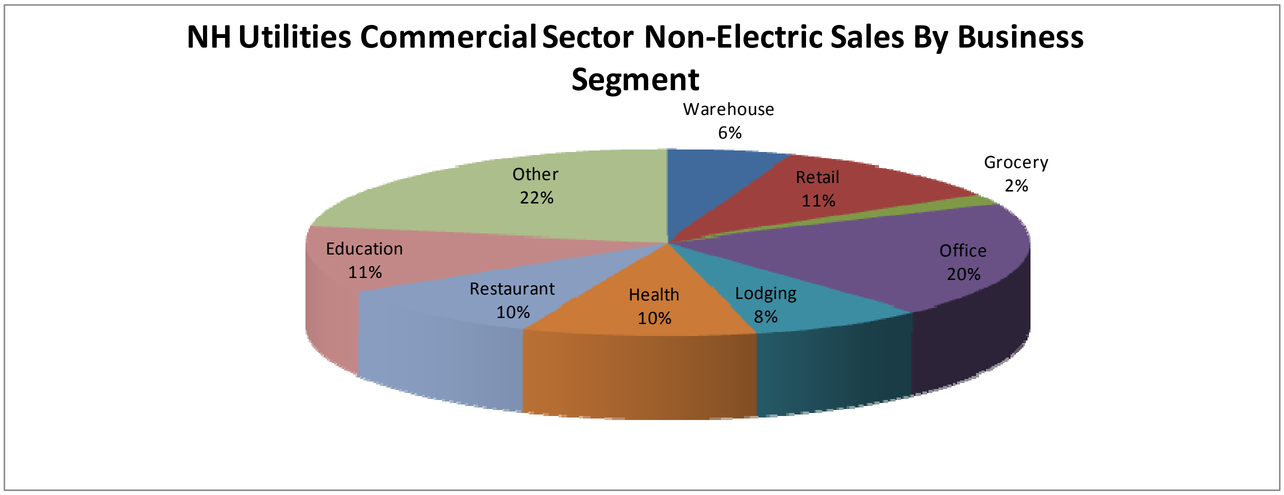
Table 49. Commercial Sector Segmentation by Industry Type – Non-Electric

	Industry Type	Percent of Non-Electric Sales*	Business Categories
1	Warehouse	5.58%	Wholesale Trade & Warehouse
2	Retail	10.94%	Other Retail Trade
3	Grocery	1.82%	Food/Grocery
4	Office	19.87%	Business/Financial Services, Social Services, US Post Office, Government, Communications, Utilities, Transportation
5	Lodging	7.81%	Lodging
6	Health	10.49%	Hospitals, Other Nursing & Care, Medical Offices & Other
7	Restaurant	9.67%	Elementary & Secondary Schools, Colleges & Education - Other
8	Education	11.38%	Restaurants, Eating & Drinking Establishments
9	Other	22.44%	Agriculture, Forestries & Fishing, Mining & Construction, Water & Wastewater, Entertainment
	Total	100.00%	

** Based on US DOE, Energy Information Administration (EIA), 2003 Commercial Buildings Energy Consumption Survey, Tables C23A and C25A*

Natural Gas Energy Efficiency Resource Development Potential in New York, Prepared for New York Energy Research and Development Authority, by OPTIMAL ENERGY, INC., AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY, VERMONT ENERGY INVESTMENT CORPORATION, RESOURCE INSIGHT, INC., ENERGY AND ENVIRONMENTAL ANALYSIS, INC., October 31, 2006

Figure 38. Commercial Sector Segmentation by Industry Type – Non-Electric



5.3 Commercial Sector End-Use Breakdowns

Table 50 and Table 51 illustrate the commercial sector energy sales based segmentation. The breakdown of commercial electricity use by end-use and industry type was developed based on data included in the 2003 New York Technical Potential Study while the breakdown for non-electric was based on a similar New York Technical Potential Study[43] conducted in 2006. This study divided New York into regions and the Albany region (Region F) was used as a reasonable representation of the commercial sector in New Hampshire.

Table 50. Commercial Sector End Use Breakdowns Allocation Table – Electric

	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other		TOTAL
Indoor Lighting	18%	25%	50%	38%	24%	28%	20%	43%	17%		29%
Outdoor Lighting	3%	2%	6%	4%	5%	2%	6%	4%	2%		4%
Cooling	2%	21%	18%	13%	13%	21%	10%	10%	8%		12%
Ventilation	10%	20%	10%	10%	18%	9%	7%	18%	6%		11%
Water Heating	1%	5%	5%	2%	8%	6%	16%	6%	4%		5%
Refrigeration	58%	9%	1%	1%	3%	3%	32%	2%	20%		13%
Space Heating	4%	12%	4%	13%	20%	9%	4%	9%	3%		8%
Office Equipment	2%	2%	2%	11%	3%	2%	1%	4%	2%		4%
Miscellaneous	3%	3%	3%	8%	5%	21%	3%	4%	38%		14%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%		100%

Table 51. Commercial Sector End Use Breakdowns Allocation Table – Non-Electric

Non-Electric	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Space Heating	76%	62%	56%	72%	53%	45%	34%	60%	48%
Water Heating	16%	22%	25%	26%	34%	37%	27%	24%	29%
Cooking	3%	15%	17%	0%	9%	15%	37%	13%	20%
Other	5%	1%	2%	2%	4%	4%	2%	3%	3%
Blank	0%	0%	0%	0%	0%	0%	0%	0%	0%

5.4 Commercial Sector – Energy Efficiency Potential Results

One-hundred-twenty-five (125) commercial electric, and sixty seven (67) commercial non-electric energy efficiency measures were included in the analysis for the commercial sector. In order to develop the list of energy efficiency measures to be examined, GDS worked closely

[43] Natural Gas Energy Efficiency Resource Development Potential in New York, Prepared for New York Energy Research and Development Authority, by OPTIMAL ENERGY, INC., AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY, VERMONT ENERGY INVESTMENT CORPORATION, RESOURCE INSIGHT, INC., ENERGY AND ENVIRONMENTAL ANALYSIS, INC., October 31, 2006

with project sponsors and reviewed recent measure life, savings and cost assumption studies including a Measure Life Report prepared by GDS for the New England State Program Working Group in June 2007 and a GasNetworks measures assumptions update project completed by GDS during the summer 2008. In addition, GDS reviewed other related electric and non-electric commercial sector energy efficiency measure-specific data sources and technical potential studies that have been conducted recently in the US. Focus was for comprehensiveness on the electric and natural gas measures, less so for fuel oil and propane. Even within electric and natural gas some measure limitations were required (e.g., Data Center/IT, etc.).

The set of energy efficiency measures considered was pre-screened to mainly those measures that are currently commercially available (or were estimated to be cost effective within the ten year study period). Thus, emerging technologies not currently in the marketplace that had benefit cost ratios below 0.9 were not included in the analysis. The portfolio of measures includes retrofit and replace on burnout programmatic approaches to achieve energy efficiency savings.

5.2.1 Characteristics of Energy Efficiency Measures

GDS collected data on the energy savings, incremental costs, useful lives and other key "per unit" characteristics of each of the commercial electric and non-electric energy efficiency measures, this data is available in Appendix F for the commercial sector. Estimates of the size of the eligible market were also developed for each efficiency measure. For example, electric T-5 lighting efficiency measures are only applicable to those commercial building types in New Hampshire that have the potential to use that lighting technology in their building space.

The commercial sector analysis was based on the most recent sales forecasts for New Hampshire for the years 2009 to 2018.[44] For the commercial new construction market segment, GDS calculated a forecast of the new construction sales estimated to be built each year based on looking at the growth of the sector over the 10 year period, and making the assumption that half of that growth is from new construction, while the other half is coming from growth of existing buildings. This assumption was approved by the project sponsors, and has been used in previous technical potential projects around the US. The sizes of various end-use market segments were informed based on project primary data collection efforts.

Energy-efficiency measures were analyzed for the most important electric and non-electric consuming end uses in the Commercial sector including:

- Space heating
- Water heating
- Air conditioning
- Lighting
- Appliances
- Pools
- Cooking
- Motors
- Transformers
- Ventilation

[44] This Commercial sector load forecast was provided to GDS by project sponsors.

Tables[45] 52 through 55 below list the commercial sector electric and non-electric energy efficiency measures included in the technical (traditional), maximum achievable, maximum achievable cost effective, and potentially obtainable potential analyses. The portfolio of measures includes retrofit, and replace on burnout programmatic approaches to achieve energy efficiency savings. More information regarding measure-specific savings, cost and measure life assumptions can be found in Appendix F.

Table 52. Commercial Electric Savings Potential by Measure – Existing Buildings

Measure	Tech. Pot.	Max. Achievable	MACE	% of MACE	Potentially Obtainable
Retrocommissioning	101,979,593	101,979,593	101,979,593	10.3%	49,256,143
Fluorescent Fixtures with Reflectors	90,751,384	81,668,048	81,668,048	8.3%	39,445,667
Switch Mounted Occupancy Sensor	56,342,676	56,342,676	56,342,676	5.7%	27,213,512
Floating Head Pressure Control	44,029,506	44,029,506	44,029,506	4.5%	21,266,252
Remote Mounted Occupancy Sensor - Non HIF	38,785,725	38,785,725	38,785,725	3.9%	18,733,505
CFL Screw-in	33,169,264	33,169,264	33,169,264	3.4%	16,020,754
Energy Efficient Windows (Replace on Burnout)	92,440,699	30,813,566	30,813,566	3.1%	14,882,953
Variable Frequency Drives (VFD)	40,501,683	27,001,122	27,001,122	2.7%	13,041,542
Ductless (mini split)	26,993,752	26,993,752	26,993,752	2.7%	6,518,991
Evaporator Fan Motor Controls	33,045,375	22,030,250	22,030,250	2.2%	5,320,305
Specialty Fixtures - Induction Fluorescent 23W	28,592,536	21,994,259	21,994,259	2.2%	10,623,227
Zero-Energy Doors - Freezers	19,520,429	19,520,429	19,520,429	2.0%	9,428,367
Replace Exterior Quartz Halogen w/PSMH or HPS	28,942,152	19,294,768	19,294,768	2.0%	9,319,373
EMS install	18,864,017	18,864,017	18,864,017	1.9%	9,111,320
Commercial Reach-In Cooler	15,924,806	15,924,806	15,924,806	1.6%	7,691,681
Replace Exterior Metal Halide w/PSMH	23,003,335	15,335,557	15,335,557	1.6%	7,407,074
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	15,243,813	15,243,813	15,243,813	1.5%	7,362,762
Demand-Controlled Ventilation (CO2 vent control)	20,968,521	13,979,014	13,979,014	1.4%	6,751,864
ECM Motors	13,676,783	13,676,783	13,676,783	1.4%	6,605,886
Water Source Heat Pump	19,613,800	13,075,867	13,075,867	1.3%	6,315,644
Zero-Energy Doors - Coolers	12,230,015	12,230,015	12,230,015	1.2%	5,907,097
Discuss Compressor	11,935,928	11,935,928	11,935,928	1.2%	5,765,053
Comprehensive Track Proper HVAC Sizing	17,165,741	11,443,827	11,443,827	1.2%	5,527,369
LEC Exit Sign	11,440,019	11,440,019	11,440,019	1.2%	5,525,529
High Efficiency AC - Unitary & Split AC Systems (Tier 3)	17,145,155	11,430,103	11,430,103	1.2%	5,520,740
Door Heater Controls	10,931,822	10,931,822	10,931,822	1.1%	5,280,070
Scroll Compressor	12,940,781	9,954,447	9,954,447	1.0%	4,807,998
High Intensity Fluorescent Fixtures (replacing HID) - Hi & Low Bay	14,430,291	9,620,194	9,620,194	1.0%	4,646,554
High Efficiency Fluorescent Fixtures (HP T8 Troffer Replacing T12)	14,285,071	9,523,381	9,523,381	1.0%	4,599,793
Lamp & Ballast Retrofit (HP T8 Replacing T12)	14,285,071	9,523,381	9,523,381	1.0%	4,599,793
High Efficiency Fluorescent Fixtures (Low Glare Troffer HPT8/T5 Replacing T12)	14,196,345	9,464,230	9,464,230	1.0%	4,571,223
Variable Speed Drive Control, 5 HP	14,125,965	9,417,310	9,417,310	1.0%	4,548,561
Solar Water Heating System	9,213,272	9,213,272	9,213,272	0.9%	2,225,005
HID Fixture - Pulse Start Metal Halide (Interior)	11,619,517	8,938,090	8,938,090	0.9%	4,317,098
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	8,571,331	8,571,331	8,571,331	0.9%	2,069,976
LED Exit Sign	7,604,134	7,604,134	7,604,134	0.8%	1,836,398
Commercial Reach-In Freezer	7,569,524	7,569,524	7,569,524	0.8%	3,656,080
Cold Cathode Screw In	7,527,043	7,527,043	7,527,043	0.8%	3,635,562
Low Flow Pre-Rinse Spray Nozzle (Included in 2006 Federal Standards) (Electric HW)	7,380,898	7,380,898	7,380,898	0.7%	3,564,974
High Efficiency AC - Unitary and Split Systems (Tier 2)	11,049,100	7,366,067	7,366,067	0.7%	3,557,810
Specialty Fixtures - Halogen Infra-Red Bulb	9,026,178	6,943,214	6,943,214	0.7%	3,353,572
Programmable Thermostat	6,929,023	6,929,023	6,929,023	0.7%	3,346,718
Energy Efficient Transformers	20,009,659	6,669,886	6,669,886	0.7%	3,221,555
CFL Fixture	6,564,217	6,564,217	6,564,217	0.7%	3,170,517
Improved Duct Sealing	9,283,367	6,188,911	6,188,911	0.6%	2,989,244
Centrifugal Chiller, 0.51 kW/ton, 300 tons	11,934,809	5,967,405	5,967,405	0.6%	2,882,256
Centrifugal Chiller, 0.51 kW/ton, 500 tons	11,934,809	5,967,405	5,967,405	0.6%	2,882,256
H.E. Evaporative Fan Motors	8,828,201	5,885,467	5,885,467	0.6%	2,842,681
Fan Motor, 5hp, 1800rpm, 90.4%	5,770,503	5,770,503	5,770,503	0.6%	1,393,576
Heat Pump Water Heater	7,763,401	5,545,286	5,545,286	0.6%	2,678,373
LED Screw In	7,084,276	5,449,443	5,449,443	0.6%	2,632,081
Specialty Fixtures - Integrated Ballast 25W MH	6,579,154	5,060,888	5,060,888	0.5%	2,444,409
Lamp & Ballast Retrofit (HP T8 Replacing Standard T8)	7,331,124	4,887,416	4,887,416	0.5%	2,360,622
Energy Star Compliant Single Door Refrigerator	6,179,517	4,753,474	4,753,474	0.5%	2,295,928
Refrigerated Case Covers	4,428,568	4,428,568	4,428,568	0.4%	2,138,998
Chiller Tune Up/Diagnostics - 500 ton	4,274,752	4,274,752	4,274,752	0.4%	2,064,705
Specialty Fixtures - Metal Halide Track	4,270,022	4,270,022	4,270,022	0.4%	2,062,421
Chiller Tune Up/Diagnostics - 300 ton	4,065,300	4,065,300	4,065,300	0.4%	981,770
Variable Speed Drive Control, 15 HP	5,782,153	3,854,769	3,854,769	0.4%	1,861,853
Heat Recovery	8,685,502	3,776,305	3,776,305	0.4%	911,978
Air Curtains (replacing electric door heaters)	3,140,876	3,140,876	3,140,876	0.3%	1,517,043
Efficient Motors	6,046,377	3,023,189	3,023,189	0.3%	1,460,200
Electronically-Commutated Permanent Magnet Motors (ECPMs)	5,953,879	2,976,939	2,976,939	0.3%	1,437,862
Variable Refrigerant Volume/Flow	4,443,727	2,962,485	2,962,485	0.3%	1,430,558
Commercial Ice-makers	2,893,273	2,893,273	2,893,273	0.3%	1,397,451
High Efficiency Heat Pump	4,182,891	2,788,594	2,788,594	0.3%	1,346,891

Table 52. Commercial Electric Savings Potential by Measure – Existing Buildings (continued)

Measure	Tech. Pot.	Max. Achievable	MACE	% of MACE	Potentially Obtainable
LED Christmas type - decorative lighting	2,781,714	2,781,714	2,781,714	0.3%	1,343,568
Controls for HIF- Remote Mount Occupancy Sensor	2,699,558	2,699,558	2,699,558	0.3%	1,303,886
LED Traffic / Pedestrian Signals	3,394,308	2,611,006	2,611,006	0.3%	1,261,116
Dual Enthalpy Economizer - from Fixed Damper	2,535,028	2,535,028	2,535,028	0.3%	1,224,419
Commercial Dishwasher (Under Counter Hi-Temp, Electric DHW)	2,479,353	2,479,353	2,479,353	0.3%	1,197,528
Hotel Guest Room Occupancy Control System	2,349,956	2,349,956	2,349,956	0.2%	1,135,029
Variable Pitch Fans	4,539,516	2,269,758	2,269,758	0.2%	1,096,293
Ozone Commercial Laundry System (Electric HW)	2,182,663	2,182,663	2,182,663	0.2%	1,054,226
Heat Pump Pool Heater	2,052,422	2,052,422	2,052,422	0.2%	991,320
Pool Cover	1,958,722	1,958,722	1,958,722	0.2%	946,063
High Efficiency Electric Water Heater	2,478,116	1,906,243	1,906,243	0.2%	920,715
Vending Miser for Non-Refrigerated Machines	1,550,737	1,550,737	1,550,737	0.2%	749,006
Vending Miser for Soft Drink Vending Machines	1,550,737	1,550,737	1,550,737	0.2%	749,006
Dual Enthalpy Economizer - from Dry Bulb	1,489,396	1,489,396	1,489,396	0.2%	719,378
HE Combination Oven	1,446,585	1,446,585	1,446,585	0.1%	349,350
Compressed Air – Non-Controls	1,376,113	1,376,113	1,376,113	0.1%	664,663
System/Component Diagnostics	1,954,450	1,302,967	1,302,967	0.1%	629,333
HE Holding Cabinet	1,068,185	890,154	890,154	0.1%	429,944
Fan Motor, 15hp, 1800rpm, 92.8%	830,981	830,981	830,981	0.1%	401,364
Variable Speed Drive Control, 40 HP	1,185,477	790,318	790,318	0.1%	381,724
Commercial Dishwasher (Single Tank Conveyor Hi-Temp, - Electric DHW)	1,350,477	675,239	675,239	0.1%	326,140
Energy Efficient Pool Pump with controls	476,912	476,912	476,912	0.0%	115,174
Liquid Pool Cover	430,788	430,788	430,788	0.0%	208,071
Solar Pool Heater	364,875	364,875	364,875	0.0%	176,235
HE Steamer	294,016	294,016	294,016	0.0%	142,010
Fan Motor, 40hp, 1800rpm, 94.1%	219,392	219,392	219,392	0.0%	52,983
Radiant Ceiling Cooling	321,497	214,332	214,332	0.0%	103,522
High efficiency spas/hot tubs	69,896	69,896	69,896	0.0%	33,760
Temperature Control	38,002	38,002	38,002	0.0%	18,355
Controls for HID - Hi/Lo	1,900,683	1,900,683	0	0.0%	0
EZ Save Monitor Power Management Software	2,953,351	2,953,351	0	0.0%	0
Compressed Air – Controls	885,013	885,013	0	0.0%	0
Ground Source Heat Pump	24,965,328	16,643,552	0	0.0%	0
Booster Water Heater	1,334,754	1,334,754	0	0.0%	0
Demand Ventilation Control	990,421	825,351	0	0.0%	0
HE Fryer - Electric	176,409	147,008	0	0.0%	0
HVAC Advanced Tune-Up	5,051,322	5,051,322	0	0.0%	0
Refrigeration Economizer	11,470,481	11,470,481	0	0.0%	0
Ground Source Heat Pump - Cooling	10,434,052	6,956,034	0	0.0%	0
Induction Cooktops	237,374	215,795	0	0.0%	0
Interior Storm Windows (Low-e or double clear film)	38,334,933	38,334,933	0	0.0%	0
Commercial Clothes washers (Hotels, Laundromats, Restaurants, etc.) (w/ Electric DHW)	1,858,358	1,858,358	0	0.0%	0
Daylight Controlled Dimming Ballast	103,310,140	103,310,140	0	0.0%	0
Point of Use Water Heater	655,459	655,459	0	0.0%	0
TVs - Energy Star over standard	3,993,912	3,993,912	0	0.0%	0
LED lighting retrofits in refrigeration end-uses/display cases	14,839,707	14,839,707	0	0.0%	0
EMS Optimization	1,632,031	1,632,031	0	0.0%	0
Grand Total	**1,451,916,034**	**1,198,691,188**	**985,683,305**	**100.00%**	**454,309,206**

Table 53. Commercial Electric Savings Potential by Measure – New Construction

Measure	Tech. Pot.	Max. Achievable	MACE	% of MACE	Potentially Obtainable
30% More Efficient Design - New Construction	37,451,152	24,967,435	24,967,435	30.8%	12,059,271
Integrated Building Design (Envelope Only)	26,398,145	8,799,382	8,799,382	10.9%	4,250,101
15% More Efficient Design - New Construction	13,041,633	8,694,422	8,694,422	10.7%	4,199,406
Floating Head Pressure Control	3,398,889	3,398,889	3,398,889	4.2%	1,641,663
Variable Frequency Drives (VFD)	3,126,556	2,084,371	2,084,371	2.6%	1,006,751
Ductless (mini split)	2,083,802	2,083,802	2,083,802	2.6%	503,238
Underfloor Air distribution	3,119,314	2,079,543	2,079,543	2.6%	1,004,419
Evaporator Fan Motor Controls	2,550,961	1,700,641	1,700,641	2.1%	410,705
Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 tons	3,245,755	1,622,878	1,622,878	2.0%	783,631
Zero-Energy Doors - Freezers	1,506,893	1,506,893	1,506,893	1.9%	727,830
Commercial Reach-In Cooler	1,229,327	1,229,327	1,229,327	1.5%	593,765
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	1,176,757	1,176,757	1,176,757	1.5%	568,374
EMS install	1,159,363	1,159,363	1,159,363	1.4%	559,972
ECM Motors	1,055,789	1,055,789	1,055,789	1.3%	509,946
Demand-Controlled Ventilation (CO2 vent control)	1,514,865	1,009,910	1,009,910	1.2%	487,787
Water Source Heat Pump	1,514,101	1,009,401	1,009,401	1.2%	487,541
Zero-Energy Doors - Coolers	944,105	944,105	944,105	1.2%	456,003
Discuss Compressor	921,402	921,402	921,402	1.1%	445,037
High Efficiency AC - Unitary & Split AC Systems (Tier 3)	1,323,532	882,355	882,355	1.1%	426,177
Door Heater Controls	843,890	843,890	843,890	1.0%	407,599
Scroll Compressor	998,973	768,441	768,441	0.9%	371,157
Comprehensive Track Proper HVAC Sizing	1,108,285	738,857	738,857	0.9%	356,868
Variable Speed Drive Control, 5 HP	1,090,464	726,976	726,976	0.9%	351,129
Solar Water Heating System	711,225	711,225	711,225	0.9%	171,761
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	661,670	661,670	661,670	0.8%	159,793
Commercial Reach-In Freezer	584,335	584,335	584,335	0.7%	282,234
Low Flow Pre-Rinse Spray Nozzle (Included in 2006 Federal Standards) (Electric HW)	569,774	569,774	569,774	0.7%	275,201
High Efficiency AC - Unitary and Split Systems (Tier 2)	852,943	568,629	568,629	0.7%	274,648
Programmable Thermostat	531,552	531,552	531,552	0.7%	256,740
Energy Efficient Transformers	1,544,660	514,887	514,887	0.6%	248,690
Centrifugal Chiller, 0.51 kW/ton, 500 tons	921,316	460,658	460,658	0.6%	222,498
Centrifugal Chiller, 0.51 kW/ton, 300 tons	921,316	460,658	460,658	0.6%	222,498
H.E. Evaporative Fan Motors	681,499	454,333	454,333	0.6%	219,443
Fan Motor, 5hp, 1800rpm, 90.4%	445,458	445,458	445,458	0.5%	107,578
Heat Pump Water Heater	599,301	428,072	428,072	0.5%	206,759
Dedicated Outdoor Air System	574,004	382,669	382,669	0.5%	184,829
Energy Star Compliant Single Door Refrigerator	477,032	366,948	366,948	0.5%	177,236
Refrigerated Case Covers	341,866	341,866	341,866	0.4%	165,122
Variable Speed Drive Control, 15 HP	446,357	297,572	297,572	0.4%	143,727
Heat Recovery	563,318	244,921	244,921	0.3%	59,148
Air Curtains (replacing electric door heaters)	242,462	242,462	242,462	0.3%	117,109
Efficient Motors	466,754	233,377	233,377	0.3%	112,721
Electronically-Commutated Permanent Magnet Motors (ECPMs)	459,614	229,807	229,807	0.3%	110,997
Commercial Ice-makers	223,348	223,348	223,348	0.3%	107,877
High Efficiency Heat Pump	322,901	215,267	215,267	0.3%	103,974
Commercial Dishwasher (Under Counter Hi-Temp, Electric DHW)	191,395	191,395	191,395	0.2%	92,444

Table 53. Commercial Electric Savings Potential by Measure – New Construction (continued)

Measure	Tech. Pot.	Max. Achievable	MACE	% of MACE	Potentially Obtainable
Hotel Guest Room Occupancy Control System	180,649	180,649	180,649	0.2%	87,253
Variable Pitch Fans	350,431	175,216	175,216	0.2%	84,629
Ozone Commercial Laundry System (Electric HW)	168,492	168,492	168,492	0.2%	81,382
Variable Refrigerant Volume/Flow	239,991	159,994	159,994	0.2%	77,255
Heat Pump Pool Heater	158,438	158,438	158,438	0.2%	76,526
Pool Cover	151,205	151,205	151,205	0.2%	73,032
Dual Enthalpy Economizer - from Fixed Damper	147,662	147,662	147,662	0.2%	71,321
High Efficiency Electric Water Heater	191,300	147,154	147,154	0.2%	71,075
Vending Miser for Soft Drink Vending Machines	119,710	119,710	119,710	0.1%	57,820
Vending Miser for Non-Refrigerated Machines	119,710	119,710	119,710	0.1%	57,820
HE Combination Oven	111,670	111,670	111,670	0.1%	26,968
Compressed Air – Non-Controls	106,230	106,230	106,230	0.1%	51,309
Dual Enthalpy Economizer - from Dry Bulb	86,322	86,322	86,322	0.1%	41,693
System/Component Diagnostics	122,737	81,825	81,825	0.1%	39,521
HE Holding Cabinet	82,459	68,716	68,716	0.1%	33,190
Fan Motor, 15hp, 1800rpm, 92.8%	64,148	64,148	64,148	0.1%	30,984
Variable Speed Drive Control, 40 HP	91,514	61,009	61,009	0.1%	29,467
Commercial Dishwasher (Single Tank Conveyor Hi-Temp, - Electric DHW)	104,251	52,126	52,126	0.1%	25,177
Energy Efficient Pool Pump with controls	36,816	36,816	36,816	0.0%	8,891
Liquid Pool Cover	33,255	33,255	33,255	0.0%	16,062
Solar Pool Heater	28,167	28,167	28,167	0.0%	13,605
HE Steamer	22,697	22,697	22,697	0.0%	10,963
Fan Motor, 40hp, 1800rpm, 94.1%	16,936	16,936	16,936	0.0%	4,090
Radiant Ceiling Cooling	24,694	16,463	16,463	0.0%	7,952
High efficiency spas/hot tubs	5,396	5,396	5,396	0.0%	2,606
Temperature Control	2,934	2,934	2,934	0.0%	1,417
LED lighting retrofits in refrigeration end-uses/display cases	1,145,562	1,145,562	0	0.0%	0
Commercial Clothes washers (Hotels, Laundromats, Restaurants, etc.) (w/ Electric DHW)	143,457	143,457	0	0.0%	0
Refrigeration Economizer	885,472	885,472	0	0.0%	0
Point of Use Water Heater	50,599	50,599	0	0.0%	0
Ground Source Heat Pump	1,927,216	1,284,811	0	0.0%	0
Commercial Clothes washers (Hotels, Laundromats, Restaurants, etc.) (w/ Non-Electric DHW)	0	0	0	0.0%	0
Induction Cooktops	18,324	16,658	0	0.0%	0
EZ Save Monitor Power Management Software	227,986	227,986	0	0.0%	0
Demand Ventilation Control	76,456	63,714	0	0.0%	0
Daylight Dimming - New Construction	13,436,518	13,436,518	0	0.0%	0
Ground Source Heat Pump - Cooling	805,464	536,976	0	0.0%	0
HE Fryer - Electric	13,618	11,348	0	0.0%	0
Compressed Air – Controls	68,319	68,319	0	0.0%	0
Booster Water Heater	103,037	103,037	0	0.0%	0
TVs - Energy Star over standard	308,313	308,313	0	0.0%	0
Grand Total	**146,116,211**	**99,371,416**	**81,088,647**	**100.00%**	**37,713,403**

Table 54. Commercial Non-Electric Savings Potential by Measure – Existing Construction

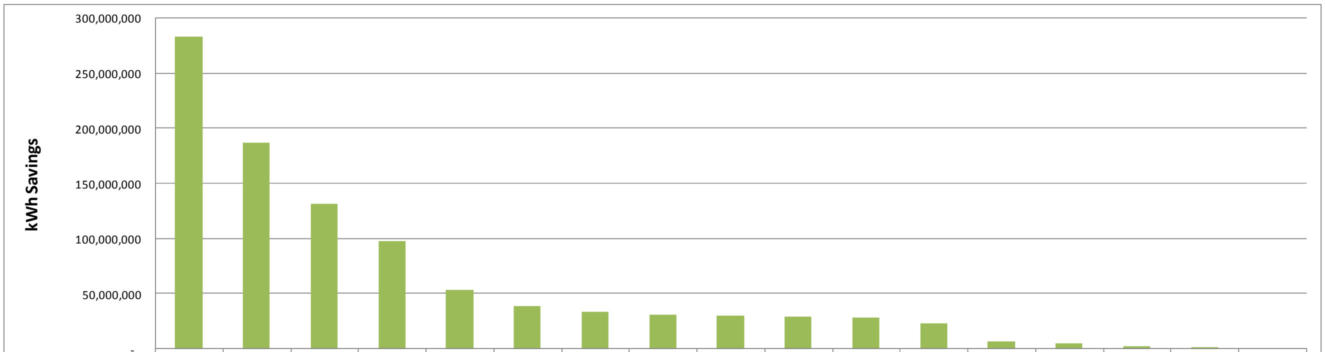
Measure	Tech. Potential (MMBtu)	Max. Achievable (MMBtu)	MACE (MMBtu)	% of MACE	Pot. Obtainable
Condensing Boiler	759,394	759,394	759,394	8.5%	183,394
Retrocommissioning	632,588	632,588	632,588	7.1%	305,540
Boiler Reset Controls	522,553	522,553	522,553	5.9%	252,393
Destratification Fans	416,537	416,537	416,537	4.7%	201,187
Programmable Thermostat	380,314	380,314	380,314	4.3%	183,692
Filter replacement	319,077	319,077	319,077	3.6%	154,114
Roof Insulation (only when re-roofing)	287,347	287,347	287,347	3.2%	134,182
Ozone Commercial Laundry System	265,156	265,156	265,156	3.0%	57,166
Tank Insulation	249,847	249,847	249,847	2.8%	120,676
Faucet Aerator	231,579	231,579	231,579	2.6%	111,853
High Efficiency Furnace (AFUE>=92%)	377,571	188,785	188,785	2.1%	91,183
Pool Cover	181,651	181,651	181,651	2.0%	76,112
Insulated Overhead Doors	345,603	172,802	172,802	1.9%	48,696
ECM - 92% (packaged with a high efficiency furnace)	256,436	142,465	142,465	1.6%	66,805
Demand-Controlled Ventilation (CO2 vent control)	203,741	135,827	135,827	1.5%	55,614
Indirect Fired Water Heating Systems	187,984	125,323	125,323	1.4%	60,531
Loading dock Seals	125,179	125,179	125,179	1.4%	51,059
EMS install	124,705	124,705	124,705	1.4%	58,247
Low Flow Shower Heads	111,991	111,991	111,991	1.3%	54,092
Exhaust hood makeup air	105,610	105,610	105,610	1.2%	48,186
Steam trap maintenance	100,813	100,813	100,813	1.1%	48,693
Dedicated Outdoor Air Systems (DOAS) (reduces both AC & htg)	133,360	88,907	88,907	1.0%	23,528
Energy Efficient Windows	212,826	85,131	85,131	1.0%	41,118
Boiler- Heating Pipe Insulation	81,795	81,795	81,795	0.9%	39,507
High Efficiency Steam Boiler	156,360	78,180	78,180	0.9%	37,761
Boiler Tune-Up	75,435	75,435	75,435	0.8%	36,435
Demand Ventilation Control	111,159	74,106	74,106	0.8%	35,793
Energy and Heat Recovery Ventilators (ERV/HRV)	65,985	65,985	65,985	0.7%	15,935
High Efficiency Hot Water Boiler(AFUE>=85%)	112,817	56,408	56,408	0.6%	27,245
Energy Star Fryer	53,993	53,993	53,993	0.6%	26,079
Efficient Furnace Fan (Non-Electric Furnace)	87,466	48,592	48,592	0.5%	11,735
Low Flow Pre-Rinse Spray Nozzle	45,589	45,589	45,589	0.5%	21,985
High Efficiency Clothes Washer	44,790	44,790	44,790	0.5%	21,423
High Efficiency Gas Steamer	40,495	40,495	40,495	0.5%	19,559
Refrigeration waste heat recovery	49,503	33,002	33,002	0.4%	15,940
Infrared Heater	54,781	32,224	32,224	0.4%	13,108
High Efficiency (95%) Gas Pool Water Heater	30,073	30,073	30,073	0.3%	11,574
High Efficiency Spa/Hot Tub Heater	26,633	26,633	26,633	0.3%	10,918
Pipe Insulation	26,592	26,592	26,592	0.3%	12,844
Solar Pool Heater	24,852	24,852	24,852	0.3%	6,017
High Efficiency Gas Rack Oven	16,873	16,873	16,873	0.2%	7,985
High Efficiency Gas Conveyer Oven	16,873	16,873	16,873	0.2%	8,150
Power Burner Oven	16,367	16,367	16,367	0.2%	7,746
High Efficiency Gas Convection Oven	15,523	15,523	15,523	0.2%	7,498
High Efficiency Gas Broiler	12,149	12,149	12,149	0.1%	5,868
High Efficiency Gas Combination Oven	10,124	10,124	10,124	0.1%	4,890
Stack Heat Exchanger	17,956	8,978	8,978	0.1%	4,336
On Demand Water Heater	7,623	7,623	7,623	0.1%	1,744
Repair malfunctioning steam traps	7,387	7,387	7,387	0.1%	3,568
High Efficiency Water Heater>=62%	6,282	6,282	6,282	0.1%	3,034
Boiler blowdown heat exchanger (steam)	3,850	3,850	3,850	0.0%	1,859
Boiler O2 Trim Controls	3,630	3,630	3,630	0.0%	1,753
Interior Storm Windows (Low-e or double clear film)	0	0	0	0.0%	0
Improved Duct Sealing	874,830	583,220	0	6.5%	0
Heat Recovery from Air to Air	69,807	69,807	0	0.8%	0
Integrated Building Design, Envelope Only (30% > code)	0	0	0	0.0%	0
Wall Insulation	765,976	765,976	0	8.6%	0
Enthalpy/Energy Recovery Heat Exchangers for Ventilation	71,730	47,820	0	0.5%	0
Solar Water Heating System	355,820	355,820	0	4.0%	0
Air curtains	130,672	130,672	0	1.5%	0
Improved Duct Sealing (also for heating & cooling)	0	0	0	0.0%	0
Exterior Door Insulation	191,491	191,491	0	2.1%	0
EMS Optimization	4,541	4,541	0	0.1%	0
Commissioning	0	0	0	0.0%	0
High Efficiency Gas Griddle	64,792	64,792	0	0.7%	0
Grand Total	**10,284,474**	**8,932,119**	**6,717,981**	**100.0%**	**2,850,349**

Table 55. Commercial Non-Electric Savings Potential by Measure – New Construction

Measure	Tech. Potential (MMBtu)	Max. Achievable (MMBtu)	MACE (MMBtu)	% of MACE	Pot. Obtainable
Condensing Boiler	759,394	759,394	759,394	11.8%	183,394
Boiler Reset Controls	522,553	522,553	522,553	8.1%	252,393
Destratification Fans	416,537	416,537	416,537	6.5%	201,187
Programmable Thermostat	380,314	380,314	380,314	5.9%	183,692
Filter replacement	319,077	319,077	319,077	5.0%	154,114
Ozone Commercial Laundry System	265,156	265,156	265,156	4.1%	57,166
Tank Insulation	249,847	249,847	249,847	3.9%	120,676
Faucet Aerator	231,579	231,579	231,579	3.6%	111,853
High Efficiency Furnace (AFUE>=92%)	377,571	188,785	188,785	2.9%	91,183
Pool Cover	181,651	181,651	181,651	2.8%	76,112
ECM - 92% (packaged with a high efficiency furnace)	256,436	142,465	142,465	2.2%	66,805
Demand-Controlled Ventilation (CO2 vent control)	203,741	135,827	135,827	2.1%	55,614
Indirect Fired Water Heating Systems	187,984	125,323	125,323	1.9%	60,531
EMS install	124,705	124,705	124,705	1.9%	58,247
Low Flow Shower Heads	111,991	111,991	111,991	1.7%	54,092
Steam trap maintenance	100,813	100,813	100,813	1.6%	48,693
Dedicated Outdoor Air Systems (DOAS) (reduces both AC & htg)	133,360	88,907	88,907	1.4%	23,528
Boiler- Heating Pipe Insulation	81,795	81,795	81,795	1.3%	39,507
High Efficiency Steam Boiler	156,360	78,180	78,180	1.2%	37,761
Boiler Tune-Up	75,435	75,435	75,435	1.2%	36,435
Demand Ventilation Control	111,159	74,106	74,106	1.2%	35,793
Energy and Heat Recovery Ventilators (ERV/HRV)	65,985	65,985	65,985	1.0%	15,935
High Efficiency Hot Water Boiler(AFUE>=85%)	112,817	56,408	56,408	0.9%	27,245
Energy Star Fryer	53,993	53,993	53,993	0.8%	26,079
Efficient Furnace Fan (Non-Electric Furnace)	87,466	48,592	48,592	0.8%	11,735
Low Flow Pre-Rinse Spray Nozzle	45,589	45,589	45,589	0.7%	21,985
High Efficiency Clothes Washer	44,790	44,790	44,790	0.7%	21,423
High Efficiency Gas Steamer	40,495	40,495	40,495	0.6%	19,559
Refrigeration waste heat recovery	49,503	33,002	33,002	0.5%	15,940
Infrared Heater	54,781	32,224	32,224	0.5%	13,108
High Efficiency (95%) Gas Pool Water Heater	30,073	30,073	30,073	0.5%	11,574
High Efficiency Spa/Hot Tub Heater	26,633	26,633	26,633	0.4%	10,918
Pipe Insulation	26,592	26,592	26,592	0.4%	12,844
Solar Pool Heater	24,852	24,852	24,852	0.4%	6,017
High Efficiency Gas Rack Oven	16,873	16,873	16,873	0.3%	7,985
High Efficiency Gas Conveyer Oven	16,873	16,873	16,873	0.3%	8,150
Power Burner Oven	16,367	16,367	16,367	0.3%	7,746
High Efficiency Gas Convection Oven	15,523	15,523	15,523	0.2%	7,498
High Efficiency Gas Broiler	12,149	12,149	12,149	0.2%	5,868
High Efficiency Gas Combination Oven	10,124	10,124	10,124	0.2%	4,890
Stack Heat Exchanger	17,956	8,978	8,978	0.1%	4,336
On Demand Water Heater	7,623	7,623	7,623	0.1%	1,744
Repair malfunctioning steam traps	7,387	7,387	7,387	0.1%	3,568
High Efficiency Water Heater>=62%	6,282	6,282	6,282	0.1%	3,034
Boiler blowdown heat exchanger (steam)	3,850	3,850	3,850	0.1%	1,859
Boiler O2 Trim Controls	3,630	3,630	3,630	0.1%	1,753
Solar Water Heating System	355,820	355,820	0	5.5%	0
Heat Recovery from Air to Air	69,807	69,807	0	1.1%	0
Improved Duct Sealing	874,830	583,220	0	9.1%	0
Enthalpy/Energy Recovery Heat Exchangers for Ventilation	71,730	47,820	0	0.7%	0
High Efficiency Gas Griddle	64,792	64,792	0	1.0%	0
Grand Total	**7,482,642**	**6,430,785**	**5,309,326**	**100.0%**	**2,221,568**

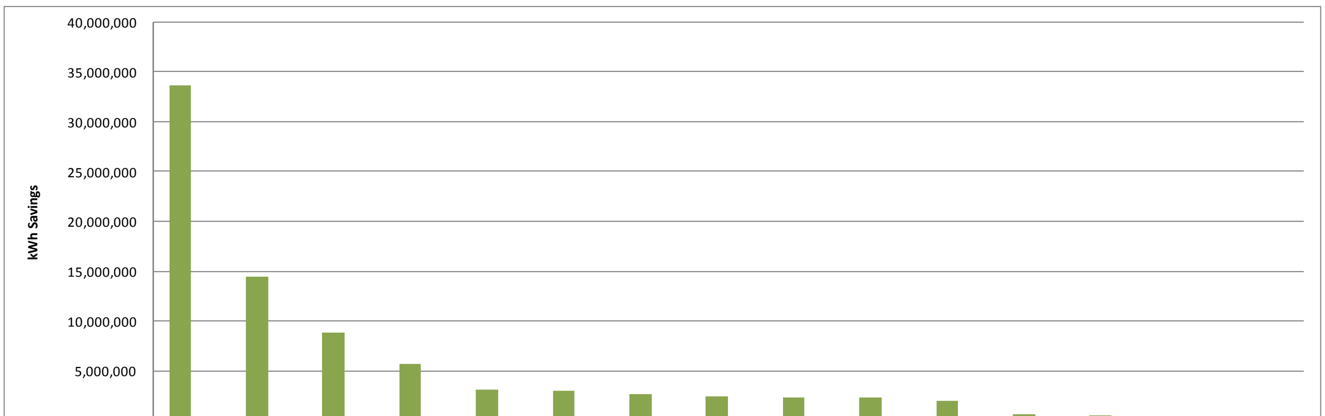
The distribution of commercial sector electric and non-electric savings by end use is shown below in Figure 39 through Figure 42 for existing and new buildings. On the electric side, for the commercial sector in New Hampshire, the electric lighting end use still represents the largest savings potential in absolute terms for both energy and peak demand, despite the significant adoption of high-efficiency lighting since the 1990's. Refrigeration represents the second largest end-use category for kWh savings and space heating and cooling makes up the third largest category for kWh savings. On the non-electric side, for the commercial sector in New Hampshire, the space-heating end use represents the largest savings potential (nearly 75%). Space heating is followed up by water heating, and the remainder is brought up by cooking, pools, and ventilation.

Figure 39. Commercial Electric Max. Achievable Cost Effective Savings By End Use – Existing



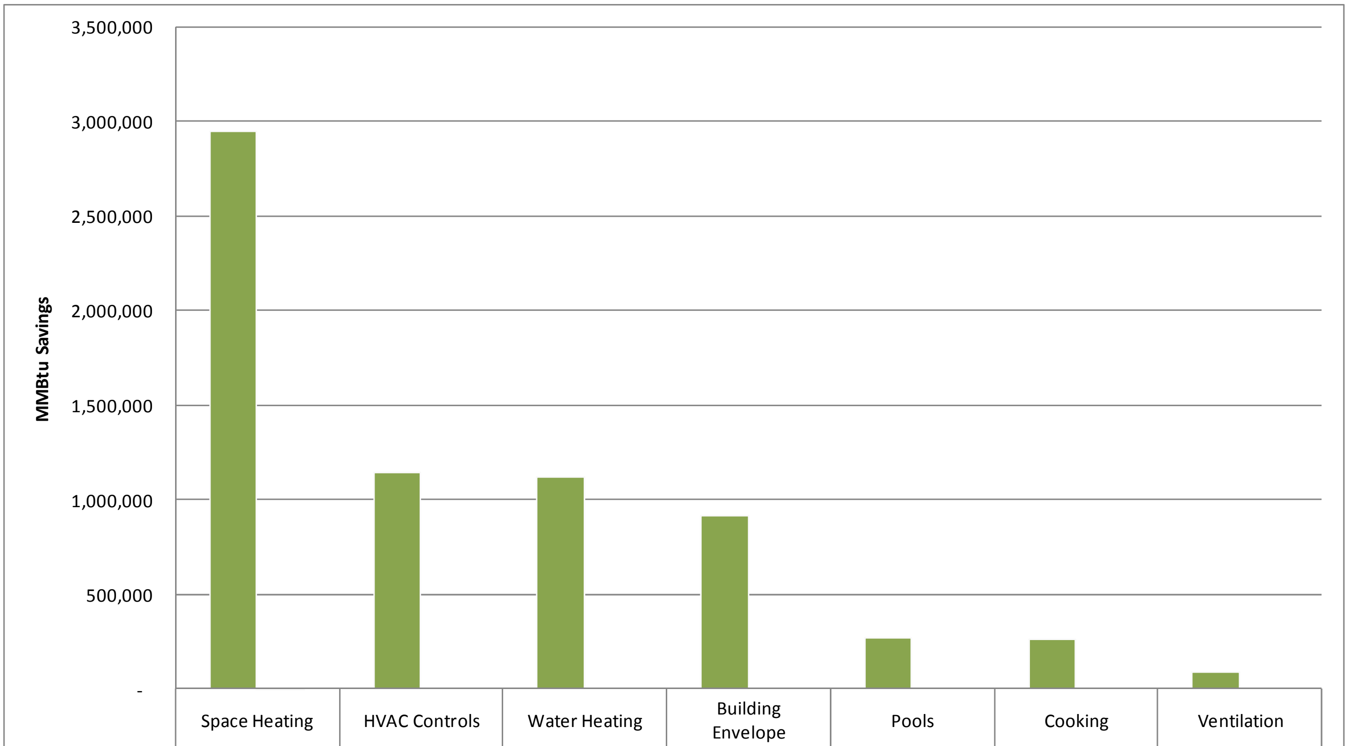
	Lighting	Refrigeration	HVAC Controls	Lighting Controls	Ventilation	Space Cooling - Unitary and Split AC	Space Heating	Building Envelope	Non-HVAC Motors	Water Heating	Appliances, Computers, Office Equipment	Space Cooling - Chillers	Transformers	Pools	Cooking	Compressed Air	Lighting Design
Total	283,670,28	187,253,17	131,425,55	97,827,958	54,098,624	39,271,838	34,040,704	30,813,566	30,024,310	29,382,954	28,568,618	23,237,346	6,669,886	5,391,617	2,630,755	1,376,113	-

Figure 40. Commercial Electric Max. Achievable Cost Effective Savings By End Use – New



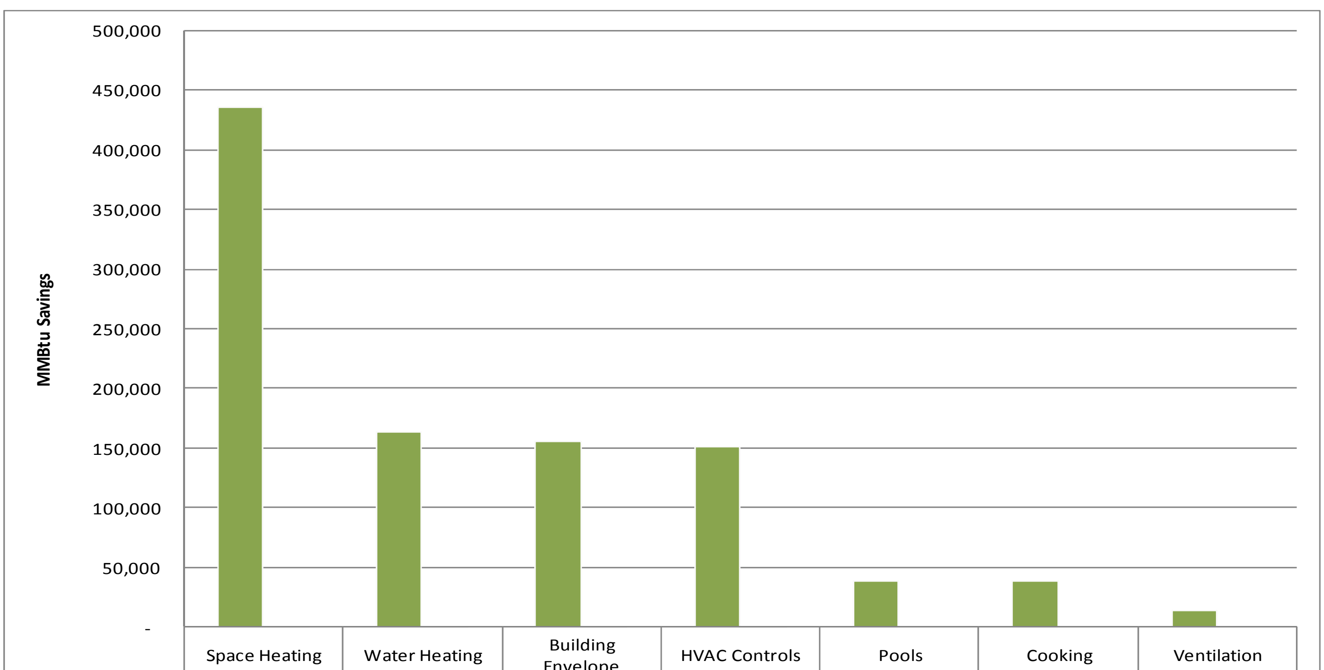
	Lighting Design	Refrigeration	Building Envelope	Ventilation	Space Cooling - Chillers	Space Cooling - Unitary and Split AC	Space Heating	Non-HVAC Motors	Water Heating	Appliances, Computers, Office Equipment	HVAC Controls	Transformers	Pools	Cooking	Compressed Air
MACE kWh Savings	33,661,856	14,455,141	8,799,382	5,585,479	2,995,167	2,978,667	2,627,796	2,317,748	2,268,238	2,205,375	1,953,389	514,887	416,210	203,083	106,230
% of MACE	41.5%	17.8%	10.9%	6.9%	3.7%	3.7%	3.2%	2.9%	2.8%	2.7%	2.4%	0.6%	0.5%	0.3%	0.1%

Figure 41. Commercial Max. Achievable Cost Effective Non-Electric Savings By End Use – Existing



	Space Heating	HVAC Controls	Water Heating	Building Envelope	Pools	Cooking	Ventilation
MACE	2,945,089	1,137,607	1,114,772	911,895	263,209	256,502	88,907
% of MACE	43.8%	16.9%	16.6%	13.6%	3.9%	3.8%	1.3%

Figure 42. Commercial Max. Achievable Cost Effective Non-Electric Savings By End Use – New



	Space Heating	Water Heating	Building Envelope	HVAC Controls	Pools	Cooking	Ventilation
MACE Savings	435,153	163,340	154,646	150,041	38,566	37,583	13,027
% of MACE	43.9%	16.5%	15.6%	15.1%	3.9%	3.8%	1.3%

5.2.2 Commercial Energy Efficiency Measure Supply Curves

This report also presents results in the form of electric and non-electric energy efficiency supply curves. Figure 43 through Figure 48 present the electric existing and new construction supply curves under each scenario (technical potential, maximum achievable, maximum achievable cost effective). Figure 49 through Figure 54 present supply curves for the non-electric existing and new construction scenario (technical potential, maximum achievable, maximum achievable cost effective). As in the residential sector, these supply curves were built up across individual measures and were sorted on a lowest to highest cost basis per unit of energy saved.

Figure 43. Commercial Electric Supply Curve: Existing Buildings – Technical Potential Scenario

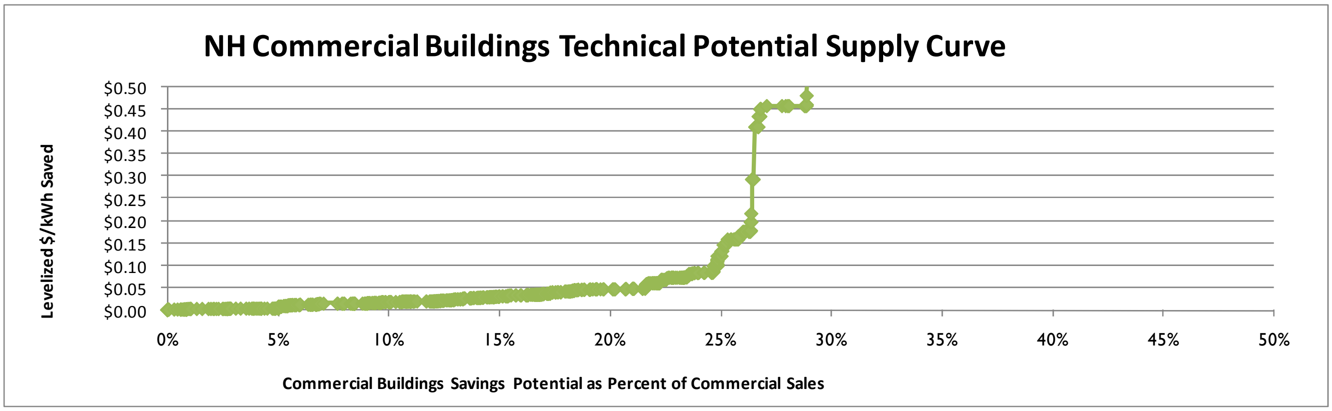


Figure 44. Commercial Electric Supply Curve: Existing Buildings – Max. Maximum Achievable

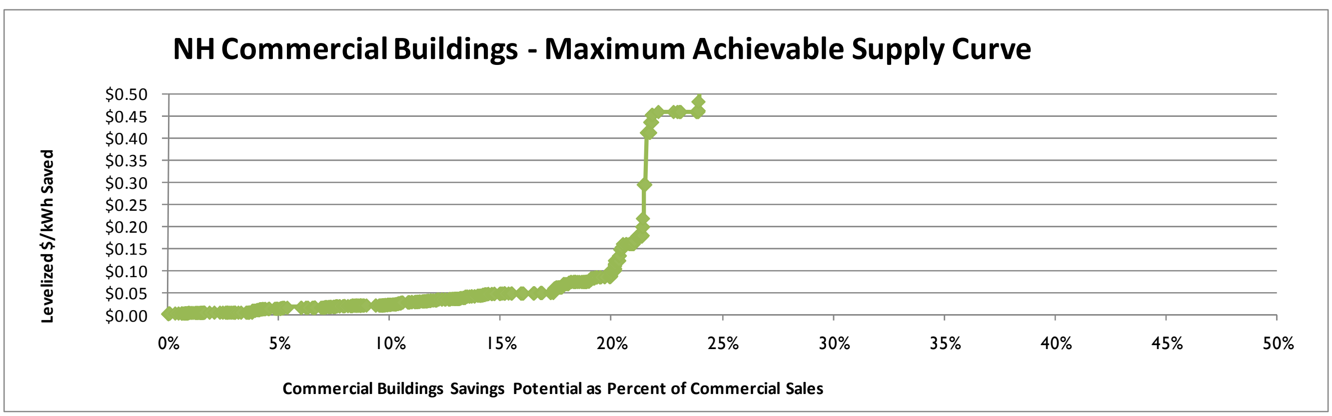


Figure 45. Commercial Electric Supply Curve: Existing Buildings – Max. Achievable Cost Effective

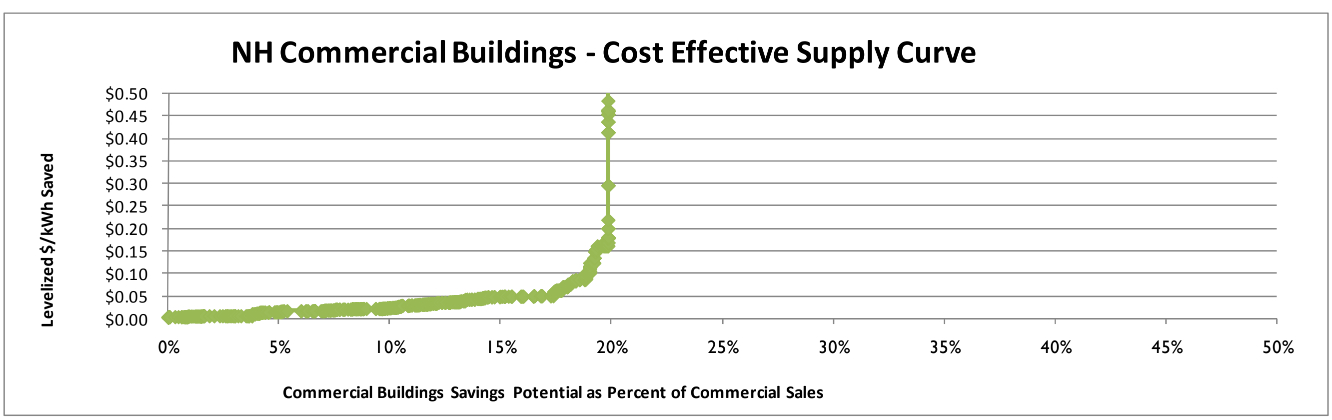


Figure 46. Commercial Electric Supply Curve: New Buildings – Technical Potential Scenario

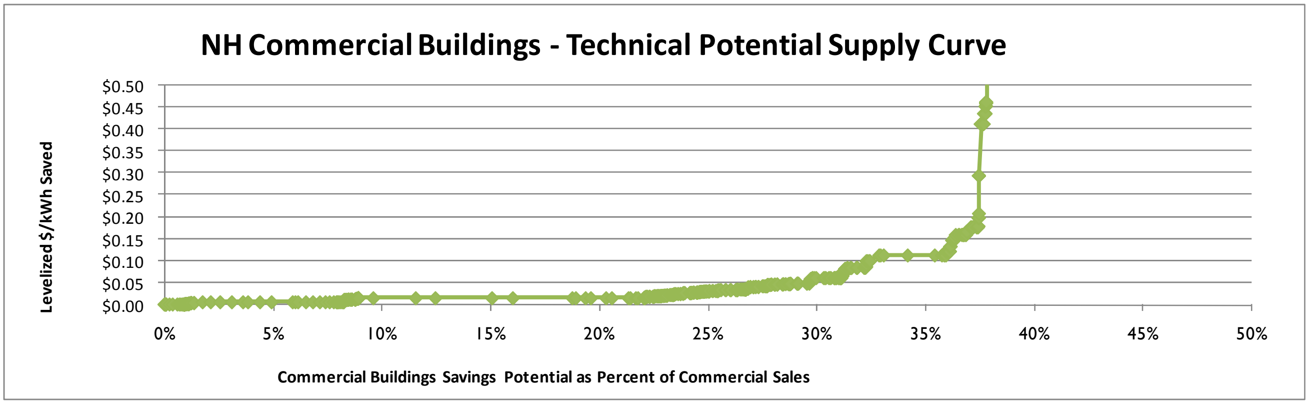


Figure 47. Commercial Electric Supply Curve: New Buildings – Max. Achievable

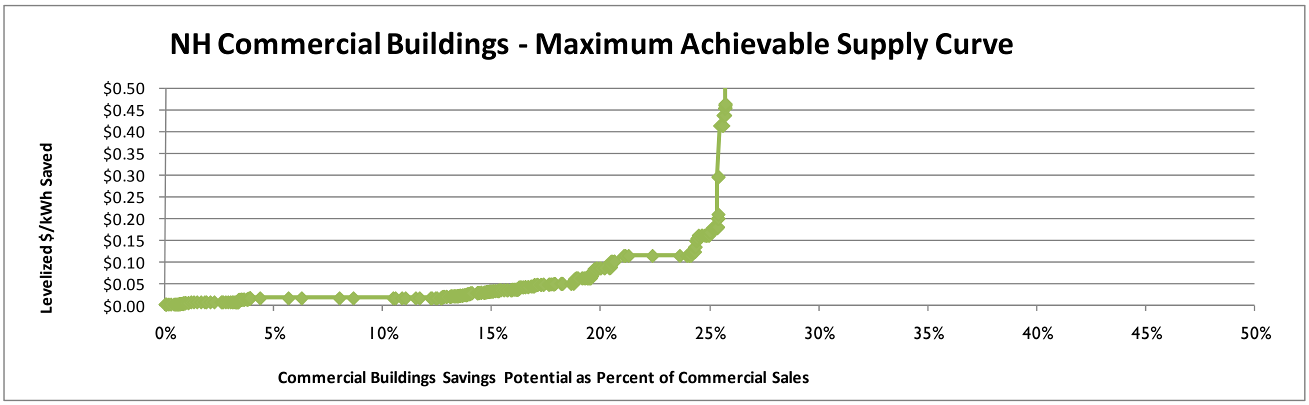


Figure 48. Commercial Electric Supply Curve: New Buildings – Max. Achievable Cost Effective

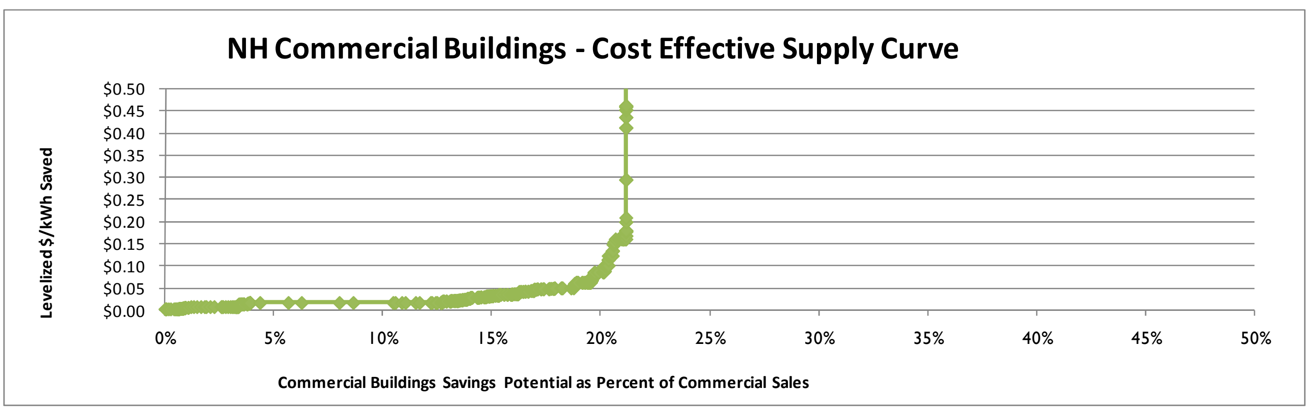


Figure 49. Commercial Non-Electric Supply Curve: Existing Buildings – Technical Potential

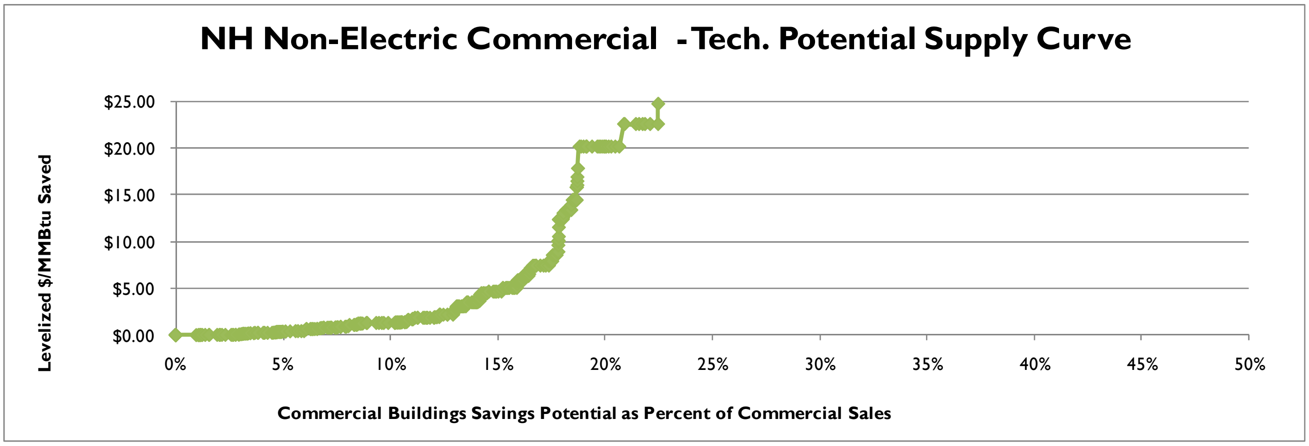


Figure 50. Commercial Non-Electric Supply Curve: Existing Buildings – Max. Achievable

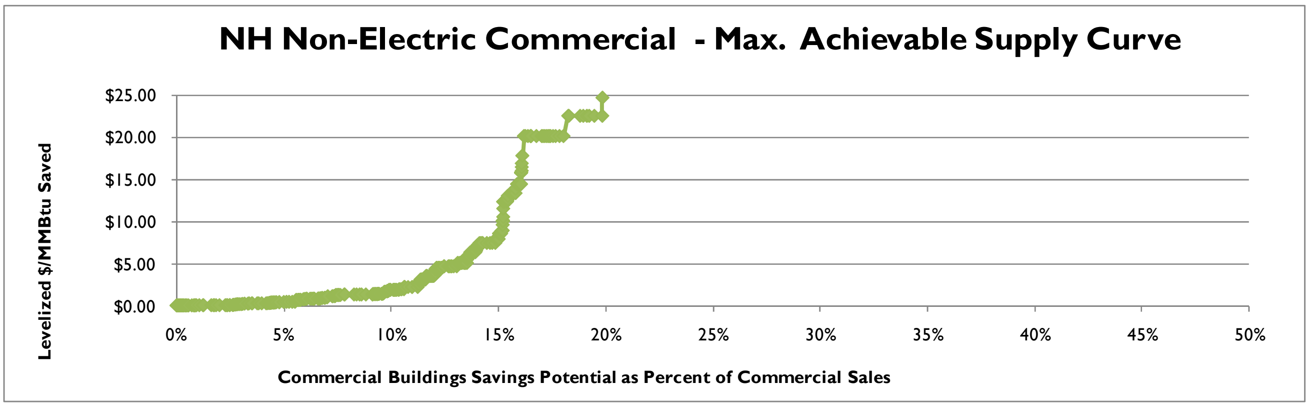


Figure 51. Commercial Non-Electric Supply Curve: Existing Buildings – Max. Achievable Cost Effective

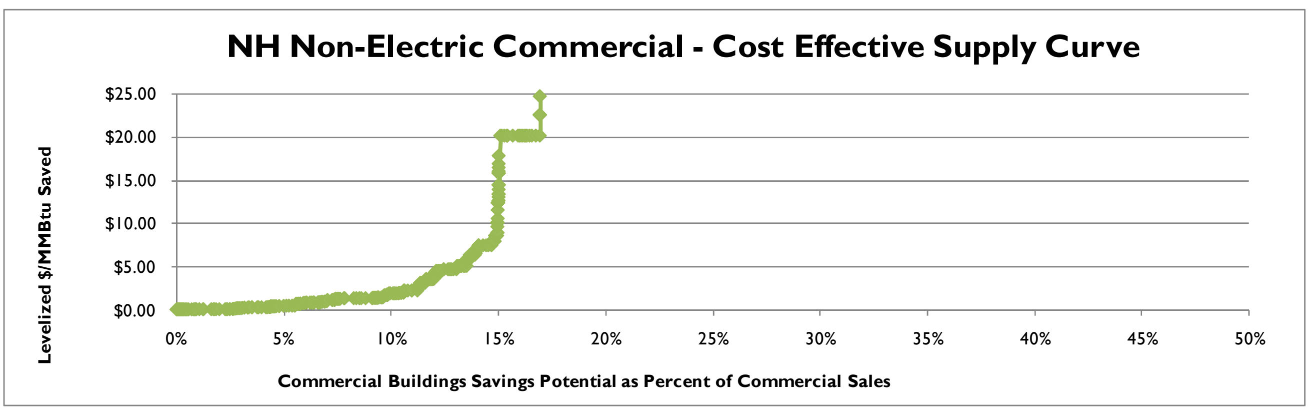


Figure 52. Commercial Non-Electric Supply Curve: New Buildings – Technical Potential

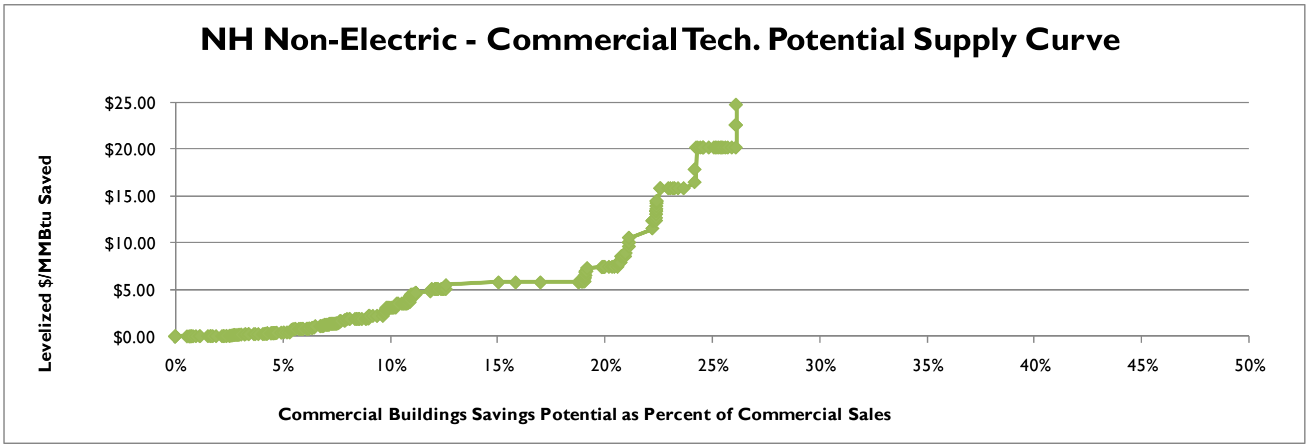


Figure 53. Commercial Non-Electric Supply Curve: New Buildings – Max. Achievable

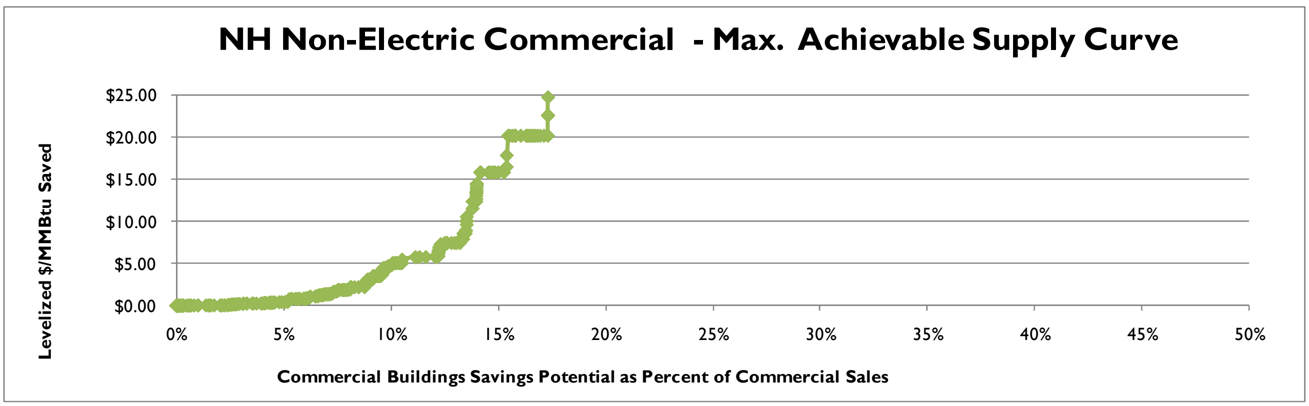
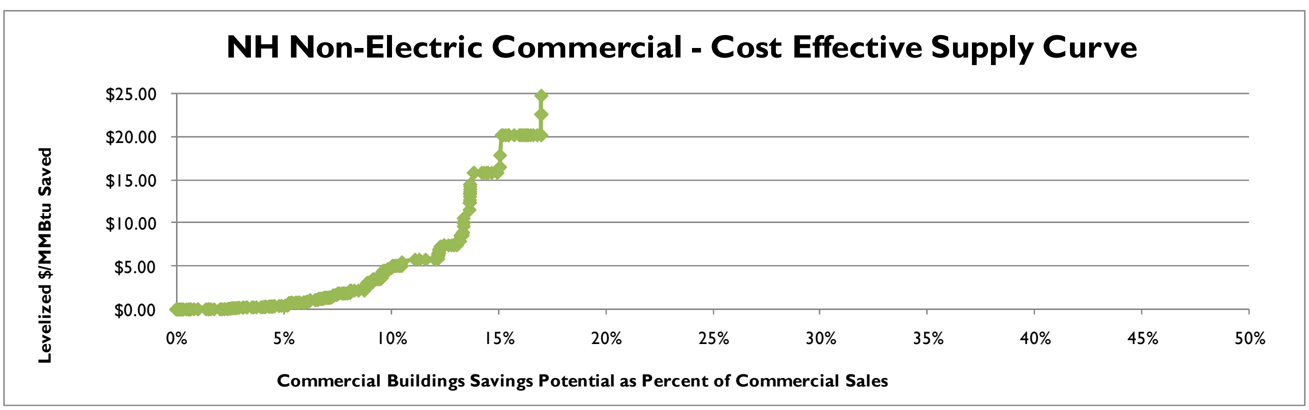


Figure 54. Commercial Non-Electric Supply Curve: New Buildings – Max. Achievable Cost Effective



Section 6: Industrial Sector Energy Efficiency Potential

This section of the report presents the estimates of electric and non-electric technical (traditional), maximum achievable, maximum achievable cost effective, and potentially obtainable energy efficiency potential for the existing and new construction market segments of the industrial sector in New Hampshire. More information regarding how these potentials were derived is also presented.

According to this analysis, there is still a large remaining potential for electric and non-electric energy efficiency savings in the industrial sector. Table 56 and Table 57 below summarize the savings by potential type by the year 2018. In addition, Table 56 presents peak demand savings for each potential level of savings associated with the electric energy efficiency measures.[45]

On the electric side, the combined existing and new buildings maximum achievable cost effective potential in the industrial sector is over 440 million kWh, or 21 percent of the New Hampshire industrial sector sales forecast in 2018. With regard to non-electric potential, the maximum achievable cost effective potential in the industrial sector is 1.4 million MMBTu, or 9 percent of projected New Hampshire industrial sector natural gas, oil and propane sales in 2018.

The results on both the electric and non-electric tables below display the Maximum Achievable being equal to the Maximum Achievable Cost Effective potential. This is due to the end-uses being screened in a combined manner, rather than at the measure level. While there is a high likelihood that some measures within each of the end-uses would screen as not cost-effective, given that this analysis was done at the end-use level, modeling limitations prevented consideration of such measure-specific results.

Table 56. Summary of Industrial Sector Electric Energy Efficiency Savings Potential

	Estimated Annual Sales by 2018 (kWh)	Estimated Annual Savings by 2018 (kWh)	Savings in 2018 as % of Sector 2018 Electric Consumption	Savings in 2018 as % of Total 2018 Electric Consumption	Estimated Annual Sales by 2018 (MW)	Estimated Annual Demand Savings by 2018 By Sector (MW)	Estimated Savings as % of Peak Sector Demand by 2018	Estimated Savings as % of Total Peak Demand by 2018	Estimated Costs to Achieve 2018 Annual Savings (10 Year Cumulative) ($2008 NPV)	Total Estimated Annual Benefits Associated W/Combined Savings in 2018 ($2008 NPV)	Simple Payback (NPV Total Costs / NPV Annual Savings)
INDUSTRIAL SECTOR											
Technical Potential (Traditional)	2,102,729,959	515,485,621	24.5%	4.0%	498	109.7	22.0%	3.7%	$133,914,929	$ 46,000,232	2.9
Max. Achievable Potential		442,671,155	21.1%	3.4%		94.2	18.9%	3.2%	$114,998,894	$ 39,502,510	2.9
Max. Achievable Cost Effective		442,671,155	21.1%	3.4%		94.2	18.9%	3.2%	$114,998,894	$ 39,502,510	2.9
Potentially Obtainable		213,810,168	10.2%	1.6%		81.9	16.5%	2.7%	$55,544,466	$ 19,079,712	2.9

[45] For purposes of this study, a simplifying assumption was used to estimate peak demand savings. Percentage sector peak demand savings are calculated to show savings over the summer coincident peak demand period only and are not broken out separately for summer and winder peak periods.

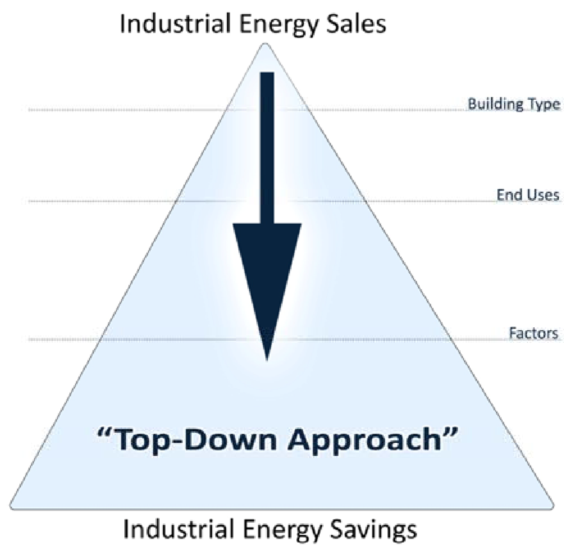
Table 57. Summary of Industrial Sector Non-Electric Energy Efficiency Savings Potential

	Estimated Annual Sales by 2018 (MMBtu)	Estimated Annual Savings by 2018 (MMBtu)	Savings in 2018 as % of Sector 2018 Non-Electric Fuel Consumption	Savings in 2018 as % of Total 2018 Non-Electric Fuel Consumption	Estimated Costs to Achieve 2018 Annual Savings (10 Year Cumulative) ($2008 NPV)	Total Estimated Annual Benefits Associated W/Combined Savings in 2018 ($2008 NPV)	Simple Payback (NPV Total Costs / NPV Annual Savings)
INDUSTRIAL SECTOR							
Technical Potential (Traditional)	15,673,818	1,755,089	11.2%	1.9%	$ 19,467,779	$ 16,623,765	1.2
Max. Achievable Potential		1,415,809	9.0%	1.5%	$ 15,704,417	$ 13,410,187	1.2
Max. Achievable Cost Effective		1,415,809	9.0%	1.5%	$ 15,704,417	$ 13,410,187	1.2
Potentially Obtainable		683,836	4.4%	0.7%	$ 7,585,234	$ 6,477,120	1.2

6.1 Industrial Sector Savings Methodology Overview

The Industrial sector analysis was modeled using what is considered a “top-down approach”. This methodology, shown visually in Figure 55 below:

Figure 55. Industrial Sector Savings Methodology – Top Down Approach



Similar to the commercial sector, this top-down methodology starts with the total projected 2018 kWh sales for the industrial sector, and then splits those sales up by industry type using SIC codes of actual customer data (provided to GDS by project sponsors). After the sales are distributed across the industry types, they are broken down further to specific end-uses (e.g. lighting, space heating, appliances) within each of the building types. This was done using the 2002 Mechanical Energy Consumption Survey data (MECS)[46] for the New England Region. Given that the industrial sector equipment stock consists of highly specialized custom equipment, this sector was modeled at the end-use level as opposed to the detailed measure level. The end-uses being modeled in the Industrial sector include the following:

- Conventional Boiler Use
- CHP and/or Cogeneration Process
- Process Heating
- Process Cooling and Refrigeration
- Machine Drive
- Electro-Chemical Processes

[46] 2002 Manufacturing Energy Consumption Survey (MECS) Data (http://www.eia.doe.gov/emeu/mecs/mecs2002/)

- Other Process Use
- Facility HVAC
- Facility Lighting
- Other Facility Support
- Onsite Transportation
- Compressed Air
- Sensors & Controls
- End Use Not Reported

Once sales is applied to each of the end-uses in both the electric models and the non-electric models, an all-inclusive applicability factor is applied to each end-use within each of the industry types to determine industry specific savings by end-use. This all inclusive applicability factor is applied to the end-use sales by industry type and takes into account the four (4) factors that have been used throughout this study (i.e., the base case factor, remaining factor, savings factor, and convertible factor). Detailed measure end-use specific factors and related information can be found within Appendix G of this report.

The cost to achieve savings estimates within the industrial sector are calculated by multiplying the levelized cost per first year kWh or MMBTu savings within each measure category (e.g. machine drive, facility lighting, etc.) by the kWh or MMBTu savings in 2018 for the potential level being evaluated (e.g. technical potential, maximum achievable, etc.). The result of which is the cost to achieve the savings potential being quoted in the year 2018. This number can then be divided by the study length (10 years) in order to yield an estimate of annual spending needed to reach the potential level target in question.

New Hampshire-specific industry types identified and used in the industrial models included the following:

- Apparel And Other Finished Products Made From Fabrics And Similar Materials
- Chemicals And Allied Products
- Electronic And Other Electrical Equipment And Components, Except Computer Equipment
- Fabricated Metal Products, Except Machinery And Transportation Equipment
- Food And Kindred Products
- Furniture And Fixtures
- Industrial And Commercial Machinery And Computer Equipment
- Leather And Leather Products
- Lumber And Wood Products, Except Furniture
- Measuring, Analyzing, And Controlling Instruments; Photographic, Medical, And Optical Goods; Watches And Clocks
- Miscellaneous Manufacturing Industries
- Paper And Allied Products
- Petroleum Refining And Related Industries
- Primary Metal Industries
- Printing, Publishing, And Allied Industries
- Rubber And Miscellaneous Plastics Products
- Stone, Clay, Glass, And Concrete Products
- Textile Mill Products
- Tobacco Products
- Transportation Equipment

More information on the distribution of energy usage within each of these industrial building type categories is presented in the following section.

6.2 Industrial Sector Segmentation

Table 58 and Table 59 illustrate the industrial sector electricity and non-electric sales based segmentation. This segmentation is based on 2009 Industrial sales data by SIC code as provided by project sponsors.

Table 58. Industrial Sector Segmentation by Industry Type - Electric

Industry	% Of Sales	2018 kWh Sales
Apparel And Other Finished Products Made From Fabrics And Similar Materials	0.23%	4,841,139
Chemicals And Allied Products	0.98%	20,537,715
Electronic And Other Electrical Equipment And Components, Except Computer Equipment	15.58%	327,660,088
Fabricated Metal Products, Except Machinery And Transportation Equipment	5.74%	120,602,372
Food And Kindred Products	8.88%	186,807,201
Furniture And Fixtures	0.56%	11,827,540
Industrial And Commercial Machinery And Computer Equipment	10.22%	215,000,038
Leather And Leather Products	0.68%	14,208,070
Lumber And Wood Products, Except Furniture	4.03%	84,834,419
Measuring, Analyzing, And Controlling Instruments; Photographic, Medical, And Optical Goods; Watches And Clocks	6.07%	127,539,458
Miscellaneous Manufacturing Industries	3.73%	78,459,698
Paper And Allied Products	6.66%	140,041,116
Petroleum Refining And Related Industries	0.94%	19,849,417
Primary Metal Industries	9.93%	208,709,932
Printing, Publishing, And Allied Industries	3.14%	66,122,451
Rubber And Miscellaneous Plastics Products	14.25%	299,645,250
Stone, Clay, Glass, And Concrete Products	3.98%	83,769,711
Textile Mill Products	2.18%	45,780,294
Tobacco Products	0.04%	761,224
Transportation Equipment	2.17%	45,732,822
Totals:	**100.00%**	**2,102,729,959**

Table 59. Industrial Sector Segmentation by Industry Type – Non-Electric

Industry	% Of Sales	2018 Therms Sales
Apparel And Other Finished Products Made From Fabrics And Similar Materials	0.27%	153,399
Chemicals And Allied Products	0.95%	542,309
Electronic And Other Electrical Equipment And Components, Except Computer Equipment	2.73%	1,557,367
Fabricated Metal Products, Except Machinery And Transportation Equipment	5.59%	3,184,570
Food And Kindred Products	15.00%	8,550,090
Furniture And Fixtures	0.26%	149,910
Industrial And Commercial Machinery And Computer Equipment	1.71%	973,233
Leather And Leather Products	0.79%	450,206
Lumber And Wood Products, Except Furniture	1.89%	1,075,247
Measuring, Analyzing, And Controlling Instruments; Photographic, Medical, And Optical Goods; Watches And Clocks	8.18%	4,663,035
Miscellaneous Manufacturing Industries	1.45%	828,708
Paper And Allied Products	20.96%	11,946,935
Petroleum Refining And Related Industries	7.62%	4,342,829
Primary Metal Industries	19.34%	11,022,195
Printing, Publishing, And Allied Industries	1.38%	785,699
Rubber And Miscellaneous Plastics Products	4.54%	2,589,478
Stone, Clay, Glass, And Concrete Products	3.88%	2,211,984
Textile Mill Products	2.55%	1,450,624
Tobacco Products	0.06%	34,841
Transportation Equipment	0.85%	483,040
Totals:	**100.00%**	**56,995,702**

6.3 Industrial Sector End-Use Breakdowns

Table 60 and Table 61 illustrate the Industrial sector energy sales based segmentation across end uses. The breakdown of Industrial electricity use by end-use and industry type was developed based on the 2002 Mechanical Energy Consumption Survey (MECS[47]) data for the New England region.

[47]2002 Manufacturing Energy Consumption Survey (MECS) Data (http://www.eia.doe.gov/emeu/mecs/mecs2002/)

Table 60. Industrial Sector End Use Breakdowns by Industry Type – Electric

2018 kWh Sales	New Hampshire Specific Industry	% kWh Sales by Industry & End Use: Conventional Boiler Use	CHP and/or Cogeneration Process	Process Heating	Process Cooling and Refrigeration	Machine Drive	Electro-Chemical Processes	Other Process Use	Facility HVAC	Facility Lighting	Other Facility Support	Onsite Transportation	Compressed Air	End Use Not Reported
4,841,139	Apparel And Other Finished Products Made From Fabrics And Similar Materials	0%	0%	4%	4%	36%	0%	0%	23%	15%	3%	0%	14%	2%
20,537,715	Chemicals And Allied Products	0%	0%	4%	9%	57%	14%	0%	6%	5%	1%	0%	2%	0%
327,660,088	Electronic And Other Electrical Equipment And Components, Except Computer Equipment	0%	0%	19%	4%	36%	3%	1%	17%	13%	3%	0%	4%	0%
120,602,372	Fabricated Metal Products, Except Machinery And Transportation Equipment	0%	0%	23%	3%	44%	1%	0%	10%	9%	2%	0%	7%	1%
186,807,201	Food And Kindred Products	0%	0%	3%	27%	48%	0%	0%	7%	7%	1%	0%	6%	1%
11,827,540	Furniture And Fixtures	1%	0%	6%	3%	53%	0%	0%	8%	18%	0%	0%	10%	1%
215,000,038	Industrial And Commercial Machinery And Computer Equipment	0%	0%	7%	3%	49%	1%	1%	18%	14%	3%	0%	4%	0%
14,208,070	Leather And Leather Products	0%	0%	3%	27%	38%	0%	0%	11%	12%	2%	0%	7%	1%
84,834,419	Lumber And Wood Products, Except Furniture	0%	0%	5%	1%	72%	0%	0%	8%	9%	0%	0%	5%	0%
127,539,458	Measuring, Analyzing, And Controlling Instruments; Photographic, Medical, And Optical Goods; Watches And Clocks	0%	0%	12%	7%	50%	9%	0%	9%	7%	2%	0%	3%	0%
78,459,698	Miscellaneous Manufacturing Industries	0%	0%	9%	6%	36%	0%	0%	20%	14%	4%	0%	8%	1%
140,041,116	Paper And Allied Products	0%	1%	2%	2%	82%	1%	0%	4%	4%	1%	0%	2%	0%
19,849,417	Petroleum Refining And Related Industries	1%	0%	8%	4%	81%	0%	0%	3%	3%	0%	0%	0%	0%
208,709,932	Primary Metal Industries	0%	0%	29%	1%	30%	32%	0%	4%	3%	1%	0%	1%	0%
66,122,451	Printing, Publishing, And Allied Industries	0%	0%	2%	4%	49%	0%	0%	18%	11%	3%	0%	11%	1%
299,645,250	Rubber And Miscellaneous Plastics Products	0%	0%	14%	8%	52%	0%	1%	10%	8%	3%	0%	3%	0%
83,769,711	Stone, Clay, Glass, And Concrete Products	0%	0%	20%	4%	59%	0%	1%	6%	5%	1%	0%	3%	0%
45,780,294	Textile Mill Products	0%	0%	10%	9%	58%	0%	0%	8%	7%	2%	0%	5%	1%
761,224	Tobacco Products	0%	0%	3%	14%	44%	0%	1%	27%	9%	0%	0%	2%	0%
45,732,822	Transportation Equipment	0%	0%	9%	4%	43%	1%	1%	19%	15%	3%	1%	3%	0%
2,102,729,959	*Source: 2002 Manufacturing Energy Consumption Survey (MECS) Data (http://www.eia.doe.gov/emeu/mecs/mecs2002/)*													

Table 61. Industrial Sector End Use Breakdowns by Industry Type – Non-Electric

2018 Therms Sales	New Hampshire Specific Industry	% Gas Sales by Industry & End Use: Conventional Boiler Use	CHP and/or Cogeneration Process	Process Heating	Process Cooling and Refrigeration	Machine Drive	Other Process Use	Facility HVAC	Facility Lighting
153,399	Apparel And Other Finished Products Made From Fabrics And Similar Materials	25%	0%	25%	0%	0%	0%	19%	0%
542,309	Chemicals And Allied Products	27%	28%	35%	2%	3%	2%	2%	0%
1,557,367	Electronic And Other Electrical Equipment And Components, Except Computer Equipment	12%	0%	53%	0%	0%	0%	29%	0%
3,184,570	Fabricated Metal Products, Except Machinery And Transportation Equipment	4%	0%	62%	0%	1%	0%	21%	0%
8,550,090	Food And Kindred Products	41%	7%	38%	0%	2%	1%	7%	0%
149,910	Furniture And Fixtures	4%	0%	42%	0%	0%	0%	46%	0%
973,233	Industrial And Commercial Machinery And Computer Equipment	16%	1%	36%	0%	3%	0%	36%	0%
450,206	Leather And Leather Products	75%	0%	0%	0%	0%	0%	25%	0%
1,075,247	Lumber And Wood Products, Except Furniture	27%	0%	48%	0%	2%	2%	14%	0%
4,663,035	Measuring, Analyzing, And Controlling Instruments; Photographic, Medical, And Optical Goods; Watches And Clocks	23%	15%	47%	1%	2%	1%	8%	0%
828,708	Miscellaneous Manufacturing Industries	29%	0%	26%	0%	0%	0%	32%	0%
11,946,935	Paper And Allied Products	29%	32%	26%	1%	4%	0%	5%	0%
4,342,829	Petroleum Refining And Related Industries	18%	15%	60%	0%	1%	0%	2%	0%
11,022,195	Primary Metal Industries	6%	5%	79%	1%	0%	0%	7%	0%
785,699	Printing, Publishing, And Allied Industries	13%	0%	40%	0%	2%	0%	33%	0%
2,589,478	Rubber And Miscellaneous Plastics Products	37%	2%	29%	1%	1%	1%	19%	0%
2,211,984	Stone, Clay, Glass, And Concrete Products	3%	1%	85%	0%	0%	0%	5%	0%
1,450,624	Textile Mill Products	21%	0%	39%	0%	3%	0%	21%	0%
34,841	Tobacco Products	50%	0%	25%	0%	0%	0%	25%	0%
483,040	Transportation Equipment	26%	2%	32%	1%	1%	0%	31%	0%
56,995,702	*Source: 2002 Manufacturing Energy Consumption Survey (MECS) Data (http://www.eia.doe.gov/emeu/mecs/mecs2002/)*								

6.4 Industrial Sector – Energy Efficiency Potential Results

Fourteen (14) industrial specific end-uses were included in the analysis for the industrial sector. In order to develop the list of energy efficiency end-uses examined, GDS worked closely with project sponsors as well reviewed other related electric and non-electric energy efficiency technical potential studies that have been conducted recently in the US.

Figure 56 and Figure 57 display a graphical comparison of the maximum achievable cost effective energy efficiency savings potential results by end use within the industrial sector (for electric and non-electric measures respectively). As shown in these figures, 40 percent of the electric savings comes from motors, followed by sensors and controls at 16 percent, facility lighting at 15 percent, and process heating at 13 percent. The remainder is made-up by compressed air and process cooling and refrigeration. With regard to savings from non-electric end-uses, process heating contributes the most at 52 percent of the savings, followed by conventional boiler use at 33 percent, facility HVAC at 13 percent, and the remaining 2 percent being classified as end-use not reported. Electric and non-electric savings allocations by building type are shown in Figure 58 and Figure 59 respectively.

Figure 56. Industrial Max. Achievable Cost Effective Electric Savings by End Use

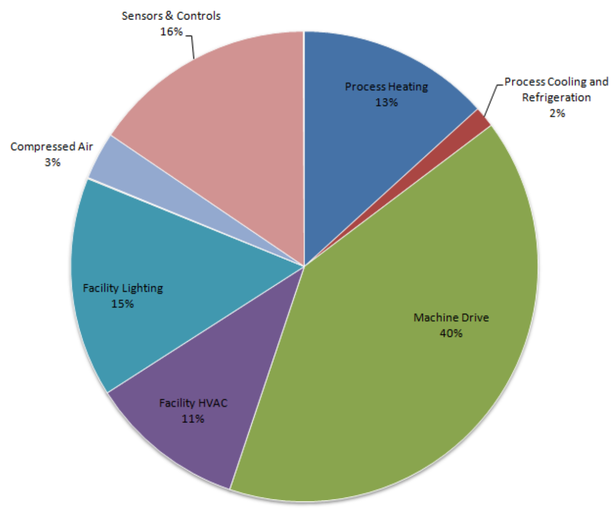


Figure 57. Industrial Max. Achievable Cost Effective Non-Electric Savings by End Use

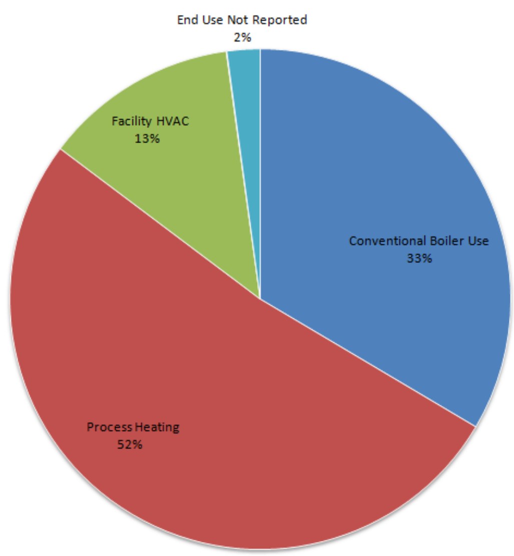


Figure 58. Industrial Max. Achievable Cost Effective Electric Savings by Building Type

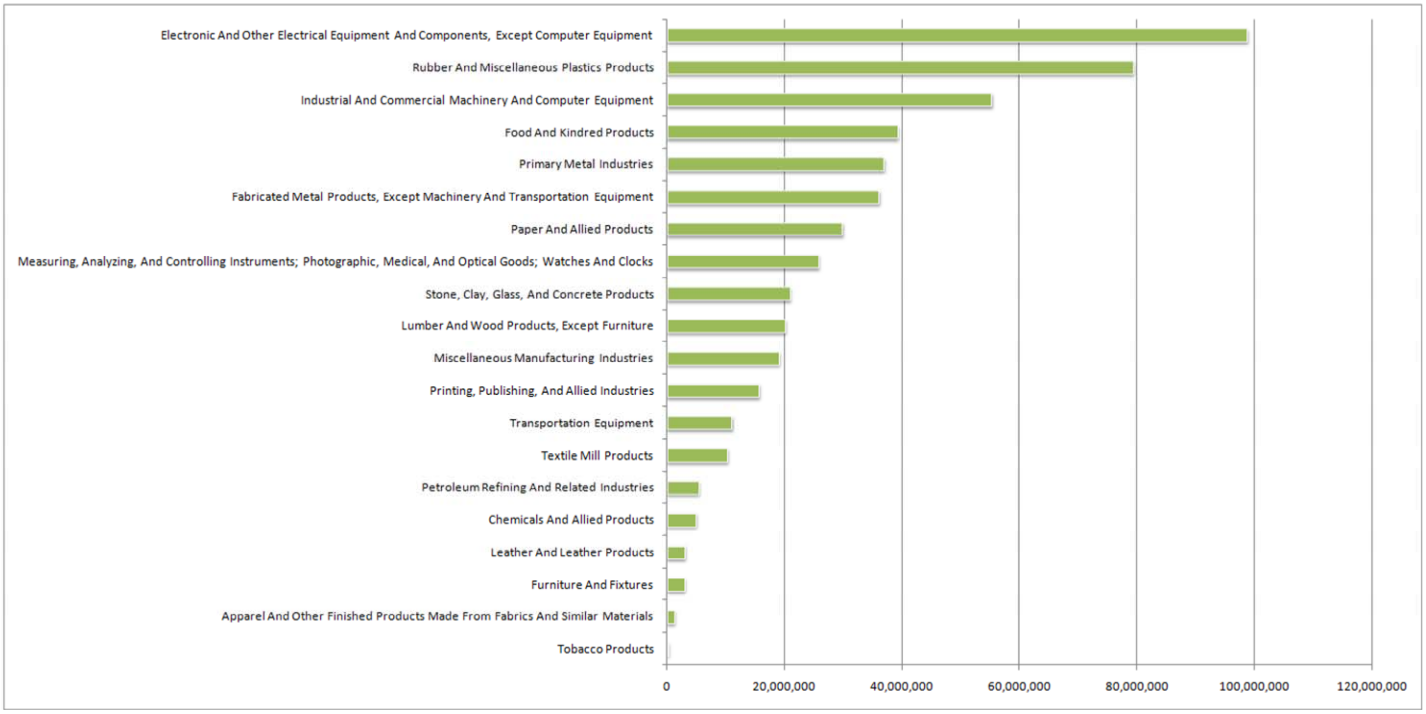
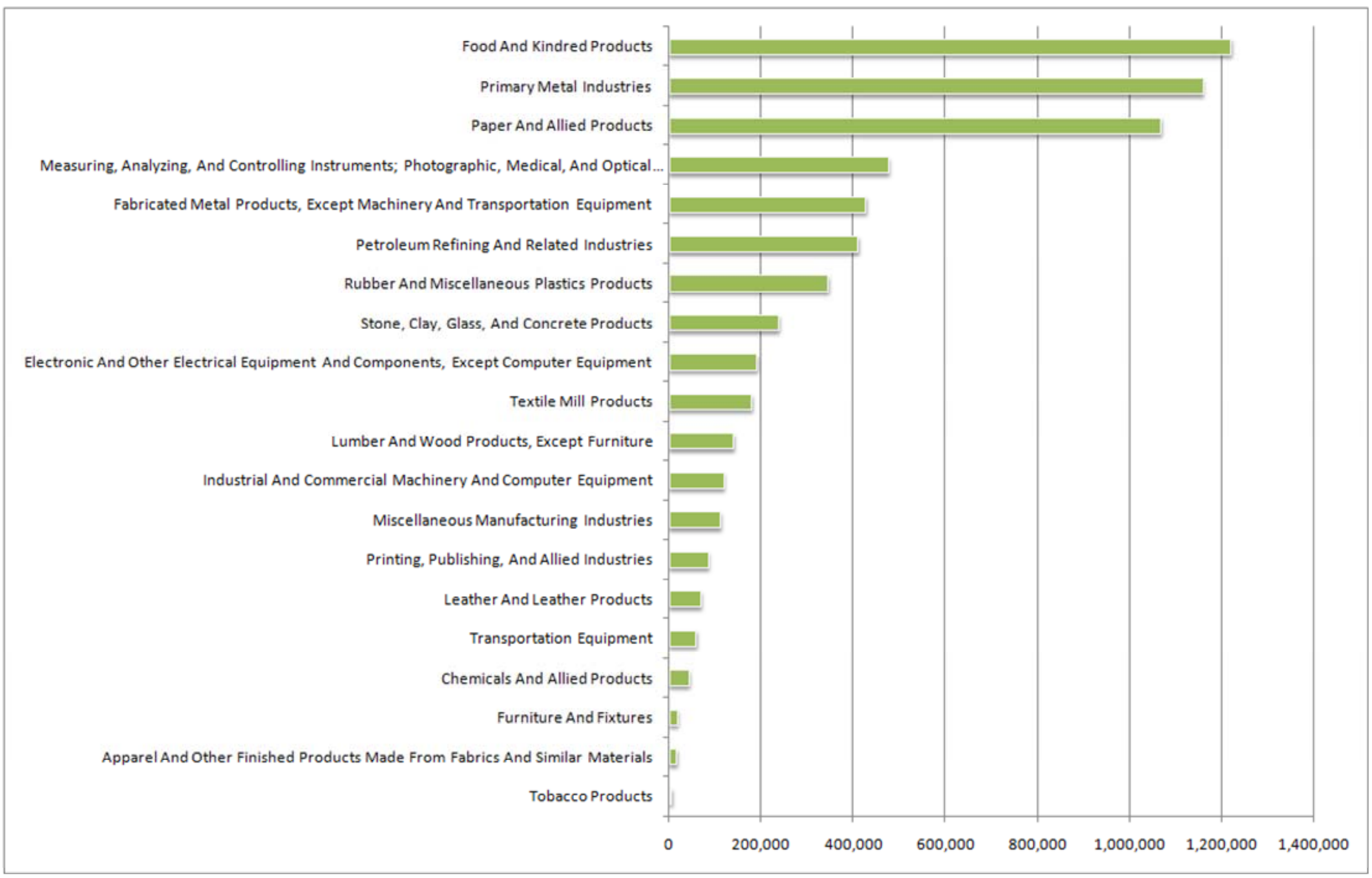


Figure 59. Industrial Max. Achievable Cost Effective Non-Electric Savings by Building Type



Section 7: Primary Data Collection Highlights

This project included a major enhancement to most of the technical potential studies that have been conducted across the country in the past. Rather than relying on best available information from existing secondary sources to estimate current levels of energy using equipment saturations and penetration of energy efficiency measures, significant primary data collection efforts were undertaken to help inform and derive New Hampshire-specific values where possible. The focus of this Section is to provide information on how the results from this project's primary data collection efforts were used to help derive New Hampshire sector-specific estimates of energy using equipment saturations (base factors) and the penetration of energy efficiency measures (remaining factors). These factors were required inputs to the project's energy efficiency potential assessment models.

As highlighted below, a substantial amount of detailed information was gathered in the primary data collection efforts for this project. Although not all information collected was directly applied as model inputs, the data will serve as a valuable resource for future studies. The information obtained from the data collected includes the following:

<u>Ownership Characteristics</u>: The telephone surveys and site visits collected information on whether the facilities were owned or leased, the building type, the approximate age and size of the buildings, the number of employees, and building schedules (i.e. hours of operation). Results are summarized in Appendix J**.**

<u>Fuel Usage</u>: Information was collected on the primary types of fuel usage (i.e. oil, natural gas, etc.) as well as the specific gas and electric utility providers for each facility. This information was useful in developing cross tabulations of other data to determine trends within groups of customer types. The surveys were also used to determine whether any facilities had on-site power generation and to identify the capacity and uses of such on-site generation.

<u>Efficiency Attitudes</u>: Valuable information regarding customer attitudes towards energy efficiency and utility sponsored programs was collected, including primary motivations and barriers to participating in currently offered programs. Results were summarized in detail in Section 3.3 of this report.

<u>Heating and Cooling</u>: The surveys collected data on the types of heating and cooling systems employed in each facility. The site visits, in particular, collected detailed information on the systems including but not limited to run times, heating and cooling capacity, motor horsepower and efficiency, humidity control, presence of outside air economizers, presence of variable air volume control, heat recovery, fuel used, and the approximate age and condition of the systems.

<u>Building Envelope</u>: The site surveys gathered information on the general condition of building envelopes including wall types, insulation types, roof and floor construction, interior and exterior finish and color, and building fenestration (windows).

<u>Water Heating</u>: Much of the survey information regarding water heating was directly applicable to the energy efficiency assessment potential models. The site surveys also collected detailed information on the types of water heating storage and distribution systems, areas served, capacities, insulation, process heating, and the relative age and condition of the systems.

Motors: Substantial information regarding motors was collected including the total number of units, service, types of control, drive type, run hours per week, and the approximate age and condition of the motors.

Refrigeration Equipment: The surveys collected detailed information on the number and type of both commercial and non-commercial refrigeration equipment. Other valuable information collected included the amperage draw of commercial equipment, whether the equipment was ENERGY STAR, defrost control types, number, size and efficiency of compressors and condensers, and the relative condition of the systems in each facility.

Compressed Air: The site surveys gathered information on all compressed air systems, including the type and application of each compressor, the control type, size (horsepower), total number of units, nominal efficiencies, drive types, average age, run hours per week, and manufacturer and model numbers. The site surveys were also used to determine whether the facilities had a leak reduction maintenance program and to assess the overall condition of the compressed air systems.

Process Heating: The site surveys gathered information on all process heating systems, including the type of process, the products produced, the number of machines, rated heat inputs, whether waste heat recovery is utilized, primary fuel used, the average age of equipment, and the average run hours per week. The condition of process heating systems at each facility was also assessed.

Cooking & Food Service Equipment: Where applicable, the site surveys gathered information on cooking and food service equipment. Information gathered included the total number of both electric and gas fueled units and the average fuel usage for each type of equipment.

As discussed in more detail in Sections 7.1 and 7.2 below, where applicable, elements from this information were used to develop model-required base and remaining factors.

7.1 Data Summary and Analysis

The primary data collection efforts were summarized in Section 3.1 of this report, and included conducting 400 telephone surveys of residential customers, 200 telephone surveys of small commercial and industrial customers, and 200 site visits of large commercial and industrial customers. The methodologies utilized to create the survey instruments and sampling plans were outlined in detail in Sections 3.1.1 and 3.1.2, respectively. Data obtained from the surveys and site visits were coupled with secondary data collection and analysis where necessary, to develop New Hampshire-specific values for saturations and penetrations used in the GDS Team's sector-specific energy efficiency potential calculation models (referred to in the models as base and remaining factors). These primary data collection efforts were also used to assess customer attitudes towards energy efficiency programs and practices, including awareness, motivations and barriers, results of which were summarized earlier in Section 3.3 of this report.

Data collected from the residential and small commercial and industrial telephone surveys were analyzed by Research Into Action (RIA) using SPSS statistical software.[48] During this process, GDS worked with RIA to identify the specific survey questions and develop the cross tabulations needed to derive base and remaining factors for use in the models. Data collected from the large commercial and industrial site visits were recorded in paper files and entered manually into an analyzable Excel spreadsheet file. The data was organized and sorted by relevant

[48] Further information regarding the SPSS program can be found at www.spss.com

measure types, using pivot tables, to obtain information that helped inform the base and remaining values for specific efficiency measures needed for the models.

It is important to note that sample sizes were designed at project outset to ensure statistical validity at the aggregate residential, commercial and industrial sector levels only. However, attempts were made to mine the data, where possible, to support determination of base and remaining factors for specific measures at the building-type level as described in more detail below.

7.1.1 Residential Survey Data

Prior to the detailed evaluation of residential telephone survey data, responses were categorized as either single or multi-family homes. In total, 269 single family responses and 135 multi-family responses were recorded. Of those 404 total responses, the data collection effort focused on the 253 single family and 127 multi-family homes that were classified as permanent residences as opposed to seasonal residences. Separate evaluation of the survey data was then performed for each type of home. Based on a total population of approximately 600,000 housing units in New Hampshire, the margin of error for proportional results obtained from the single family surveys (253 total) was 6.2% with 95% confidence. The margin of error for proportional results obtained from the multi-family surveys (127 total) was 8.7% with 95% confidence.

7.1.2 Commercial and Industrial Survey Data

Data from the 200 small commercial and industrial phone surveys and the 200 large commercial and industrial site visits were analyzed on several levels. The most basic level of evaluation was to separate the commercial properties data from the industrial properties data. The breakdown of commercial versus industrial facilities for each survey is shown in Table 62 below.

Table 62. Number of Commercial and Industrial Facilities Surveyed

	Small C/I Phone Surveys	Large C/I Site Surveys
Commercial	177	100
Industrial	23	100
Total	**200**	**200**

The small and large commercial properties were further categorized by model-defined building types, as shown below in Table 63.

Table 63. Small Commercial vs. Large Commercial Surveys by Building Type

Model Building Type	Small Commercial Phone Surveys	Large Commercial Site Surveys
Warehouse	4	5
Retail	23	7
Grocery	13	7
Office	56	22
Lodging	6	14
Health	14	12
Restaurant	10	4
Education	5	16
Other - unclassified	46	13
Total	**177**	**100**

The GDS Team established a minimum sample size of 30 respondents as the threshold for collecting and reporting data at the building type-specific level for both small and large commercial buildings. This would ensure statistically valid results at a 15 percent margin of error and 90 percent confidence. As shown in the table above, based on this threshold, results from the small commercial phone surveys provided sufficient data to derive base and remaining factors for measures within both *office* (56) and *other* (46) building types. For the remaining building types, measure specific data was collected and reported based on the aggregate responses within the small commercial sector. Similarly in the large commercial sector, due to the limited number of responses within specific building types, a majority of the measure-specific base and remaining factors derived from the site visits were based on aggregate responses across the entire large commercial building stock. In some instances where a substantial amount of site visit data was available for a specific measure, base and remaining factors were determined at the building type level. An example is facility lighting, where a substantial volume of information was recorded during the site visits. It was the opinion of GDS that the data illuminated trends in lighting characteristics among the building types and warranted inclusion in the energy efficiency potential assessment models.

Industrial properties were also categorized by building type. The large industrial properties were broken down into ten specific building types as listed in Table 64 below. The small[49] industrial properties, where data was collected through a total of 23 phone surveys, were viewed as a single group (i.e., results were aggregated across all building types since the combined number of respondents was less than the 30 building type threshold required to ensure statistical validity).

Table 64. Small Industrial vs. Large Industrial Surveys by Building Type

Model Building Type	Small Industrial Phone Surveys	Large Industrial Site Surveys
Electronic and Other Electrical Equipment	-	15
Fabricated Metals	-	23
I & C Machinery and Computer Equipment	-	1
Lumber and Wood Products	-	14
Other Assembly / Light Manufacturing	-	13
Other Medium/Heavy Equipment Manufacturing	-	6
Paper and Allied Products	-	2
Printing, Publishing and Allied Ind.	-	7
Rubber and Miscellaneous Plastics Production	-	9
Other – not classified	-	10
Total	**23**	**100**

As described elsewhere in this report, the industrial supply model requires single savings factors for specific end uses (e.g., lighting, process heating, etc.) and recognizes that these factors can vary depending on the type of industry being assessed. Therefore, the information mined from the large industrial property site visits was analyzed to identify New Hampshire-specific equipment, system and process practices and trends that could be used to support adjustment of the original model assumptions which had initially been based only on secondary data sources from previous studies and prior experience.

[49] The 23 small industrial survey respondents consist of Seven (7) Industrial Metals Machining, Four (4) Industrial Parts Assembly, and Twelve (12) Industrial Other

7.1.3 Weighting of Small and Large Commercial Survey Data

In both the commercial electric and the commercial gas energy efficiency potential analysis models, small (less than 100 kW or 300,000 kWh annual consumption) and large (greater than 100 kW or 300,000 kWh annual consumption) commercial facilities have been treated as a single sector. Therefore, weighted averages were developed for the measure-specific base and remaining factors using results from both the small and large facilities data collection efforts.

The method used for calculating these weighted averages was based on 2007 total kWh consumption data provided by the utilities for their customers classified as small commercial/industrial and large commercial/industrial. In total, the small commercial customers consumed 2,100,349,654 cumulative kWh of energy in 2007 and the large commercial customers consumed a total of 2,643,763,935 kWh of energy. Based on these values, small commercial customers consumed 44.3 percent of commercial energy usage in 2007 and the large commercial customers consumed 55.7 percent. These ratios were used, where applicable, to derive weighted average commercial sector and building specific end-use measure saturation (base factor) and energy efficiency equipment penetration (remaining factor) values for use in the commercial models.

In several instances, survey data was available only from the small commercial facilities phone surveys, or from the large commercial facilities site visits, or from neither depending on the specific measure. If penetration and saturation values obtained from survey data were available for either the small commercial or large commercial facilities, but not both, an un-weighted survey value was utilized in the model. If values obtained from the surveys were not available for a specific measure, the original assumptions (based on existing secondary data) were utilized in the models and all applicable references that formed the basis for such assumptions were noted.

7.2 Application of Survey Data

As noted previously, a substantial amount of useful New Hampshire-specific information was collected on energy end use equipment saturations and energy efficiency measure penetrations for a number of residential, commercial, and industrial measures. In cases where such New Hampshire customer-specific information could not be collected from the phone surveys and site visits, the most prevalent barrier to obtaining that information tended to be the extremely specific nature of some measures and the time constraints existing for conducting the surveys and site visits. Wherever possible, when secondary sources were required to be used as the basis for base and remaining factors in the models, they were verified for reasonableness, or modified based on results obtained through the project's primary data collection activities.

The greatest percentage of model values that relied on primary survey data occurred in the residential sector, where nearly 70 percent of the model's required base and remaining factors for efficiency measures came directly from survey information. In the commercial electric model, 36 percent of the measures' base and remaining factors were also derived directly from this project's primary data collection activities. In the commercial non-electric model, 24 percent of the measures were based on survey information. This large variation between the percentages of survey data applicable in the residential (70%) versus commercial sectors (24 to 36%) is in part attributable to the complexity and specificity of the commercial measures compared to the residential measures. A more detailed analysis of the survey data application is provided in the following sections.

7.2.1 Residential Sector

The measure end-use categories that were most informed by the residential sector telephone surveys were appliances and water heating. Overall, customers appeared knowledgeable and provided potentially useful information regarding the types of appliances they owned (i.e. refrigerators, ranges, water heaters, etc.) and whether the appliances were ENERGY STAR rated.[50] The total number of responses used to derive base and remaining factors for use in the residential models in these end use categories was also very high since these end uses are quite common in across all residences.

The measure end use categories of lighting and space conditioning were also fairly well informed by the surveys. Information on standard measures such as CFL bulbs, fixtures and programmable thermostats was readily available and was used to derive reliable base and remaining factors. Information on measures that were less well known to the general public, such as heat pumps, duct sealing, and photocell controlled outdoor lighting, proved to be less reliable (with little to no survey data responses) and were therefore supplemented in the model by secondary data sources.

A complete list of the base and remaining factors derived through information collected in this project's telephone surveys for each measure assessed within both single and multifamily homes is provided in Appendix K, along with links to specific survey questions and data sources.

7.2.1.1 Residential Sector Example

Programmable thermostats provide a good example as to how the base and remaining factors were derived from this project's telephone surveys. In the residential models, programmable thermostats are applied as energy efficiency measures within homes using electric heat, gas furnaces, gas boilers, and oil boilers. The measures are further categorized by systems for heating only and for systems with both heating and central air conditioning. In addition programmable thermostats are broken out by single family homes and multifamily homes and recognize that the savings associated with use of programmable thermostats will differ based on all of these factors. In the following example, the derivation of base and remaining factors for programmable thermostats is described within the context of single family homes without central air conditioning that heat with oil boilers.

The first step in the analysis was to derive the end use saturation (base case factor) for each sub-category of the measure. The end use saturation is defined as the percentage of total single family homes that contain the end use or measure. For this example, the end use saturation is the percentage of single family homes that have oil-fueled boiler heating (heating only, no central air conditioning) and was derived from survey questions SH2, SH3 and SC1. Question SC1 was used to determine whether homes had central air conditioning. As illustrated in the summary table below, a total of 214 respondents did not have central air conditioning.

SC1: Do you have central air conditioning? * UTILITY Crosstabulation

			UTILITY				
			Granite State Electric	NH Elec CoOp	PSNH	Unitil	Total
SC1: Do you have central air conditioning?	Yes	Count	5	3	25	6	39
		% within UTILITY	17.9%	6.5%	18.5%	13.6%	15.4%
	No	Count	23	43	110	38	214
		% within UTILITY	82.1%	93.5%	81.5%	86.4%	84.6%
	Total	Count	28	46	135	44	253
		% within UTILITY	100.0%	100.0%	100.0%	100.0%	100.0%

Of the 214 single family respondents who did not have air conditioning, a summary table was developed that combined the responses to questions SH2 and SH3. SH2 was used to identify

[50] It is important to note however, that past studies have shown as many people incorrectly identify products as being ENERGY STAR as do those that do not think their products are ENERGY STAR when in fact they are.

the primary type of heating fuel utilized and Question SH3 was used to identify the primary types of heating systems. The responses to Question SH2 (fuel type) were used as the cross-tab headings for the Question SH3 summary table shown below. A total of 36 responses are missing because they reported wood or electricity as the primary fuel used for heating and were excluded from this question.

SH3: What type of heating system is your main source of heat? * SH2: What is the main fuel you use to heat this home? Crosstabulation

			SH2: What is the main fuel you use to heat this home?				
			Natural gas purchased from	Bottled gas or propane: [CONFIRM: DELIVERED BY TRUCK?]	Oil	Kerosene	Total
SH3: What type of heating system is your main source of heat?	Furnace: central forced air furnace (aka forced hot air)	Count	12	12	48	1	73
		% within SH2: What is the main fuel you use to heat this home?	46.2%	42.9%	39.3%	50.0%	41.0%
	Boiler + Radiator + Hot Water (aka forced hot water)	Count	4	9	28	0	41
		% within SH2: What is the main fuel you use to heat this home?	15.4%	32.1%	23.0%	.0%	23.0%
	Boiler + Baseboard + Hot Water (forced hot water)-OR JUST BASEBOARD	Count	3	2	34	0	39
		% within SH2: What is the main fuel you use to heat this home?	11.5%	7.1%	27.9%	.0%	21.9%
	Boiler + Radiator + Steam	Count	1	2	3	0	6
		% within SH2: What is the main fuel you use to heat this home?	3.8%	7.1%	2.5%	.0%	3.4%
	Radiator + DK (i.e., other components unknown)	Count	0	0	4	0	4
		% within SH2: What is the main fuel you use to heat this home?	.0%	.0%	3.3%	.0%	2.2%
	Could Identify Fuel, But Not Equipment	Count	1	0	1	1	3
		% within SH2: What is the main fuel you use to heat this home?	3.8%	.0%	.8%	50.0%	1.7%
	Other (please specify)	Count	2	1	1	0	4
		% within SH2: What is the main fuel you use to heat this home?	7.7%	3.6%	.8%	.0%	2.2%
	DON'T KNOW	Count	1	0	3	0	4
		% within SH2: What is the main fuel you use to heat this home?	3.8%	.0%	2.5%	.0%	2.2%
	REFUSAL	Count	2	2	0	0	4
		% within SH2: What is the main fuel you use to heat this home?	7.7%	7.1%	.0%	.0%	2.2%
	Total	Count	26	28	122	2	178
		% within SH2: What is the main fuel you use to heat this home?	100.0%	100.0%	100.0%	100.0%	100.0%

The end use saturation of homes with oil boilers, heating only, was calculated by summing the number of oil using respondents with boilers (28 + 34 + 3 + 4 = 69) and dividing it by the total number single family respondents (253). The total number of single family homes was used in the calculation because the end use saturation is defined as the percentage of all single family homes with oil boilers and no central air conditioning. The percentage of oil customers with boilers for heating only (i.e. end use saturation) was then 69/253 = 27.3%.

The next step was to derive the energy efficiency measure penetration for programmable thermostats. The penetration is defined as the fraction of the end use energy that is already energy efficient. For this example, the penetration is the percentage of homes that already have programmable thermostats and was derived from survey question SH14 which specifically asked whether the customers have a programmable thermostat. The cross tabulated responses, by primary fuel type (question SH2), are shown below for reference.

			Main heating fuel						
			natural gas	electricity	propane	oil	kerosene	wood	Total
SH14: Do you have a programmable thermostat?	Yes	Count	26	0	26	77	1	14	144
		% within Main heating fuel	76.50%	0.00%	68.40%	51.00%	50.00%	35.00%	53.50%
	No	Count	8	4	12	73	1	26	124
		% within Main heating fuel	23.50%	100.00%	31.60%	48.30%	50.00%	65.00%	46.10%
	DON'T KNOW	Count	0	0	0	1	0	0	1
		% within Main heating fuel	0.00%	0.00%	0.00%	0.70%	0.00%	0.00%	0.40%
	Total	Count	34	4	38	151	2	40	269
		% within Main heating fuel	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

As illustrated in the table above, 51.3% (77/150) of customers indicated that they have programmable thermostats after discounting the “Don’t Know” response. Thus, the penetration for this measure is 51.3%. The remaining factor, defined as the percentage of homes in which this measure can be installed, is 1 minus the penetration, or 48.7% for this example. The resulting end use saturations (base case factors) and remaining factors were used in the residential model to calculate the potential for savings from this efficiency measure. Refer to Section 4.1 above for the actual equations used in the model to calculate potential savings.

7.2.2 Commercial Sector

Valuable information was gathered from both the telephone surveys and site visits to help derive base and remaining factors use in the commercial sector electric and gas models. In the commercial electric model, 36% of the measure remaining factors were directly attributable to the survey data. In the commercial gas model, 24% of the measure remaining factors were directly attributable to the survey data. The measure end-use categories that were most informed by the surveys and site visits were lighting, refrigeration, appliances, compressed air, motors and water heating. The measure end-use categories that were least influenced by the primary data collection activities were space cooling (chillers), space cooling (unitary and split AC), and cooking.

In the *Lighting* end use category for example, the base case factors were developed by first identifying sub-categories such as fluorescent tube lighting, screw-in incandescent/CFL lighting, high-bay lighting, exit signs and other specialty lighting. Then, the total number of fixtures reported in each sub-category from the site visits was tabulated and the relative percentages of each sub-category were calculated. Fixture counts were utilized to formulate the base case factors due to incomplete data on the wattage and run hours for all fixtures. These relative percentages, based on total fixture counts, were applied as base case factors for each building type to reflect the percentage of energy attributable to each sub-category. The site visits then provide useful information regarding the penetration of energy efficient lighting within each sub-category so remaining factors could be developed for each measure.

Substantial data was also compiled for the commercial non-electric model. Measure end use categories that were the most well informed by the phone surveys and site visits included water heating, pools, HVAC controls, and cooking. Measure end use categories that were least informed by the surveys were ventilation, building envelope, and space heating.

A complete list of base and remaining factors used in the commercial models is provided in Appendix L to this report. Factors that have been informed by data collected through the telephone and site visits conducted through primary data collection elements of this project have been highlighted for ease of reference. The survey instruments for the phone and site surveys are provided in Appendices B and C, respectively. Appendix L includes a summary sheet that identifies the questions used to derive the factors.

7.2.2.1 Commercial Sector Example

As with the residential sector, programmable thermostats provide a good example of how base and remaining factors were derived from survey data collected in the small commercial sector. To start, nearly all commercial customers were found to have thermostat-controlled heating systems as shown in the cross tabulation for Question 20 below. 90% of respondents indicated that they had control over the heating, while 10% did not have control, or did not know.

Q20: Do you have control over the temperature of the heating? * Building type_recoded2 Crosstabulation

			Building type_recoded2										
			Warehouse	Retail	Grocery	Office	Lodging	Health	Education	Industrial	Restaurant	Other	Total
Q20: Do you have control over the temperature of the heating?	Yes	Count	2	22	12	50	6	14	4	19	8	43	180
		% within Building type_recoded2	50.0%	95.7%	92.3%	89.3%	100.0%	100.0%	80.0%	82.6%	80.0%	93.5%	90.0%
	No	Count	2	1	1	6	0	0	1	3	2	3	19
		% within Building type_recoded2	50.0%	4.3%	7.7%	10.7%	.0%	.0%	20.0%	13.0%	20.0%	6.5%	9.5%
	DON'T KNOW	Count	0	0	0	0	0	0	0	1	0	0	1
		% within Building type_recoded2	.0%	.0%	.0%	.0%	.0%	.0%	.0%	4.3%	.0%	.0%	.5%
	Total	Count	4	23	13	56	6	14	5	23	10	46	200
		% within Building type_recoded2	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

It was assumed that the percentage of respondents without control of the temperature of the heating is largely attributable to tenant or landlord circumstances, thus the base case factor for this end use was determined to be 100 percent. For the small commercial phone surveys, Question 21 specifically asked whether respondents had a programmable thermostat. The cross tabulated summary table is provided below for reference.

Q21: Do you have a programmable thermostat? * Building type_recoded2 Crosstabulation

			Building type_recoded2										
			Warehouse	Retail	Grocery	Office	Lodging	Health	Education	Industrial	Restaurant	Other	Total
Q21: Do you have a programmable thermostat?	Yes	Count	1	11	6	31	3	7	3	8	5	20	95
		% within Building type_recoded2	50.0%	50.0%	50.0%	62.0%	50.0%	50.0%	75.0%	42.1%	62.5%	46.5%	52.8%
	No	Count	1	10	6	18	3	6	1	11	3	21	80
		% within Building type_recoded2	50.0%	45.5%	50.0%	36.0%	50.0%	42.9%	25.0%	57.9%	37.5%	48.8%	44.4%
	DON'T KNOW	Count	0	1	0	1	0	1	0	0	0	2	5
		% within Building type_recoded2	.0%	4.5%	.0%	2.0%	.0%	7.1%	.0%	.0%	.0%	4.7%	2.8%
	Total	Count	2	22	12	50	6	14	4	19	8	43	180
		% within Building type_recoded2	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The energy efficient measure penetration, defined as the percentage that is already efficient, was calculated by dividing the total number of positive responses among non-industrial building types (95 total "yes" responses minus 8 "yes responses from the "industrial" building type = 87 commercial "yes" responses) by the total number of non-industrial respondents, excluding "don't know" responses (156). The average penetration for this measure was thus determined to be 55.8%. The remaining factor was simply calculated as 1 minus the penetration, or 44.2% for this example.

As can be seen from the cross tabulation table above, more than 30 total responses were received in both the *Office* and *Other* building type categories. Therefore, the remaining factors for programmable thermostats were derived at the building-specific level for each of these two building types. For example, the remaining factor for programmable thermostats in the *Office* building type was 36.7% and 51.2% for the *Other* building type category. For all remaining commercial building types, the 44.2% remaining factor (calculated in aggregate across all building types) was applied to maintain statistical validity in the data with reasonable confidence.

Programmable thermostats were not included in the survey for the large commercial surveys due to a larger prevalence of EMS systems as the primary means for temperature controls in these facilities and because larger facilities that use thermostatic control often have a large number of thermostats, or a mix of programmable and manual thermostats. This makes the quantification of programmable thermostats in larger commercial facilities very difficult. Since no large commercial data was available for programmable thermostats, the data from the small commercial surveys was applied without weighting. It is important to note that once the weightings were completed, the remaining factor for each measure was qualitatively assessed for reasonableness and adjusted if necessary. It was felt that applying the small commercial remaining factor overall was reasonable for this application based on industry experience.

7.2.3 Industrial Sector

The industrial model varies from the residential and commercial models in that energy end-use areas are assessed from a top-down (end-use category) perspective vs. bottom-up (a measure specific assessment approach). Therefore, the base case, remaining and other factors that were considered independently (by measure) in the residential and commercial models, are combined into a single savings factor in the industrial model. Initial values for each industrial end-use category savings factor were based upon secondary data that was developed previously by the American Council for an Energy Efficient Economy (ACEEE)[51] and used in other GDS technical potential studies in the region. These factors were then adjusted, where appropriate, based upon the New Hampshire industrial sector-specific survey results. Adjustments to the savings factor based upon this project's primary data collection efforts are summarized in Table 65 and Table 66 below.

Table 65. Industrial Electric End-Uses Informed by Primary Data

Industry	End Use Area	Adjustment
Electronic and Other Electrical Equipment	Process Heating	The savings factor was raised 10% to 30% total because this industry type had the largest number of process heat machines and lower MECS data percentage than other industry types with fewer machines (19%)
Electronic and Other Electrical Equipment	Process Cooling and Refrigeration	The savings factor was raised 5% to 10% total because this industry type had the largest number of both commercial and non-commercial refrigeration units and a low relative MECS percentage (4%)
Electronic and Other Electrical Equipment	Facility Lighting	The savings factor was raised 9% due to the disproportional ratio of T12 to T8 lighting in this industry type.
Fabricated Metals	Process Cooling and Refrigeration	The savings factor was increased 2% to 7% total because this industry type had the second highest total of both commercial and non-commercial refrigeration units and a low relative MECS percentage (3%)
Fabricated Metals	Machine Drive	The savings factor was increased 7% to 26% total because this industry type had the 2nd highest number of motors, and the most number of motors that run for 40 hours per week or more. The MECS percentage for this industry type (44%) was also at the low range for this measure category (36% - 82%)
Measuring, Analyzing, and Controlling Instruments	Facility Lighting	The savings factor was increased 9% to 49% total due to a disproportionally high percentage of incandescent lighting fixtures in this industry type compared to other types
Paper and Allied Products	Machine Drive	The savings factor was decreased 9% to 17% total due to the low number of machine drive processes compared to other industry types. The MECS data for this industry type was also high (82%) compared to other industry types
Printing, Publishing and Allied Industries	Process Heating	The savings factor was reduced 10% to 20% total. This industry type had a 50th percentile number of process heating applications so the savings factor was adjusted to represent the 50th percentile of factors for this end use area. The MECS data for this industry type was also the lowest of any industry type (2%)
Rubber and Miscellaneous Plastics Products	Machine Drive	The savings factor was increased 6% to 23% total due to an average number of machine driven equipment, but a relatively high number of motors that run more than 40 hours per week. The MECS data for this industry type was also lower than average (52%) for this measure category
Rubber and Miscellaneous Plastics Products	Facility Lighting	The savings factor was decreased 5% to 35% total due to a large percentage (97%) of fluorescent tube lighting already being T8 fixtures. Fluorescent

[51] *Sources: Connecticut Efficiency Potential Analysis (GDS), EPRI Potential Study Webinar, Resource Assessment for Energy Trust of Oregon, California Industrial Energy Efficiency Potential (Ernest Orlando Lawrence, Berkeley National Laboratory), ACEEE Potential Studies (Vermont, Florida, Texas and Fan & Pump Analyses), Reading Industrial Tech Potential Analysis (GDS), Vermont Electric Energy Efficiency Potential Study (GDS).*

		lighting comprised over 60% of all lighting in this industry type
All	Sensors and Controls	The savings factors were increased uniformly 3% to 4% total to account for the low number of occupancy sensors currently in place, and the low number of reported energy management systems

Table 66. Industrial Non-Electric End-Uses Informed by Primary Data

Industry	End Use Area	Adjustment
Electronic and Other Electrical Equipment	Conventional Boiler Use	The savings factor was raised 4% to 20% total because this industry type reported the largest number of conventional boilers and a low MECS percentage (12%) relative to other industry types
Electronic and Other Electrical Equipment	Facility HVAC	The savings factor was decreased 2% to 11% total due to a high reported incidence of outside air economizers and EMS systems in this industry type
Fabricated Metals	Facility HVAC	The savings factor was increased 4% to 17% total due to a lower than average number of outside air economizers, EMS systems, and heat recovery systems
Lumber and Wood Products	Facility HVAC	The savings factor was increased 7% to 20% total due to the lowest reported number of outside air economizers, EMS systems, and heat recovery systems. This industry type also had a lower than average MECS percentage (14%)
Petroleum Refining and Related Industries	Process Heating	The savings factor was decreased 2% to 11% total due to the lowest number of reported gas-fired process heating applications. This industry type also had a higher than average MECS percentage (60% in this measure category
Petroleum Refining and Related Industries	Facility HVAC	The savings factor was increased 3% to 16% total due to a lower than average number of outside air economizers, EMS systems, and heat recovery systems. This industry type also had the lowest MECS percentage (2%) in this measure category

The adjustments summarized above were made by compiling all relevant data for each end-use area by industry type and looking for trends in the data. As examples, industry types that were found to have disproportionate amounts of processes (i.e. process heating applications), or fixtures (i.e. T8 fluorescent tubes versus T12 fluorescent tubes) were adjusted to reflect the trends noted within that industry type. Trends noted from the surveys were also reviewed with respect to the MECS data. The MECS data was used to determine energy distribution among various processes in each facility. Using the example above, the industry type Electronics and Other Electrical Equipment had the highest number of process heating machines but a lower MECS percentage for process heating than other industry types. In this example, the savings factor for this industry type was increased to reflect the trend noted in the site surveys. In some instances, such as the end use area *Sensors and Controls*, a uniform adjustment was made to reflect what appeared to be increased potential for savings beyond the initial assumptions.

A complete list of savings factors for all end use categories and industry types is provided in Appendix M. In the electric model, 10 of 180 (5.5%) of the factors were adjusted based on survey results. In the non-electric model, 6 of 80 (7.5%) were adjusted. Specific factors that have been amended based on survey data are highlighted for reference.

7.3 Summary and Recommendations

The primary data collection effort for this project gathered an abundance of information relating to the saturation of electric and non-electric (natural gas, oil and propane) energy end uses and the penetration of energy efficiency measures across New Hampshire's residential, commercial, and industrial sectors. These data were used, where applicable, to help derive base and remaining factors applied to the energy efficiency potential assessment models employed for this specific study and will serve as a valuable starting reference for New Hampshire-specific energy end use saturations and efficient equipment penetrations going forward.

Beyond survey information used to derive critical model inputs, a wealth of additional customer and energy usage data was obtained through the telephone surveys and site visits conducted as part of this project. Considerable information regarding customer attitudes towards energy efficiency concepts and programs was acquired, as well as the main motivations and barriers considered by customers with respect to their participation in efficiency programs. Other data such as the distribution of heating fuel usage, facility information, and process information was also collected and will be a valuable resource for future studies.

A number of lessons have been learned through this initial primary data collection effort which might help to increase the effectiveness and value of subsequent efforts. Following is a brief listing of the top three recommendations:

1. Begin with the end in mind – Documenting and communicating a clear vision of the required results from the data collection effort and how those results will be used is a vital first step to ensuring success. This is especially important given the large number of project sponsors, consultant team data collection/evaluation staff, and other parties interested and involved in the process and outcomes from a project of this magnitude. For this current project, written work scopes were developed, discussed, refined and shared with all project participants.

2. Set realistic expectations – It is important to set realistic expectations regarding the amount of measure-specific information that can be collected through a phone survey or site visit. Prioritizing measures and consolidating multiple measures within common end-use categories, up front, will help to maximize survey instrument effectiveness. For this project, multiple discussions and drafts of survey and site visit instruments were developed for this purpose. Results from this report identify measures within each sector that have the greatest potential for savings. Going forward, review of the base and remaining factors associated with these measures will identify clear areas where refined New Hampshire-specific information would be most valuable.

3. Allot sufficient time for data collection and analysis – When large amounts of data are being collected, it is critical that sufficient time be made available, not only for the data collection phase of the project, but more importantly for data analysis. Time to enter, verify, clean and analyze data results is needed to ensure that the most value is mined out of the efforts expended. For this project, as discussed throughout this section of the report, substantial information from this primary data collection effort was used to help inform development of base and remaining factors and to identify customer behaviors and barriers. Going forward, additional review of the data collected through this project could yield further insights and value to the project sponsors.

Section 8: Past Program Capture and Recommendations

This section summarizes results from evaluation of the penetration of energy efficiency savings (electric and natural gas) associated with past and current utility-sponsored program activities. A review of the utilities' annual Core New Hampshire Program Highlights reports formed the basis for this evaluation, along with estimated savings for prior years not posted on the New Hampshire Public Utilities Commission website[52]. Results are presented from both a cumulative savings as a percent of sales perspective, and on a number of customers served as a percent of population basis. Recommendations for potential modifications to program and measure offerings that could increase the likelihood of achieving identified potentials are made and have been developed mainly through information on barriers collected directly from New Hampshire utility customers (through this project's telephone surveys and site visits) and supplemented by the GDS Team's experience with looking at programs from a logic-modeling perspective, and extensive knowledge of other local, regional and national programs and best practices.[53]

Energy efficiency programs offered in New Hampshire include both electric and gas efficiency measures and serve all customer sectors; residential (including low income), commercial and industrial. The electric efficiency programs are comprised of CORE programs offered jointly by the four electric utility providers, and additional efficiency programs offered by the individual utilities. The gas efficiency programs are offered through the individual utility providers.

The CORE programs were formally launched in June 2002, although efficiency programs have been offered by the utilities for quite some time prior. As shown in Table 67, since the formal inception of the CORE programs in June 2002, an estimated total of 557,274 MWh (annual) have been saved.[54] This savings value is based on the estimated annual savings for each year since 2002 added together. In other words, this savings value is calculated by adding the annual savings from the 2003 programs to the annual savings from the 2004 programs to the annual savings from the 2005 programs and so on. This value does not consider the fact that the annual savings from the programs are actually realized every year over the lifetime of the measures. The total annual savings were calculated in this manner to provide a useful comparison to the forecast sales in 2008.

This total savings represents five percent of the total forecasted electric usage for New Hampshire in 2008. Nearly four percent of this savings has been achieved within the commercial industrial sector, with slightly more than one percent of the savings coming from the residential sector.

[52] http://www.puc.state.nh.us/Electric/coreenergyefficiencyprograms.htm

[53] Assessments based on a logic-modeling perspective recognize current program resources (dollars, staffing, etc.) and activities (measure installations, promotional rebates/incentives, marketing/outreach, education/training, etc.) and seek to identify their causal links to anticipated outputs (measures installed, in-program energy and capacity savings, # of customers served, market actors trained, etc.), short-, intermediate- and long-term outcomes (changes in awareness and behavior, market-wide/sustainable energy, economic and environmental benefits, etc.). In addition, logic models recognize the existence and potential impacts of external influences (price of energy, state of the local and regional economy, federal tax incentives, other non-program sponsored activities, etc.).

[54] Estimate is based on reported lifetime savings from 2005-2008 available on NHPUC website, GDS estimates for program measure lives, and extrapolated kWh savings estimates for 2002-2004

Table 67. Energy Efficiency Program Savings as Percent of 2008 Sales: 2002-2008 – Electric Utilities

Sector	Total Annual Savings Since 2002 (MWh)	Forecasted Sales 2008 (MWh)	Cummulative Annual Savings as a Percent of 2008 Sector Sales	Cummulative Annual Savings as a Percent of 2008 Total Sales
Residential	120,064	4,537,480	2.6%	1.1%
Commercial/Industrial	437,210	6,650,732	6.6%	3.9%
Total	**557,274**	**11,188,212**		**5.0%**

It is important to note that the above figure is conservative in several ways. First, the utility providers have been actively offering efficiency programs since well before 2002 so the total amount of energy saved since the inception of efficiency programs is much higher. Second, this figure considers only a single year of annual savings. In reality, annual savings are realized every year over the assumed measure life of the programs. The data was reported in the above manner to provide an appropriate comparison to the forecast 2008 usage.

New Hampshire's natural gas utilities offered energy efficiency programs from 1993 through 1999, at which time the programs were suspended in light of gas industry restructuring and investigation of the electric industry's development of energy efficiency programs. The natural gas utilities began offering the energy efficiency programs again on January 1, 2003, and since that time have saved an estimated total of nearly 250,000 decatherms (annual).[55] This value was again calculated by adding the estimated annual savings for each year since 2003. This value does not consider the cumulative savings over the life of the measures installed in the programs each year (i.e. only one annual year of savings from 2003 programs). As shown in Table 68, this savings represents 1.1 percent of the total forecasted therm sales for New Hampshire in 2008.

Table 68. Energy Efficiency Program Savings as Percent of 2008 Sales: 2003-2008 – Natural Gas Utilities

Sector	Total Annual Savings Since 2003 (decatherms)	Forecasted Sales 2008 (decatherms)	Cummulative Annual Savings as a Percent of 2008 Sector Sales	Cummulative Annual Savings as a Percent of 2008 Total Sales
Residential	95,387	8,435,900	1.1%	0.4%
Commercial/Industrial	150,248	14,267,000	1.1%	0.7%
Total	**245,635**	**22,702,900**		**1.1%**

Overall since 2003, a substantial amount of energy has been saved in both the residential and commercial/industrial sectors. The values presented above are also conservative as they do not reflect the efficiency efforts of the utility providers prior to 2003, nor do they consider the cumulative annual savings of the programs since 2003. The following sections discuss the programs in more detail, including customer participation, benefit cost ratios, and expansion potential.

8.1 Electric Utility Energy Efficiency Programs

The electric utility energy efficiency programs assessed in this section include the CORE programs and other utility-specific programs being offered by National Grid, the New Hampshire Electric Cooperative, Public Service Company of New Hampshire, and Unitil Energy Systems. Any programs being offered by New Hampshire's municipal electric utilities or through conservation and educational programs that do not have reportable energy savings have not been included in this summary. Table 69 presents a listing of the programs and sponsoring

[55] Estimate based on reported savings from 2003-2007 and GDS estimates for program measure lives

utilities included in this past and current electric utility energy efficiency program savings capture assessment. More detailed information on these programs can be found on the NHPUC website at http://www.puc.state.nh.us/Electric/coreenergyefficiencyprograms.htm.

Table 69. New Hampshire Electric Utility Core and Additional Programs

Program Name	Utility Sponsor
ENERGY STAR Home Program	CORE Program – NH Electric Providers
Home Energy Solutions	CORE Program – NH Electric Providers
Home Energy Assistance Program	CORE Program – NH Electric Providers
ENERGY STAR Lighting Program	CORE Program – NH Electric Providers
ENERGY STAR Appliance Program	CORE Program – NH Electric Providers
Small Business Energy Solutions	CORE Program – NH Electric Providers
Large Business Energy Solutions	CORE Program – NH Electric Providers
New Equipment and Construction	CORE Program – NH Electric Providers
NHEC High Efficiency Heat Pump Program	New Hampshire Electric Cooperative (NHEC)
PSNH ENERGY STAR Homes - geothermal	Public Service Company of New Hampshire (PSNH)
PSNH C&I RFP Pilot Program	Public Service Company of New Hampshire (PSNH)

8.1.1 Program Participation

The number of customers participating in the CORE programs has remained relatively constant since 2005. Some programs, such as the Home Energy Solutions and the Home Energy Assistance programs have decreased slightly in participation since 2005. Participation in these programs is somewhat limited under current program design, as they serve limited markets (i.e., homes with electric heat and low income homes, respectively). Homes with electric heat as the main fuel source represent approximately 4 percent of all residences in the state.[56] Low-income homes represent approximately 5.5 percent of all residences in New Hampshire. Since 2005, the total customer participation in the Home Energy Solutions and Home Energy Assistance programs is summarized in Table 70 below:

Table 70. Customer Served Through Utility HES and HEA Programs: 2005-2008

	Customers Served (2005-2008)	Total Population	Saturation
Home Energy Solutions	5,087	20,849	24.3%
Home Energy Assistance Program	4,143	28,668	14.5%

Given that the CORE programs have been in effect since June 2002, the actual saturation of these two markets is likely greater than the totals shown above. It is important to note however, that there are over 16,000 households on the waiting list for the Home Energy Assistance programs that serves low-income households[57] – therefore, there remains substantial demand for this program for the foreseeable future.,

56 Figure based on residential phone survey data for both single family and multi-family
57 Based on recent testimony by PSNH in CORE docket hearings (DE 08-120). Also, the low-income subgroup of the CORE docket produced an estimate that there are about 87,000 low-income households in New Hampshire, almost one-fifth of the total housing stick, that still need energy efficiency services (Low Income Report entered as Appendix B to the CORE Settlement Agreement filed on December 11, 2008 in DE 08-120.

Participation in the ENERGY STAR lighting and appliance programs has remained mostly steady since 2005, with spikes in participation in the lighting program in 2007 and the highest participation rate for the appliance program in 2006. These two programs have consistently maintained a good return of lifetime kWh saved per unit of cost. Since these programs target individual appliances and fixtures, and not individual homes per se, it is difficult to assess the extent to which the available market for these programs has diminished since the inception of the programs.

Participation in the ENERGY STAR Homes program has remained relatively stable since 2006 likely due to an overall downturn in the real estate market. In 2007, 524 builders (i.e. 524 homes) participated in New Hampshire's ENERGY STAR Homes programs out of a total of 3,772 single-family residential building permits[58]. This represents a saturation of 13.9 percent of ENERGY STAR homes among the residential new construction market in 2007.

Since 2005, a total of 3,110 small businesses have participated in the Small Business Energy Solutions program and a total of 1,008 large businesses have participated in the Large C&I Retrofit Program. These participation rates cannot be directly correlated to program saturation rates because many of the large businesses may have participated more than once. It is clear from this data, however, that the saturation of the large business programs has been much greater than in the small business programs.

In 2007, 194 builders or clients participated in the New Equipment and Construction program representing 24.6 percent of commercial/industrial building permits.

With respect to the three utility specific programs reviewed[59], total number of participants and total expenditures are far less than the CORE programs.

8.1.2 Program Awareness

Customer attitudes towards energy efficiency practices and programs were obtained from sector-specific site visits and phone surveys and were summarized in detail in Section 3.3 of this report. It seems relevant to this discussion to reiterate the findings relative to customer awareness of existing energy efficiency programs offered by the utilities. From the site and phone surveys, the percentages of customers who reported being aware of the programs offered are summarized in Table 71. As shown in this table New Hampshire's large commercial and industrial customers reported being most aware utility efficiency programs (over 85%). Residential customers were the least aware, at less than 50 percent. Nearly 60 percent of small commercial/industrial customers were aware of the utilities' programs.

Table 71. Percent of Customers Aware of Utility Efficiency Programs

	% Aware of Efficiency Programs Offered
Residential	49.4%
Small Commercial/Industrial	59.6%
Large Commercial/Industrial	85.9%

Although less than half of the 400 residential customers surveyed were aware that their utility providers offered energy efficiency programs, over 90 percent of all residential survey

[58] http://www.bos.frb.org/
[59] NHEC's *High Efficiency Heat Pump Program*, PSNH's *Energy Star Homes Geothermal Program*, and PSNH's *C&I RFP Pilot Program*

respondents indicated that they would incorporate energy efficient features in future renovations. This data indicates the potential for much greater participation in the residential marketplace with increased awareness. Similar opportunities exist with small commercial/industrial customers, although these customers are often the most hard to reach and to encourage to take action.

8.1.3 Efficiency Measures *Not* Included in Current Programs

This New Hampshire Additional Energy Efficiency Opportunities Potential Assessment study identified an abundance of energy efficiency measures that were cost effective and represent potential energy savings for New Hampshire in the next 10 years. Many of the most cost effective measures such as lighting, programmable thermostats and ENERGY STAR appliances are already included in the current energy efficiency programs sponsored by the electric and natural gas utilities. The efficiency measures discussed in Table 72 below are not included in the current programs and may represent opportunities for program expansion upon further review. It is important to note that the table below is by no means comprehensive, it is intended to be illustrative of areas with potential for expansion.

Table 72. Residential Measures Not Included in Current Programs

Efficiency Measure	Measure End Use	Comments
Programmable thermostat	Space heating and cooling	For homes with Oil or Propane heating. Programmable thermostats are included in the Home Energy Solutions (HES) program for homes with electric heat and offered by the gas utilities for homes with gas heat. The Home Energy Assistance (HEA) offers them for low income customers
Energy Efficient Windows	Space heating and cooling	For homes with Oil or Propane heating. The HEA low income program offers windows replacement for all fuels when cost-effective. The gas utilities offer a rebate for high efficiency window replacement for customers with gas heat.
Duct Sealing	Space heating and cooling	For homes with Oil or Propane heating. Duct sealing is included in the Home Energy Solutions program for homes with electric heat and the Weatherization program for homes with gas heat.
High efficiency heat pumps	Space heating and cooling	This measure is included in NHEC's specific program but not in the CORE programs for existing residential homes
Ground source heat pumps	Space heating and cooling	This measure is included in NHEC's specific program but not in the CORE programs for existing residential homes. PSNH offers this measure for residential new construction
Low flow shower heads/faucets	Water heating	For homes with Oil or Propane heating. Low flow shower heads and faucets are included in the Home Energy Solutions program for homes with electric heating (and also in the gas utility efficiency programs)
Water Heating measures	Water heating	For homes with Oil or Propane heating. Low flow shower heads and faucets are included in the Home Energy Solutions program for homes with electric heating, HES for all fuels and in the gas Weatherization program. Water heater wraps are offered for older water heaters in the HES program.
New water heater (efficient, tank less, heat pump)	Water heating	For all homes. Incentives are offered by the gas utilities
ENERGY STAR Refrigerator	Appliances	For all homes, not currently included in ENERGY STAR Appliances program. Available in HEA & HES programs if qualification criterion are met.
ENERGY STAR Freezer	Appliances	For all homes, not currently included in ENERGY STAR Appliances program. Available in HEA & HES programs if qualification criterion are met.
ENERGY STAR Dehumidifier	Appliances	For all homes, not currently included in ENERGY STAR Appliances program. Available in HEA if qualification criterion are met but none have been done.
ENERGY STAR Dishwasher	Appliances	For all homes, not currently included in ENERGY STAR Appliances program. Available in HEA if qualification criterion are met but none have been done.

Many of the efficiency measures identified above are efficiency measures that are cost effective and to date have been included only in programs serving homes with electric or natural gas heating. Homes with electric heat comprise approximately 4 percent of all residences based on the survey data whereas homes with natural gas, propane or oil heat comprise approximately 84 percent of homes. The appliances noted consume a significant amount of electricity and are not currently included in the ENERGY STAR appliances program for existing residences. Table 73 provides similar information regarding measures not currently included in the utilities' commercial/industrial programs.

Table 73. Commercial/Industrial Measures Not Included in Current Programs

Efficiency Measure	Measure End Use	Comments
Dishwasher, clothes washers, refrigeration, etc.	Appliances	Energy efficient appliances represents a potential for small and large businesses to conserve energy with small incremental costs, but is currently included only in the Small Business Energy Solutions Program
Ground source heat pumps	Space heating and cooling	Ground source heat pumps represent both a significant initial cost as well as a significant payback in terms of energy savings
General water heating measures	Water heating	Water heating measures such as low flow faucets and shower heads, efficient water heaters, water heater blankets, and similar water heating measures are only included in the Small Business Energy Solutions Program but represent a potential for energy savings in other facilities using electric hot water heating

8.2 Gas Efficiency Programs

Gas efficiency programs are offered independently in New Hampshire by the two gas utilities, National Grid and Northern Utilities. The gas efficiency programs were offered from 1993 through 1999, at which time the programs were suspended in light of gas industry restructuring and investigation of the electric industry's development of energy efficiency programs. The natural gas utilities began offering the energy efficiency programs again on January 1, 2003. The programs offered since 2003 are the programs evaluated in this analysis, and include the following (Table 74).

Table 74. Gas Efficiency Programs Evaluated

Program Name	Utility Sponsor
Residential custom measures	Northern Utilities (Gas)
Residential Low Income custom measures	Northern Utilities (Gas)
residential high efficiency heating equipment	Northern Utilities (Gas)
High efficiency water heating	Northern Utilities (Gas)
ENERGY STAR homes	Northern Utilities (Gas)
ENERGY STAR Programmable thermostats	Northern Utilities (Gas)
ENERGY STAR Windows	Northern Utilities (Gas)
Weatherization	Northern Utilities (Gas)
Multifamily custom measures	Northern Utilities (Gas)
Small commercial and Industrial Custom Measures	Northern Utilities (Gas)
Med and large C/I custom measures	Northern Utilities (Gas)
Commercial high efficiency heating program	Northern Utilities (Gas)
Infrared heating program	Northern Utilities (Gas)
Commercial ENERGY STAR Thermostats	Northern Utilities (Gas)

Program Name	Utility Sponsor
Low Income	National Grid (Gas)
Residential High Efficiency heating	National Grid (Gas)
ENERGY STAR Windows	National Grid (Gas)
Residential Weatherization	National Grid (Gas)
ENERGY STAR Thermostats	National Grid (Gas)
Residential High Efficiency Water Heating	National Grid (Gas)
ENERGY STAR Homes	National Grid (Gas)
Commercial Energy Efficiency Program	National Grid (Gas)
Economic Redevelopment	National Grid (Gas)
Commercial High Efficiency Heating	National Grid (Gas)
Multifamily Housing	National Grid (Gas)

Programs that do not have reportable therm savings such as the online audit and educational programs have been excluded from this list. A complete list of efficiency programs offered by the New Hampshire natural gas utilities may be found on the NHPUC website. [60]

8.2.1 Program Participation

Program summary sheets reviewed for the gas efficiency programs did not report the total number of actual participants for each program on a yearly basis. Based on the design goals for each program, the total number of participants has increased each year since 2003 with the largest increase in targeted users occurring between 2005 and 2006.

The design goal participation in several programs has increased steadily since 2003. Efficiency programs with notable increases in design goal participations since 2003 include the following:

- ENERGY STAR Homes
- ENERGY STAR Programmable Thermostats
- ENERGY STAR Windows
- Residential Weatherization
- Commercial High Efficiency Heating

GDS estimated the saturation of natural gas efficiency programs in the residential and commercial/industrial marketplace by calculating the cumulative number of design goal participants for each program since 2003 and comparing that number to the total number of potential users. The number of actual participants was not available from the documents posted to the NHPUC website. Potential users were determined by applying the percentage of natural gas users from the phone surveys, to the overall number of end use customers in each sector. For the purpose of estimating saturations, participation in programs offered by both utilities has been added together. The saturations presented in Table 75 below do not account for homes and facilities already equipped with the efficiency measure (i.e. homes already with programmable thermostats) and are intended only to reflect the percentage of the marketplace reached by the individual programs[61].

[60] http://www.puc.state.nh.us/Gas-Steam/energyefficiencyprograms.htm
[61] It is also important to note that many of the programs are time of replacement, so the saturations may be misleading because the total population is actually the number of customers in need of a heating system replacement and that number is constantly changing.

Table 75. Customer Served Through Natural Gas Utility Programs: 2005-2008

	Customers Served (2005-2008)	Total Population[62]	Saturation
Residential Conservation Services	2,245	45,279	5.0%
Residential Custom Measures	580	45,279	1.3%
Residential Low Income Custom Measures	621	2,402	25.9%
Residential High Efficiency Heating Equipment	2,912	45,279	6.4%
ENERGY STAR Homes	307	15,088[63]	2.0%
ENERGY STAR Programmable Thermostats	2,054	45,279	4.5%
Multi-Family Custom Measures	56	84,989	0.1%
C&I Custom Measures	375	33,481	1.1%
Commercial High Efficiency Heating Program	437	34,400	1.3%
Infrared Heating Program	28	34,440	0.1%
Commercial ENERGY STAR Thermostats	220	34,440	0.6%
Commercial Food Service Program	18	3,851	0.5%

The summary table above indicates that the gas efficiency programs since 2003 have penetrated the residential market to a greater extent than the commercial and industrial market. It appears that there is substantial opportunity for further penetration in all customer sectors.

8.2.2 Program Awareness

Customer awareness of utility sponsored efficiency programs is summarized in Sections 3.3 and 8.1.2 of this report. Of importance to this discussion of gas efficiency programs is the finding that less than half of residential customers are aware that programs are offered by their utility providers. More than 40 percent of small commercial and industrial customers are not aware of the programs offered by the utility providers. Increasing customer awareness will be an important barrier to overcome.

8.2.3 Efficiency Measures *Not* Included in Current Programs

A significant majority of the efficiency measures identified in the technical potential study have already been incorporated in the programs offered by the natural gas utilities. Several measures that are cost effective and are not currently included in the efficiency programs offered by the utility providers are summarized in Table 76 below. It is important to note that the current program designs do not permit the utility providers to pay for programs for oil/propane measures because the programs are funded by electric and gas ratepayers.

[62] Total population estimates are based on the total number of available properties by program type, times the percentage of facilities reporting the usage of natural gas from the site and phone surveys
[63] Estimate is number of 2007 single family building permits (3,772) times four years

Table 76. Measures Not Included in Current Natural Gas Efficiency Programs

Efficiency Measure	Measure End Use	Comments
ENERGY STAR Dishwashers	Appliances / Water heating	In homes with natural gas water heating
ENERGY STAR Clothes Washers	Appliances / Water heating	In homes with natural gas water heating
Boiler Tune up	Water Heating	In homes with natural gas supplied boilers
High efficiency cooking equipment	Cooking	High efficiency cooking equipment represents a potential for substantial savings. Northern Utilities and National Grid currently offer rebates for high-efficiency fryers and steamers.

Both of New Hampshire's natural gas utilities offer basic or prescriptive rebates for incorporating general energy efficiency products such as space heating equipment and water heaters. For small and large commercial and industrial customers, both utilities offer energy audit services and the potential for custom energy efficiency programs tailored to the specific facility. The audit and custom approach to efficiency programs in the commercial and industrial sector incorporate the potential for a wealth of energy efficiency measures to be incorporated at a specific facility.

8.3 Summary and Recommendations

To date, the efficiency programs offered in New Hampshire by the state's four largest electric utilities and two natural gas distribution companies have been successful and have saved a substantial amount of energy. Many of the programs have and are continuing to perform quite well in terms of cost per unit of energy saved and customer participation. Several other programs have shown positive trends becoming more cost effective on a yearly basis.

For all programs, but most notably in the electric market, the cost per kWh saved in the commercial and industrial sectors has been better than in the residential market. This might explain why in general, commercial and industrial customers have indicated a higher awareness of the utilities' efficiency programs available to them as well as an increased likelihood of participation compared to residential customers. Given the scale of energy consumption in the commercial and industrial sectors, these customers continue to represent a substantial area for potential energy savings in the upcoming years. Additional penetration can be achieved through increased outreach to small commercial/industrial customers and by expanding current program offerings to include other cost effective measures not currently included in the companies' CORE and utility-specific programs.

Residential customer participation in the state's electric and natural gas energy efficiency programs has met or exceeded program expectations on a yearly basis. However, in the phone surveys more than half of respondents indicated that they were not aware of the programs offered by their utilities, or that they were even eligible. Of the customers who were aware of the programs, a high percentage participated and indicated they would participate in the future. This data underscores the importance of increasing consumer education on the programs available to residential customers and of the associated benefits.

One final finding from the study is that nearly all of the most cost effective energy efficiency measures are included in current programs in some manner. In several programs, however, the cost effective measures are targeted to a small percentage of consumers. The best example of this is the *Home Energy Solutions* program which targets consumers with 65 percent or greater electric heating. Customers with primarily electric heat represent approximately 4 percent of the total population based on the phone surveys. Customers with 65% or more electric heat likely represent a larger percentage of the total population but are nonetheless a small percentage of all customers. Adding more comprehensive programs and expanding the depth, breadth and promotion of the current programs to include a larger number of potential participants may lead to increased overall energy savings. It is important to recognize that such expansion would require providing services to customers that heat with fuels other than electric or natural gas. Issues regarding who would pay for the provision of services to such customers would need to be addressed.

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix G

Appendix H

Appendix I

Appendix J

Appendix K

Appendix L

Appendix M

Appendix D

Resource and Requirements Tables

Resource and Requirements Tables: Section I

Design Year and Normal Year Base Case Demand With DSM Scenarios

Resource and Requirements Tables

Design Year Base Case Demand
No DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2010-11: No DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,501,745	2,190,898	2,466,082	2,109,611	1,848,570	1,066,574	532,896	391,350	379,510	379,211	442,044	841,331	10,116,906	4,032,916	14,149,822	140,043
Refill	Underground Storage	82,833	0	0	0	0	477,497	525,795	489,383	276,870	15,465	0	0	82,833	1,785,010	1,867,843	0
	LNG	2,845	2,940	68,072	20,352	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	88,568	4,890	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,587,423	2,193,838	2,622,722	2,134,853	1,854,360	1,544,071	1,079,680	891,260	659,325	397,621	444,894	844,276	10,393,196	5,861,127	16,254,323	149,650
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	52,208	325	0	0	0	0	48,432	604,000	100,965	704,965	4,000
	Niagara Supply	93,660	85,665	43,415	33,119	20,291	33,970	0	0	0	0	0	25,817	276,150	59,787	335,937	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	**0**	0	0	0	2,229,977	0	2,229,977	24,778
	Dracut Swing	694,215	63,618	14,939	75,081	967,504	836,230	420,157	262,550	**0**	373,073	435,534	758,433	1,815,356	3,085,977	4,901,333	12,550
	Gulf Supply	640,405	656,857	644,276	579,642	669,476	612,855	630,676	612,093	650,335	15,465	0	0	3,190,656	2,521,424	5,712,080	21,596
	Storage	26,162	480,353	678,015	582,077	56,051	169	0	0	0	0	0	0	1,822,658	169	1,822,827	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	68,072	20,352	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	74,600	20,352	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	107,761	4,890	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	88,568	4,890	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,587,422	2,193,838	2,622,723	2,134,853	1,854,360	1,544,072	1,079,680	891,260	659,325	397,621	444,894	844,276	10,393,196	5,861,128	16,254,324	149,650

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2011-12: No DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,538,332	2,236,141	2,514,796	2,239,699	1,889,648	1,097,679	556,341	409,603	397,369	397,306	462,149	869,770	10,418,616	4,190,217	14,608,833	142,301
Refill	Underground Storage	86,308	0	0	0	0	476,171	525,795	489,383	497,643	333,401	0	0	86,308	2,322,393	2,408,701	0
	LNG	2,845	2,940	71,365	17,059	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,627,485	2,239,081	2,679,619	2,256,758	1,895,438	1,573,850	1,103,125	909,513	897,957	733,652	464,999	872,715	10,698,381	6,555,811	17,254,192	151,908
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	104,814	100,000	124,000	53,971	1,387	0	0	0	0	4,000	572,814	59,358	632,172	4,000
	Niagara Supply	93,660	35,691	44,187	51,178	28,874	36,403	0	0	0	0	0	143	253,590	36,546	290,136	3,122
	Dracut Baseload	0	768,103	768,103	718,547	0	0	0	0	0	0	0	0	2,254,753	0	2,254,753	24,778
	Dracut Swing	729,575	79,945	31,508	133,210	906,455	860,123	442,540	280,803	255,742	391,168	455,639	856,978	1,880,693	3,542,993	5,423,686	14,808
	Gulf Supply	640,091	620,076	505,686	497,656	669,476	612,896	630,676	612,093	633,225	333,401	0	0	2,932,985	2,822,291	5,755,276	21,596
	Storage	31,178	596,023	858,981	713,060	149,595	1,818	0	0	0	0	0	0	2,348,837	1,818	2,350,655	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	71,365	17,059	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	77,893	17,059	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,627,484	2,239,080	2,679,620	2,256,759	1,895,438	1,573,851	1,103,125	909,513	897,957	733,652	464,999	872,715	10,698,381	6,555,812	17,254,193	151,908

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2012-13: No DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,575,638	2,281,759	2,563,715	2,194,737	1,931,298	1,129,768	581,235	429,497	416,982	417,139	483,800	899,414	10,547,147	4,357,835	14,904,982	144,531
Refill	Underground Storage	89,783	0	0	0	0	483,962	525,795	508,834	497,643	219,367	0	0	89,783	2,235,601	2,325,384	0
	LNG	2,845	2,940	71,994	16,430	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,215	7,978	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,668,266	2,284,699	2,729,167	2,211,167	1,937,088	1,613,730	1,127,718	949,159	917,570	639,451	486,650	902,359	10,830,387	6,636,637	17,467,024	154,138
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	12,447	0	0	0	0	0	4,000	604,000	16,447	620,447	4,000
	Niagara Supply	93,660	37,464	48,201	53,065	14,401	6,244	0	0	0	0	0	1,437	246,791	7,681	254,472	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	765,649	98,166	55,870	143,156	1,410,542	1,056,729	573,702	423,407	410,937	411,001	477,290	885,328	2,473,384	4,238,394	6,711,778	17,039
	Gulf Supply	639,778	629,943	519,327	484,140	282,768	526,201	525,795	508,834	497,643	219,367	0	0	2,555,956	2,277,840	4,833,796	21,596
	Storage	36,198	611,780	846,068	683,495	88,339	3,469	0	0	0	0	0	0	2,265,880	3,469	2,269,349	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	71,994	16,430	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	78,522	16,430	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,215	7,978	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,668,265	2,284,698	2,729,168	2,211,166	1,937,088	1,613,730	1,127,718	949,159	917,570	639,451	486,650	902,359	10,830,385	6,636,637	17,467,022	154,138

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2013-14: No DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,610,788	2,324,883	2,610,004	2,235,114	1,970,606	1,159,904	604,427	447,888	435,072	435,444	503,885	927,170	10,751,395	4,513,790	15,265,185	146,653
Refill	Underground Storage	93,076	0	0	0	0	483,658	525,795	508,834	497,643	226,067	0	0	93,076	2,241,997	2,335,073	0
	LNG	2,845	2,940	71,255	17,169	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	90,294	3,164	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,706,709	2,327,823	2,771,553	2,255,447	1,976,396	1,643,562	1,151,211	967,249	935,660	664,456	506,735	930,115	11,037,928	6,798,988	17,836,916	156,260
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	64,524	14,944	0	0	0	0	0	4,735	544,524	19,679	564,203	4,000
	Niagara Supply	9,366	72,613	55,034	53,074	16,440	7,158	0	0	0	0	0	2,658	206,527	9,816	216,343	3,122
	Dracut Baseload	0	768,103	768,102	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	1,265,515	117,104	83,909	165,999	1,487,881	1,079,215	596,894	441,798	429,027	429,306	497,375	911,128	3,120,408	4,384,743	7,505,151	21,900
	Gulf Supply	257,891	638,434	528,737	491,553	291,701	528,572	525,795	508,834	497,643	226,067	0	0	2,208,316	2,286,911	4,495,227	21,596
	Storage	40,955	592,327	851,978	689,705	98,812	5,033	0	0	0	0	0	0	2,273,777	5,033	2,278,810	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	71,255	17,169	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	77,783	17,169	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	109,487	3,164	0	0	0	0	0	0	0	0	112,651	0	112,651	32,260
	Truck	0	0	90,294	3,164	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,706,707	2,327,823	2,771,553	2,255,447	1,976,396	1,643,562	1,151,211	967,249	935,660	664,456	506,735	930,115	11,037,926	6,798,988	17,836,914	156,260

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2014-15: No DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,646,385	2,369,016	2,657,573	2,276,528	2,010,618	1,190,077	627,012	465,352	452,124	452,728	523,183	954,692	10,960,120	4,665,168	15,625,288	148,866
Refill	Underground Storage	98,041	0	0	0	0	483,377	525,795	508,834	497,643	258,822	0	0	98,041	2,274,471	2,372,512	0
	LNG	2,845	2,940	69,413	19,011	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	9,373	0	0	0	0	93,458	20,889	114,347	5,607
Total Requirements		1,747,271	2,371,956	2,820,444	2,295,539	2,016,408	1,673,454	1,173,796	986,409	952,712	714,495	526,033	957,637	11,251,618	6,984,536	18,236,154	158,473
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	112,751	124,000	124,000	112,000	67,704	16,158	0	0	0	0	0	5,929	540,455	22,087	562,542	4,000
	Niagara Supply	9,366	75,070	62,107	54,060	18,498	9,527	0	0	0	0	0	3,122	219,101	12,649	231,750	3,122
	Dracut Baseload	0	768,103	768,102	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	1,291,583	136,615	117,441	189,929	1,502,034	1,100,572	619,479	459,262	446,079	446,590	516,673	936,216	3,237,602	4,524,871	7,762,473	25,223
	Gulf Supply	274,734	645,385	535,924	502,142	301,495	531,915	525,795	508,834	497,643	258,822	0	776	2,259,680	2,323,785	4,583,465	21,596
	Storage	45,856	607,541	857,468	689,901	107,942	6,643	0	0	0	0	0	0	2,308,708	6,643	2,315,351	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	69,413	19,011	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	75,941	19,011	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	9,397
Propane	Vapor	0	0	105,616	7,035	1,696	0	0	0	0	0	0	0	114,347	0	114,347	32,282
	Truck	0	0	93,458	0	0	0	11,516	9,373	0	0	0	0	93,458	20,889	114,347	5,607
Total Resources		1,747,270	2,371,956	2,820,444	2,295,539	2,016,407	1,673,455	1,173,796	986,409	952,712	714,495	526,033	957,637	11,251,616	6,984,537	18,236,153	158,473

Resource and Requirements Tables

Design Year Base Case Demand
Low Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2010-11: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,474,618	2,154,939	2,426,426	2,075,463	1,817,058	1,045,293	520,172	383,760	372,732	372,184	432,481	823,286	9,948,504	3,949,908	13,898,412	138,032
Refill	Underground Storage	79,941	0	0	0	0	437,743	525,795	489,383	283,390	7,144	0	0	79,941	1,743,455	1,823,396	0
	LNG	2,845	2,940	64,851	23,573	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	77,630	15,828	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,557,404	2,157,879	2,568,907	2,114,864	1,822,848	1,483,036	1,066,956	883,670	659,067	382,273	435,331	826,231	10,221,902	5,736,564	15,958,466	147,639
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	50,489	0	0	0	0	0	46,727	604,000	97,216	701,216	4,000
	Niagara Supply	93,660	82,126	40,814	29,352	17,597	32,617	0	0	0	0	0	21,728	263,549	54,345	317,894	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	**0**	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	668,094	50,890	10,539	48,814	945,801	775,120	407,758	254,960	**0**	366,046	425,971	746,182	1,724,138	2,976,037	4,700,175	10,539
	Gulf Supply	640,666	655,309	639,692	561,245	669,476	616,171	630,676	612,093	650,077	7,144	0	0	3,166,388	2,516,161	5,682,549	21,596
	Storage	22,003	462,210	664,101	582,201	48,936	0	0	0	0	0	0	0	1,779,451	0	1,779,451	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	64,851	23,573	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	71,379	23,573	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	96,823	15,828	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	77,630	15,828	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,557,403	2,157,880	2,568,906	2,114,864	1,822,848	1,483,037	1,066,956	883,670	659,067	382,273	435,331	826,231	10,221,901	5,736,565	15,958,466	147,639

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2011-12: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,502,162	2,188,196	2,461,921	2,192,353	1,847,632	1,069,304	539,376	399,483	388,332	387,936	449,398	845,710	10,192,264	4,079,539	14,271,803	139,620
Refill	Underground Storage	82,451	0	0	0	0	477,504	525,795	489,383	497,643	303,755	0	0	82,451	2,294,080	2,376,531	0
	LNG	2,845	2,940	62,356	26,068	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	7,677	11,516	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,587,458	2,191,136	2,617,735	2,218,421	1,853,422	1,546,808	1,082,321	903,232	888,920	694,636	452,248	848,655	10,468,172	6,416,820	16,884,992	149,227
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	103,950	99,954	124,000	52,368	404	0	0	0	0	2,861	571,904	55,633	627,537	4,000
	Niagara Supply	93,660	31,659	43,307	41,566	28,098	34,080	0	0	0	0	0	0	238,290	34,080	272,370	3,122
	Dracut Baseload	0	768,102	768,103	718,547	0	0	0	0	0	0	0	0	2,254,753	0	2,254,753	24,778
	Dracut Swing	694,746	61,929	12,706	96,814	870,823	838,905	426,557	270,683	246,706	381,798	442,888	834,199	1,737,017	3,441,736	5,178,753	12,127
	Gulf Supply	640,439	610,655	487,663	484,013	669,476	612,813	630,676	612,093	633,225	303,755	0	0	2,892,246	2,792,562	5,684,808	21,596
	Storage	25,633	579,549	853,683	716,401	143,988	3	0	0	0	0	0	0	2,319,254	3	2,319,257	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	62,356	26,068	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	68,884	26,068	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	7,677	11,516	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,587,458	2,191,136	2,617,735	2,218,421	1,853,423	1,546,809	1,082,320	903,232	888,921	694,636	452,248	848,654	10,468,173	6,416,820	16,884,993	149,227

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2012-13: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,530,426	2,221,828	2,497,621	2,137,823	1,878,778	1,094,300	560,029	416,847	405,686	405,427	467,861	869,338	10,266,476	4,219,488	14,485,964	141,179
Refill	Underground Storage	84,962	0	0	0	0	486,389	525,795	508,834	497,643	167,626	0	0	84,962	2,186,287	2,271,249	0
	LNG	2,845	2,940	68,082	20,342	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,618,233	2,224,768	2,659,161	2,158,165	1,884,568	1,580,689	1,106,813	936,208	906,274	575,998	470,711	872,283	10,544,895	6,448,976	16,993,871	150,786
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	10,091	0	0	0	0	0	3,834	604,000	13,925	617,925	4,000
	Niagara Supply	93,660	34,650	43,708	45,366	12,488	6,244	0	0	0	0	0	0	229,872	6,244	236,116	3,122
	Dracut Baseload	0	768,102	768,102	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	722,113	73,420	24,517	105,962	1,388,009	1,030,462	552,496	410,757	399,641	399,289	461,351	856,855	2,314,020	4,110,851	6,424,871	13,687
	Gulf Supply	640,213	618,037	500,629	467,501	270,934	524,052	525,795	508,834	497,643	167,626	0	0	2,497,314	2,223,950	4,721,264	21,596
	Storage	29,266	591,317	838,428	684,204	72,100	1,200	0	0	0	0	0	0	2,215,315	1,200	2,216,515	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	68,082	20,342	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	74,610	20,342	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,618,232	2,224,768	2,659,159	2,158,167	1,884,569	1,580,689	1,106,813	936,208	906,274	575,998	470,711	872,283	10,544,895	6,448,976	16,993,871	150,786

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2013-14: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,556,534	2,252,965	2,530,691	2,166,818	1,907,583	1,117,342	578,980	432,709	421,517	421,389	484,758	891,079	10,414,591	4,347,774	14,762,365	142,631
Refill	Underground Storage	87,291	0	0	0	0	486,581	525,795	508,834	497,643	164,982	0	0	87,291	2,183,835	2,271,126	0
	LNG	2,845	2,940	73,764	14,660	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,646,670	2,255,905	2,697,913	2,181,478	1,913,373	1,603,923	1,125,764	952,070	922,105	589,316	487,608	894,024	10,695,339	6,574,810	17,270,149	152,238
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	61,607	13,052	0	0	0	0	0	4,000	541,607	17,052	558,659	4,000
	Niagara Supply	9,366	71,806	44,780	48,985	13,545	6,244	0	0	0	0	0	735	188,482	6,979	195,461	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,236,830	84,783	35,476	124,922	1,463,921	1,048,802	571,446	426,619	415,472	415,251	478,248	877,696	2,945,932	4,233,534	7,179,466	15,138
	Gulf Supply	234,856	624,952	511,604	472,104	277,337	524,876	525,795	508,834	497,643	164,982	0	0	2,120,853	2,222,130	4,342,983	21,596
	Storage	32,637	567,020	842,811	691,697	79,924	2,310	0	0	0	0	0	0	2,214,089	2,310	2,216,399	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	73,764	14,660	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	80,292	14,660	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,646,669	2,255,906	2,697,913	2,181,478	1,913,372	1,603,924	1,125,763	952,070	922,105	589,316	487,608	894,025	10,695,338	6,574,811	17,270,149	152,238

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2014-15: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,583,088	2,285,112	2,565,041	2,196,849	1,937,091	1,140,421	597,323	447,643	436,310	436,331	500,868	912,586	10,567,181	4,471,482	15,038,663	144,174
Refill	Underground Storage	89,723	0	0	0	0	485,631	525,795	508,834	497,643	192,460	0	0	89,723	2,210,363	2,300,086	0
	LNG	2,845	2,940	72,381	16,043	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,675,656	2,288,052	2,730,880	2,212,892	1,942,881	1,626,052	1,144,107	967,004	936,898	631,736	503,718	915,531	10,850,361	6,725,046	17,575,407	153,781
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	108,585	124,000	124,000	112,000	62,512	13,975	0	0	0	0	0	4,000	531,097	17,975	549,072	4,000
	Niagara Supply	9,366	71,806	48,478	53,074	14,657	7,145	0	0	0	0	0	1,654	197,381	8,799	206,180	3,122
	Dracut Baseload	0	768,102	768,104	693,771	0	0	0	0	0	0	0	0	2,229,977	0	2,229,977	24,778
	Dracut Swing	1,263,412	98,028	54,302	141,310	1,476,567	1,066,219	589,791	441,553	430,265	430,193	494,358	898,284	3,033,619	4,350,663	7,384,282	16,681
	Gulf Supply	245,162	631,980	520,348	481,160	284,040	526,608	525,795	508,834	497,643	192,460	0	0	2,162,690	2,251,340	4,414,030	21,596
	Storage	36,151	578,893	847,276	690,812	88,065	3,466	0	0	0	0	0	0	2,241,197	3,466	2,244,663	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	72,381	16,043	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	78,909	16,043	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,675,656	2,288,051	2,730,881	2,212,893	1,942,879	1,626,053	1,144,108	967,004	936,898	631,736	503,718	915,532	10,850,360	6,725,049	17,575,409	153,781

Resource and Requirements Tables

Design Year Base Case Demand
Base Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2010-11: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,465,302	2,143,340	2,413,906	2,064,571	1,806,566	1,037,431	514,354	379,305	368,394	367,783	427,534	816,143	9,893,685	3,910,944	13,804,629	137,446
Refill	Underground Storage	79,308	0	0	0	0	417,352	525,795	488,454	287,412	6,582	0	0	79,308	1,725,595	1,804,903	0
	LNG	2,845	2,940	63,566	24,858	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	74,268	19,190	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,547,455	2,146,280	2,551,740	2,108,619	1,812,356	1,454,783	1,061,138	878,286	658,751	377,310	430,384	819,088	10,166,450	5,679,740	15,846,190	147,053
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	49,706	0	0	0	0	0	45,651	604,000	95,357	699,357	4,000
	Niagara Supply	93,660	80,742	39,584	27,655	16,986	32,335	0	0	0	0	0	20,677	258,627	53,012	311,639	3,122
	Dracut Baseload	0	768,102	768,102	693,770	0	0	0	0	**0**	0	0	0	2,229,974	0	2,229,974	24,777
	Dracut Swing	659,380	46,953	9,954	40,973	938,116	746,343	401,940	249,503	**0**	361,645	421,024	741,166	1,695,376	2,921,621	4,616,997	9,954
	Gulf Supply	640,723	654,574	638,124	559,770	669,476	617,759	630,676	612,166	649,761	6,582	0	0	3,162,667	2,516,944	5,679,611	21,596
	Storage	20,712	456,666	659,613	577,676	46,740	0	0	0	0	0	0	0	1,761,407	0	1,761,407	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	63,566	24,858	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	70,094	24,858	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	93,461	19,190	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	74,268	19,190	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,547,455	2,146,279	2,551,740	2,108,620	1,812,356	1,454,783	1,061,138	878,286	658,751	377,310	430,384	819,088	10,166,450	5,679,740	15,846,190	147,053

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2011-12: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,488,188	2,170,797	2,443,142	2,175,379	1,831,893	1,057,512	530,649	392,800	381,824	381,335	441,978	834,996	10,109,399	4,021,094	14,130,493	138,741
Refill	Underground Storage	81,109	0	0	0	0	478,593	525,795	489,383	497,643	282,529	0	0	81,109	2,273,943	2,355,052	0
	LNG	2,845	2,940	59,966	28,458	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	88,760	4,698	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,572,142	2,173,737	2,591,868	2,208,535	1,837,683	1,536,105	1,077,433	892,710	882,412	666,809	444,828	837,941	10,383,965	6,338,238	16,722,203	148,348
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	103,416	107,902	124,000	51,561	1	0	0	0	0	2,373	579,318	53,935	633,253	4,000
	Niagara Supply	93,660	31,541	42,160	38,930	27,846	33,227	0	0	0	0	0	0	234,137	33,227	267,364	3,122
	Dracut Baseload	0	768,102	768,103	718,548	0	0	0	0	0	0	0	0	2,254,753	0	2,254,753	24,778
	Dracut Swing	681,245	56,024	11,248	80,146	855,843	829,933	418,233	264,000	240,197	375,197	435,468	823,974	1,684,506	3,387,002	5,071,508	11,248
	Gulf Supply	640,561	607,356	481,464	479,391	669,476	612,744	630,676	612,093	633,225	282,529	0	0	2,878,248	2,771,267	5,649,515	21,596
	Storage	23,695	571,472	851,331	708,316	143,480	0	0	0	0	0	0	0	2,298,294	0	2,298,294	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	59,966	28,458	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	66,494	28,458	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	107,953	4,698	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	88,760	4,698	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,572,141	2,173,737	2,591,869	2,208,535	1,837,683	1,536,105	1,077,432	892,710	882,412	666,809	444,828	837,941	10,383,965	6,338,237	16,722,202	148,348

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2012-13: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,511,793	2,198,629	2,472,583	2,116,040	1,857,793	1,078,576	548,392	407,937	397,008	396,625	457,968	855,054	10,156,838	4,141,560	14,298,398	140,008
Refill	Underground Storage	83,172	0	0	0	0	487,182	525,795	508,834	497,643	148,576	0	0	83,172	2,168,030	2,251,202	0
	LNG	2,845	2,940	63,776	24,648	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,597,810	2,201,569	2,629,817	2,140,688	1,863,583	1,565,758	1,095,176	927,298	897,596	548,146	460,818	857,999	10,433,467	6,352,791	16,786,258	149,615
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	9,441	0	0	0	0	0	3,184	604,000	12,625	616,625	4,000
	Niagara Supply	93,660	32,689	43,646	38,641	12,488	6,244	0	0	0	0	0	0	221,124	6,244	227,368	3,122
	Dracut Baseload	0	768,103	768,102	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	704,112	65,097	15,960	91,873	1,377,922	1,017,573	540,859	401,847	390,963	390,487	451,458	843,220	2,254,964	4,036,407	6,291,371	12,515
	Gulf Supply	640,375	613,113	491,652	460,443	266,824	523,508	525,795	508,834	497,643	148,576	0	0	2,472,407	2,204,356	4,676,763	21,596
	Storage	26,683	583,326	835,292	685,986	65,311	351	0	0	0	0	0	0	2,196,598	351	2,196,949	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	63,776	24,648	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	70,304	24,648	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,597,810	2,201,570	2,629,815	2,140,689	1,863,583	1,565,757	1,095,176	927,298	897,596	548,146	460,818	857,998	10,433,467	6,352,789	16,786,256	149,614

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2013-14: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,533,243	2,223,967	2,499,393	2,139,588	1,881,351	1,097,688	564,434	421,570	410,670	410,387	472,392	873,224	10,277,542	4,250,365	14,527,907	141,166
Refill	Underground Storage	85,053	0	0	0	0	487,392	525,795	508,834	497,643	139,484	0	0	85,053	2,159,148	2,244,201	0
	LNG	2,845	2,940	68,305	20,119	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,621,141	2,226,907	2,661,156	2,159,707	1,887,141	1,585,080	1,111,218	940,931	911,258	552,816	475,242	876,169	10,556,052	6,452,714	17,008,766	150,773
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	60,761	11,443	0	0	0	0	0	3,922	540,761	15,365	556,126	4,000
	Niagara Supply	9,366	71,806	43,708	43,654	12,531	6,244	0	0	0	0	0	0	181,065	6,244	187,309	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,223,205	73,868	24,779	104,562	1,452,936	1,033,444	556,901	415,480	404,625	404,249	465,882	860,652	2,879,350	4,141,233	7,020,583	13,673
	Gulf Supply	226,182	618,797	501,455	463,774	271,422	524,060	525,795	508,834	497,643	139,484	0	0	2,081,630	2,195,816	4,277,446	21,596
	Storage	29,408	555,091	838,890	693,029	72,452	1,249	0	0	0	0	0	0	2,188,870	1,249	2,190,119	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	68,305	20,119	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	74,833	20,119	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,621,141	2,226,907	2,661,156	2,159,707	1,887,140	1,585,080	1,111,218	940,931	911,258	552,816	475,242	876,168	10,556,051	6,452,713	17,008,764	150,773

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2014-15: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,555,139	2,250,314	2,527,484	2,164,173	1,905,612	1,116,836	579,868	434,277	423,293	423,128	486,029	891,159	10,402,722	4,354,590	14,757,312	142,416
Refill	Underground Storage	87,037	0	0	0	0	486,602	525,795	508,834	497,643	162,443	0	0	87,037	2,181,317	2,268,354	0
	LNG	2,845	2,940	73,146	15,278	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,645,021	2,253,254	2,694,088	2,179,451	1,911,402	1,603,438	1,126,652	953,638	923,881	588,516	488,879	894,104	10,683,216	6,579,108	17,262,324	152,023
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	107,302	124,000	124,000	112,000	61,556	12,945	0	0	0	0	0	4,000	528,858	16,945	545,803	4,000
	Niagara Supply	9,366	71,806	44,593	48,499	13,440	6,244	0	0	0	0	0	680	187,704	6,924	194,628	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	1,249,069	83,525	34,151	122,787	1,463,386	1,048,657	572,335	428,187	417,248	416,990	479,519	877,830	2,952,919	4,240,766	7,193,685	14,923
	Gulf Supply	234,027	624,594	510,768	471,591	276,883	524,758	525,795	508,834	497,643	162,443	0	0	2,117,863	2,219,473	4,337,336	21,596
	Storage	32,277	565,985	842,571	691,568	79,099	2,193	0	0	0	0	0	0	2,211,500	2,193	2,213,693	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	73,146	15,278	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	79,674	15,278	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,645,021	2,253,255	2,694,089	2,179,451	1,911,402	1,603,437	1,126,652	953,638	923,881	588,516	488,879	894,104	10,683,218	6,579,107	17,262,325	152,023

Resource and Requirements Tables

Design Year Base Case Demand
High Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2010-11: High Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,473,515	2,154,135	2,425,778	2,074,807	1,816,066	1,043,943	518,386	381,832	370,695	370,157	430,636	821,724	9,944,301	3,937,373	13,881,674	138,042
Refill	Underground Storage	79,909	0	0	0	0	426,989	525,795	489,383	293,384	6,766	0	0	79,909	1,742,317	1,822,226	0
	LNG	2,845	2,940	64,823	23,601	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	77,553	15,905	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,556,269	2,157,075	2,568,154	2,114,313	1,821,856	1,470,932	1,065,170	881,742	667,024	379,868	433,486	824,669	10,217,667	5,722,891	15,940,558	147,649
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	49,621	0	0	0	0	0	46,551	604,000	96,172	700,172	4,000
	Niagara Supply	93,660	81,943	40,754	29,282	17,557	32,366	0	0	0	0	0	21,585	263,196	53,951	317,147	3,122
	Dracut Baseload	0	768,103	768,103	693,771	0	0	0	0	**0**	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	667,006	50,753	10,549	48,624	944,924	754,823	397,229	244,571	**0**	364,019	424,126	744,940	1,721,857	2,929,708	4,651,565	10,549
	Gulf Supply	640,669	655,224	639,511	561,048	669,476	625,483	639,419	620,554	658,034	6,766	0	0	3,165,928	2,550,256	5,716,184	21,596
	Storage	21,954	461,809	663,790	581,896	48,861	0	0	0	0	0	0	0	1,778,310	0	1,778,310	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	64,823	23,601	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	71,351	23,601	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	96,746	15,905	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	77,553	15,905	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,556,269	2,157,074	2,568,154	2,114,313	1,821,856	1,470,933	1,065,170	881,742	667,024	379,868	433,486	824,670	10,217,666	5,722,893	15,940,559	147,649

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2011-12: High Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,497,504	2,182,396	2,455,661	2,186,695	1,842,386	1,065,374	536,467	397,256	386,163	385,736	446,925	842,138	10,164,642	4,060,059	14,224,701	139,327
Refill	Underground Storage	81,928	0	0	0	0	478,479	525,795	489,383	497,643	293,646	0	0	81,928	2,284,946	2,366,874	0
	LNG	2,845	2,940	59,928	28,496	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,582,277	2,185,336	2,609,047	2,215,191	1,848,176	1,543,853	1,083,251	897,166	886,751	682,327	449,775	845,083	10,440,027	6,388,206	16,828,233	148,934
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	121,106	125,143	104,350	100,922	125,143	51,977	0	0	0	0	0	2,698	576,664	54,675	631,339	4,037
	Niagara Supply	93,660	30,982	42,897	40,313	28,098	33,231	0	0	0	0	0	0	235,950	33,231	269,181	3,122
	Dracut Baseload	0	768,102	768,103	718,547	0	0	0	0	0	0	0	0	2,254,753	0	2,254,753	24,778
	Dracut Swing	689,168	59,629	11,797	91,361	864,046	828,792	415,310	259,995	235,793	379,598	440,415	830,792	1,716,000	3,390,695	5,106,695	11,797
	Gulf Supply	640,487	609,640	487,250	485,267	669,476	621,212	639,419	620,554	641,967	293,646	0	0	2,892,120	2,816,798	5,708,918	21,596
	Storage	24,876	576,598	851,184	712,798	144,375	0	0	0	0	0	0	0	2,309,831	0	2,309,831	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	59,928	28,496	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	66,456	28,496	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,582,277	2,185,336	2,609,048	2,215,190	1,848,176	1,543,852	1,083,251	897,166	886,750	682,327	449,775	845,084	10,440,027	6,388,205	16,828,232	148,934

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2012-13: High Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,511,676	2,197,766	2,471,373	2,115,103	1,857,346	1,079,007	549,705	409,649	398,878	398,471	459,496	855,868	10,153,264	4,151,074	14,304,338	139,900
Refill	Underground Storage	82,991	0	0	0	0	487,772	525,795	508,834	497,643	142,245	0	0	82,991	2,162,289	2,245,280	0
	LNG	2,845	2,940	63,405	25,019	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,597,512	2,200,706	2,628,236	2,140,122	1,863,136	1,566,779	1,096,489	929,010	899,466	543,661	462,346	858,813	10,429,712	6,356,564	16,786,276	149,507
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	121,106	125,143	125,143	113,032	125,143	9,223	0	0	0	0	0	3,175	609,567	12,398	621,965	4,037
	Niagara Supply	93,660	32,464	43,577	38,277	12,488	6,259	0	0	0	0	0	0	220,466	6,259	226,725	3,122
	Dracut Baseload	0	768,102	768,103	693,771	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,777
	Dracut Swing	702,950	64,301	15,034	90,497	1,372,261	1,018,086	542,172	403,559	392,833	392,333	452,986	844,043	2,245,043	4,046,012	6,291,055	12,371
	Gulf Supply	640,391	612,955	492,711	461,732	271,564	524,311	525,795	508,834	497,643	142,245	0	0	2,479,353	2,198,828	4,678,181	21,596
	Storage	26,425	582,499	833,247	684,096	64,642	260	0	0	0	0	0	0	2,190,909	260	2,191,169	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	63,405	25,019	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	69,933	25,019	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,597,512	2,200,706	2,628,236	2,140,123	1,863,136	1,566,779	1,096,489	929,010	899,466	543,661	462,346	858,812	10,429,713	6,356,563	16,786,276	149,507

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2013-14: High Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,533,087	2,222,816	2,497,780	2,138,340	1,880,755	1,098,261	566,184	423,854	413,162	412,848	474,429	874,309	10,272,778	4,263,047	14,535,825	141,023
Refill	Underground Storage	84,837	0	0	0	0	488,002	525,795	508,834	497,643	133,442	0	0	84,837	2,153,716	2,238,553	0
	LNG	2,845	2,940	67,778	20,646	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,620,769	2,225,756	2,659,016	2,158,986	1,886,545	1,586,263	1,112,968	943,215	913,750	549,235	477,279	877,254	10,551,072	6,459,964	17,011,036	150,630
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	121,106	125,143	125,143	113,032	60,681	10,949	0	0	0	0	0	3,910	545,105	14,859	559,964	4,037
	Niagara Supply	9,366	71,806	43,708	43,146	12,488	6,259	0	0	0	0	0	0	180,514	6,259	186,773	3,122
	Dracut Baseload	0	768,103	768,102	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,777
	Dracut Swing	1,222,703	72,820	23,657	102,832	1,448,702	1,034,120	558,651	417,764	407,117	406,710	467,919	861,750	2,870,713	4,154,031	7,024,744	13,494
	Gulf Supply	225,512	618,472	502,283	464,699	275,934	525,153	525,795	508,834	497,643	133,442	0	0	2,086,900	2,190,867	4,277,767	21,596
	Storage	29,101	554,170	836,956	691,535	71,702	1,143	0	0	0	0	0	0	2,183,464	1,143	2,184,607	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	67,778	20,646	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	74,306	20,646	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,620,768	2,225,756	2,659,016	2,158,986	1,886,545	1,586,264	1,112,968	943,215	913,750	549,235	477,279	877,254	10,551,071	6,459,965	17,011,036	150,630

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2014-15: High Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,554,944	2,248,875	2,525,467	2,162,613	1,904,867	1,117,553	582,056	437,131	426,409	426,205	488,575	892,516	10,396,766	4,370,445	14,767,211	142,237
Refill	Underground Storage	86,786	0	0	0	0	487,263	525,795	508,834	497,643	158,264	0	0	86,786	2,177,799	2,264,585	0
	LNG	2,845	2,940	72,533	15,891	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,644,575	2,251,815	2,691,458	2,178,504	1,910,657	1,604,816	1,128,840	956,492	926,997	587,414	491,425	895,461	10,677,009	6,591,445	17,268,454	151,844
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	108,292	125,143	125,143	113,032	61,812	12,428	0	0	0	0	0	4,037	533,422	16,465	549,887	4,037
	Niagara Supply	9,366	71,806	44,490	48,022	13,337	6,259	0	0	0	0	0	627	187,021	6,886	193,907	3,122
	Dracut Baseload	0	768,103	768,103	693,771	0	0	0	0	0	0	0	0	2,229,977	0	2,229,977	24,778
	Dracut Swing	1,248,795	82,307	32,830	118,593	1,459,165	1,049,502	574,523	431,041	420,364	420,067	482,065	879,203	2,941,690	4,256,765	7,198,455	14,707
	Gulf Supply	233,221	624,261	511,588	472,468	281,021	525,916	525,795	508,834	497,643	158,264	0	0	2,122,559	2,216,452	4,339,011	21,596
	Storage	31,921	564,954	840,629	692,156	78,284	2,071	0	0	0	0	0	0	2,207,944	2,071	2,210,015	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	72,533	15,891	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	79,061	15,891	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,644,575	2,251,816	2,691,460	2,178,504	1,910,657	1,604,816	1,128,840	956,492	926,997	587,414	491,425	895,461	10,677,012	6,591,445	17,268,457	151,844

Resource and Requirements Tables

Normal Year Base Case Demand
No DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2010-11: No DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,375,552	2,008,471	2,244,772	1,934,393	1,693,874	980,458	506,833	387,852	379,510	378,838	429,319	778,498	9,257,062	3,841,308	13,098,370	113,684
Refill	Underground Storage	78,020	0	0	0	0	427,074	525,795	249,098	276,963	0	0	0	78,020	1,478,930	1,556,950	0
	LNG	8,508	14,247	50,305	21,150	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	100,000	24,008	124,008	4,000
	Propane	0	0	18,579	31,012	0	0	11,516	7,677	0	0	0	0	49,591	19,193	68,784	5,607
Total Requirements		1,462,080	2,022,718	2,313,656	1,986,555	1,699,664	1,407,532	1,053,617	647,477	659,418	381,783	432,169	781,443	9,484,673	5,363,439	14,848,112	123,291
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	43,072	0	0	0	0	0	33,134	604,000	76,206	680,206	4,000
	Niagara Supply	93,660	71,806	29,272	14,441	12,345	27,397	0	0	0	0	0	13,860	221,524	41,257	262,781	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	**0**	**0**	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	582,205	0	0	0	853,611	711,739	394,419	**0**	**0**	372,700	422,809	722,855	1,435,816	2,624,522	4,060,338	0
	Gulf Supply	640,840	638,908	616,580	541,461	669,476	616,684	630,676	630,860	650,428	0	0	0	3,107,265	2,528,648	5,635,913	21,596
	Storage	1,070	382,045	601,239	511,880	23,193	0	0	0	0	0	0	0	1,519,427	0	1,519,427	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	8,508	14,247	50,305	21,150	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	100,000	24,008	124,008	4,000
LNG From Storage		8,508	14,247	56,833	21,150	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,678	20,330	124,008	10,528
Propane	Vapor	0	0	37,773	31,012	0	0	0	0	0	0	0	0	68,785	0	68,785	21,192
	Truck	0	0	18,579	31,012	0	0	11,516	7,677	0	0	0	0	49,591	19,193	68,784	5,607
Total Resources		1,462,081	2,022,718	2,313,658	1,986,556	1,699,663	1,407,532	1,053,617	647,477	659,418	381,783	432,169	781,443	9,484,676	5,363,439	14,848,115	123,292

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2011-12: No DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,410,616	2,051,533	2,290,903	2,056,608	1,733,095	1,010,459	529,831	406,010	397,369	396,909	449,189	806,093	9,542,755	3,995,860	13,538,615	115,684
Refill	Underground Storage	78,020	0	0	0	0	486,080	525,795	489,383	497,643	206,937	0	0	78,020	2,205,838	2,283,858	0
	LNG	2,845	21,164	42,291	27,909	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	3,613
	Propane	0	0	61,606	16,822	0	0	11,516	7,677	0	0	0	0	78,428	19,193	97,621	5,607
Total Requirements		1,491,481	2,072,697	2,394,800	2,101,339	1,738,885	1,496,539	1,076,615	905,920	897,957	606,791	452,039	809,038	9,799,202	6,244,899	16,044,101	124,904
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	96,322	94,904	124,000	45,931	0	0	0	0	0	179	559,226	46,110	605,336	4,000
	Niagara Supply	93,660	19,162	32,199	25,876	24,976	30,454	0	0	0	0	0	0	195,873	30,454	226,327	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,754	0	2,254,754	24,778
	Dracut Swing	614,066	0	0	503	762,640	799,323	417,417	277,210	255,742	390,771	442,679	797,265	1,377,209	3,380,407	4,757,616	0
	Gulf Supply	640,840	588,558	434,542	425,260	669,476	612,190	630,676	612,093	633,225	206,937	0	0	2,758,676	2,695,121	5,453,797	21,596
	Storage	9,935	521,186	838,338	718,602	140,755	0	0	0	0	0	0	0	2,228,816	0	2,228,816	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	21,164	42,291	27,909	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	3,613
LNG From Storage		2,845	21,164	48,819	27,909	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	95
Propane	Vapor	0	0	61,606	36,016	0	0	0	0	0	0	0	0	97,622	0	97,622	33,625
	Truck	0	0	61,606	16,822	0	0	11,516	7,677	0	0	0	0	78,428	19,193	97,621	5,607
Total Resources		1,491,481	2,072,699	2,394,800	2,101,339	1,738,885	1,496,538	1,076,615	905,920	897,957	606,791	452,039	809,038	9,799,204	6,244,898	16,044,102	124,905

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2012-13: No DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,446,474	2,095,082	2,337,368	2,015,450	1,772,987	1,041,502	554,306	425,817	416,982	416,720	470,616	834,932	9,667,361	4,160,875	13,828,236	117,669
Refill	Underground Storage	78,020	0	0	0	0	492,176	525,795	508,834	497,643	60,136	0	0	78,020	2,084,584	2,162,604	0
	LNG	2,845	18,665	44,409	28,290	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	2,160
	Propane	0	0	76,636	16,822	0	0	11,215	7,978	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,527,339	2,113,747	2,458,413	2,060,562	1,778,777	1,533,678	1,100,789	945,479	917,570	479,801	473,466	837,877	9,938,838	6,288,660	16,227,498	125,436
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	118,777	112,000	123,936	8,000	0	0	0	0	0	1,429	598,713	9,429	608,142	4,000
	Niagara Supply	93,660	24,356	34,062	25,387	9,366	5,755	0	0	0	0	0	0	186,831	5,755	192,586	3,122
	Dracut Baseload	0	768,102	768,103	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	646,710	11,152	0	5,993	1,337,111	992,038	546,773	419,727	410,937	410,582	464,106	824,854	2,000,966	4,069,017	6,069,983	0
	Gulf Supply	640,840	597,187	451,784	418,683	248,975	519,245	525,795	508,834	497,643	60,136	0	0	2,357,469	2,111,653	4,469,122	21,596
	Storage	13,149	542,258	826,096	686,632	42,351	0	0	0	0	0	0	0	2,110,486	0	2,110,486	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	18,665	44,409	28,290	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	2,160
LNG From Storage		2,845	18,665	50,937	28,290	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	4,907
Propane	Vapor	0	0	76,636	36,016	0	0	0	0	0	0	0	0	112,652	0	112,652	30,797
	Truck	0	0	76,636	16,822	0	0	11,215	7,978	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,527,339	2,113,747	2,458,414	2,060,563	1,778,777	1,533,678	1,100,789	945,479	917,570	479,801	473,466	837,877	9,938,840	6,288,660	16,227,500	125,436

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2013-14: No DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,480,227	2,136,209	2,381,307	2,053,920	1,810,597	1,070,632	577,089	444,121	435,072	435,004	490,484	861,916	9,862,260	4,314,318	14,176,578	119,555
Refill	Underground Storage	78,283	0	0	0	0	490,946	525,795	508,834	497,643	68,679	0	0	78,283	2,091,897	2,170,180	0
	LNG	2,845	2,940	57,678	30,746	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	81,105	12,353	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,561,355	2,139,149	2,520,090	2,097,019	1,816,387	1,561,578	1,123,873	963,482	935,660	506,628	493,334	864,861	10,134,000	6,449,416	16,583,416	129,162
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	107,813	57,492	8,708	0	0	0	0	0	2,608	533,305	11,316	544,621	4,000
	Niagara Supply	9,366	65,684	36,132	31,148	9,380	6,244	0	0	0	0	0	0	151,710	6,244	157,954	3,122
	Dracut Baseload	0	768,102	768,103	693,771	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	1,200,921	37,606	0	19,348	1,426,342	1,016,111	569,556	438,031	429,027	428,866	483,974	850,659	2,684,218	4,216,224	6,900,442	0
	Gulf Supply	200,969	605,155	468,097	432,460	255,835	521,875	525,795	508,834	497,643	68,679	0	0	1,962,516	2,122,826	4,085,342	21,596
	Storage	17,118	523,359	828,690	698,409	50,300	0	0	0	0	0	0	0	2,117,876	0	2,117,876	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	57,678	30,746	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	64,206	30,746	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	81,105	31,546	0	0	0	0	0	0	0	0	112,651	0	112,651	27,063
	Truck	0	0	81,105	12,353	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,561,354	2,139,148	2,520,090	2,097,020	1,816,387	1,561,578	1,123,873	963,482	935,660	506,628	493,334	864,861	10,133,999	6,449,416	16,583,415	129,163

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2014-15: No DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,514,321	2,178,193	2,426,325	2,093,276	1,848,779	1,099,712	599,236	461,490	452,124	452,265	509,551	888,606	10,060,894	4,462,984	14,523,878	121,513
Refill	Underground Storage	79,909	0	0	0	0	489,134	525,795	508,834	497,643	99,451	0	0	79,909	2,120,857	2,200,766	0
	LNG	2,845	2,940	58,011	30,413	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,597,075	2,181,133	2,577,794	2,123,689	1,854,569	1,588,846	1,146,020	980,851	952,712	554,661	512,401	891,551	10,334,260	6,627,042	16,961,302	131,120
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	107,236	124,000	124,000	112,000	60,517	10,046	0	0	0	0	0	3,801	527,753	13,847	541,600	4,000
	Niagara Supply	9,366	71,361	40,357	39,045	11,417	6,244	0	0	0	0	0	0	171,546	6,244	177,790	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,234,128	50,945	0	52,419	1,443,031	1,040,047	591,703	455,400	446,079	446,127	503,041	876,156	2,780,523	4,358,553	7,139,076	0
	Gulf Supply	211,622	613,209	483,249	450,760	263,495	523,869	525,795	508,834	497,643	99,451	0	0	2,022,335	2,155,592	4,177,927	21,596
	Storage	21,741	538,273	835,735	692,906	59,071	0	0	0	0	0	0	0	2,147,726	0	2,147,726	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	58,011	30,413	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	64,539	30,413	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	4,549
Propane	Vapor	0	0	99,369	13,283	0	0	0	0	0	0	0	0	112,652	0	112,652	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,597,073	2,181,133	2,577,795	2,123,689	1,854,569	1,588,846	1,146,020	980,851	952,712	554,661	512,401	891,551	10,334,259	6,627,042	16,961,301	131,121

Resource and Requirements Tables

Normal Year Base Case Demand
Low Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2010-11: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,349,999	1,974,886	2,207,864	1,902,618	1,664,261	960,376	494,359	380,562	372,732	371,836	420,280	761,327	9,099,628	3,761,472	12,861,100	111,948
Refill	Underground Storage	78,020	0	0	0	0	431,909	525,795	255,601	283,305	0	0	0	78,020	1,496,610	1,574,630	0
	LNG	6,930	10,138	42,346	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	86,103	24,008	110,111	4,000
	Propane	0	0	13,614	26,328	0	0	11,516	7,677	0	0	0	0	39,942	19,193	59,135	5,607
Total Requirements		1,434,949	1,985,024	2,263,824	1,949,845	1,670,051	1,392,285	1,041,143	646,690	658,982	374,781	423,130	764,272	9,303,693	5,301,283	14,604,976	121,555
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	41,573	0	0	0	0	0	29,088	604,000	70,661	674,661	4,000
	Niagara Supply	93,660	71,806	27,719	12,118	11,025	25,012	0	0	0	0	0	13,173	216,328	38,185	254,513	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	**0**	**0**	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	559,300	0	0	0	829,453	700,737	381,945	**0**	**0**	365,698	413,770	710,417	1,388,753	2,572,567	3,961,320	0
	Gulf Supply	640,840	632,214	528,997	536,855	669,476	616,323	630,676	630,073	649,992	0	0	0	3,008,382	2,527,064	5,535,446	21,596
	Storage	0	359,263	666,390	491,968	19,059	0	0	0	0	0	0	0	1,536,680	0	1,536,680	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	6,930	10,138	42,346	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	86,103	24,008	110,111	4,000
LNG From Storage		6,930	10,138	48,874	20,899	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	89,781	20,330	110,111	4,000
Propane	Vapor	0	0	32,808	26,328	0	0	0	0	0	0	0	0	59,136	0	59,136	25,983
	Truck	0	0	13,614	26,328	0	0	11,516	7,677	0	0	0	0	39,942	19,193	59,135	5,607
Total Resources		1,434,950	1,985,024	2,263,825	1,949,845	1,670,051	1,392,285	1,041,143	646,690	658,982	374,781	423,130	764,272	9,303,695	5,301,283	14,604,978	121,555

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2011-12: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,376,545	2,006,752	2,241,692	2,012,527	1,693,611	983,683	513,199	396,290	388,332	387,572	437,137	783,198	9,331,127	3,889,411	13,220,538	113,369
Refill	Underground Storage	78,020	0	0	0	0	487,858	525,795	489,383	497,643	174,477	0	0	78,020	2,175,156	2,253,176	0
	LNG	2,845	13,760	49,519	23,711	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	95,625	24,008	119,633	4,000
	Propane	0	0	36,642	30,274	0	0	0	0	0	0	0	0	66,916	0	66,916	5,607
Total Requirements		1,457,410	2,020,512	2,327,853	2,066,512	1,699,401	1,471,541	1,048,467	888,523	888,920	564,994	439,987	786,143	9,571,688	6,088,575	15,660,263	122,976
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	91,884	93,138	124,000	43,223	0	0	0	0	0	0	553,022	43,223	596,245	4,000
	Niagara Supply	93,660	14,244	29,105	19,224	24,976	27,569	0	0	0	0	0	0	181,209	27,569	208,778	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,754	0	2,254,754	24,778
	Dracut Swing	583,525	0	0	0	722,679	780,063	400,785	267,490	246,706	381,434	430,627	774,550	1,306,204	3,281,655	4,587,859	0
	Gulf Supply	640,840	578,138	417,726	397,762	669,476	612,047	630,676	612,093	633,225	174,477	0	0	2,703,942	2,662,518	5,366,460	21,596
	Storage	6,405	499,146	831,211	720,881	141,232	0	0	0	0	0	0	0	2,198,875	0	2,198,875	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	13,760	49,519	23,711	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	95,625	24,008	119,633	4,000
LNG From	Storage	2,845	13,760	56,047	23,711	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	99,303	20,330	119,633	3,709
Propane	Vapor	0	0	36,642	30,274	0	0	0	0	0	0	0	0	66,916	0	66,916	27,696
	Truck	0	0	36,642	30,274	0	0	0	0	0	0	0	0	66,916	0	66,916	5,607
Total Resources		1,457,410	2,020,513	2,327,853	2,066,513	1,699,401	1,471,542	1,048,467	888,523	888,921	564,994	439,987	786,144	9,571,690	6,088,578	15,660,268	122,977

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2012-13: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,403,885	2,039,106	2,275,854	1,962,492	1,723,632	1,008,032	533,516	413,667	405,686	405,049	455,551	806,314	9,404,969	4,027,815	13,432,784	114,775
Refill	Underground Storage	78,020	0	0	0	0	491,940	525,795	508,834	497,643	48,281	0	0	78,020	2,072,493	2,150,513	0
	LNG	2,845	18,174	51,018	22,172	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	40,897	20,616	0	0	0	11,516	0	7,677	0	0	61,513	19,193	80,706	0
Total Requirements		1,484,750	2,057,280	2,367,769	2,005,280	1,729,422	1,499,972	1,068,784	936,867	906,274	463,952	458,401	809,259	9,644,501	6,143,509	15,788,010	118,775
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	95,360	97,932	122,708	8,000	0	0	0	0	0	0	560,000	8,000	568,000	4,000
	Niagara Supply	93,660	17,485	31,042	19,374	0	4,111	0	0	0	0	0	0	161,561	4,111	165,672	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	608,534	0	0	0	1,309,100	964,954	525,983	407,577	399,641	398,911	449,041	797,664	1,917,634	3,943,771	5,861,405	0
	Gulf Supply	640,840	586,543	429,506	389,334	239,913	514,268	525,795	508,834	497,643	48,281	0	0	2,286,136	2,094,821	4,380,957	21,596
	Storage	8,736	515,439	836,819	697,028	40,663	0	0	0	0	0	0	0	2,098,685	0	2,098,685	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	18,174	51,018	22,172	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	18,174	57,546	22,172	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	2,554
Propane	Vapor	0	0	46,505	34,202	0	0	0	0	0	0	0	0	80,707	0	80,707	30,257
	Truck	0	0	40,897	20,616	0	0	0	11,516	0	7,677	0	0	61,513	19,193	80,706	0
Total Resources		1,484,750	2,057,280	2,367,770	2,005,280	1,729,422	1,499,973	1,068,784	936,867	906,274	463,952	458,401	809,258	9,644,502	6,143,509	15,788,011	118,776

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2013-14: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,429,120	2,069,038	2,307,490	1,990,371	1,751,371	1,030,469	552,141	429,541	421,517	420,999	472,406	827,574	9,547,390	4,154,647	13,702,037	116,083
Refill	Underground Storage	78,020	0	0	0	0	488,368	525,795	508,834	497,643	54,413	0	0	78,020	2,075,053	2,153,073	0
	LNG	2,845	23,675	42,592	25,098	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	100,000	24,008	124,008	4,000
	Propane	0	0	65,667	27,791	0	0	8,224	0	0	0	0	0	93,458	8,224	101,682	5,607
Total Requirements		1,509,985	2,092,713	2,415,749	2,043,260	1,757,161	1,518,837	1,095,633	941,225	922,105	478,357	475,256	830,519	9,818,868	6,261,932	16,080,800	125,690
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	117,214	100,101	48,302	8,000	0	0	0	0	0	785	509,617	8,785	518,402	4,000
	Niagara Supply	7,820	20,714	33,017	22,339	8,643	5,025	0	0	0	0	0	0	92,533	5,025	97,558	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,171,732	0	0	1,830	1,401,064	984,041	544,608	423,451	415,472	414,861	465,896	818,140	2,574,626	4,066,469	6,641,095	0
	Gulf Supply	186,557	593,040	440,525	402,745	244,635	513,131	525,795	508,834	497,643	54,413	0	0	1,867,502	2,099,816	3,967,318	21,596
	Storage	10,895	530,145	822,872	699,793	37,479	0	0	0	0	0	0	0	2,101,184	0	2,101,184	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	23,675	42,592	25,098	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	100,000	24,008	124,008	4,000
LNG From	Storage	2,845	23,675	49,120	25,098	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,678	20,330	124,008	95
Propane	Vapor	0	0	65,667	36,016	0	0	0	0	0	0	0	0	101,683	0	101,683	34,023
	Truck	0	0	65,667	27,791	0	0	8,224	0	0	0	0	0	93,458	8,224	101,682	5,607
Total Resources		1,509,984	2,092,714	2,415,751	2,043,261	1,757,161	1,518,837	1,095,633	941,225	922,105	478,357	475,256	830,519	9,818,871	6,261,932	16,080,803	125,690

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2014-15: Low Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,454,697	2,099,827	2,340,206	2,019,135	1,779,682	1,052,855	570,130	444,480	436,310	435,926	488,460	848,541	9,693,547	4,276,702	13,970,249	117,462
Refill	Underground Storage	78,020	0	0	0	0	486,897	525,795	508,834	497,643	60,749	0	0	78,020	2,079,918	2,157,938	0
	LNG	2,845	19,131	43,813	28,420	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	76,636	16,822	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,535,562	2,118,958	2,460,655	2,064,377	1,785,472	1,539,752	1,116,914	963,841	936,898	499,620	491,310	851,486	9,965,024	6,399,821	16,364,845	127,069
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	103,647	124,000	124,000	107,253	52,828	8,000	0	0	0	0	0	1,674	511,728	9,674	521,402	4,000
	Niagara Supply	8,903	39,326	34,114	25,587	9,366	5,959	0	0	0	0	0	0	117,296	5,959	123,255	3,122
	Dracut Baseload	0	768,103	768,103	693,771	0	0	0	0	0	0	0	0	2,229,977	0	2,229,977	24,778
	Dracut Swing	1,203,740	10,784	0	5,657	1,414,140	1,002,632	562,597	438,390	430,265	429,788	481,950	838,218	2,634,321	4,183,840	6,818,161	0
	Gulf Supply	193,151	599,075	453,429	416,053	249,664	514,521	525,795	508,834	497,643	60,749	0	0	1,911,372	2,107,542	4,018,914	21,596
	Storage	13,141	530,047	822,610	697,698	42,436	0	0	0	0	0	0	0	2,105,932	0	2,105,932	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	19,131	43,813	28,420	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	19,131	50,341	28,420	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	8,111
Propane	Vapor	0	0	76,636	36,016	0	0	0	0	0	0	0	0	112,652	0	112,652	27,386
	Truck	0	0	76,636	16,822	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,535,562	2,118,959	2,460,656	2,064,377	1,785,472	1,539,752	1,116,914	963,841	936,898	499,620	491,310	851,486	9,965,026	6,399,821	16,364,847	127,069

Resource and Requirements Tables

Normal Year Base Case Demand
Base Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2010-11: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,341,074	1,963,877	2,196,028	1,892,317	1,654,241	952,813	488,603	376,181	368,394	367,441	415,464	754,402	9,047,537	3,723,298	12,770,835	111,430
Refill	Underground Storage	78,020	0	0	0	0	433,597	525,795	259,590	287,327	0	0	0	78,020	1,506,309	1,584,329	0
	LNG	6,100	8,859	39,707	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	81,355	24,008	105,363	4,000
	Propane	0	0	12,610	24,905	0	0	11,516	7,677	0	0	0	0	37,515	19,193	56,708	0
Total Requirements		1,425,194	1,972,736	2,248,345	1,938,121	1,660,031	1,386,410	1,035,387	646,298	658,666	370,386	418,314	757,347	9,244,427	5,272,808	14,517,235	115,430
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	41,261	0	0	0	0	0	27,732	604,000	68,993	672,993	4,000
	Niagara Supply	93,660	71,806	27,283	11,307	10,619	24,162	0	0	0	0	0	12,917	214,675	37,079	251,754	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	**0**	**0**	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	551,204	0	0	0	821,124	696,142	376,189	**0**	**0**	361,303	408,954	705,104	1,372,328	2,547,692	3,920,020	0
	Gulf Supply	640,840	629,864	496,786	535,111	669,476	616,205	630,676	629,681	649,676	0	0	0	2,972,077	2,526,238	5,498,315	21,596
	Storage	0	351,884	690,845	485,644	17,774	0	0	0	0	0	0	0	1,546,147	0	1,546,147	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	6,100	8,859	39,707	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	81,355	24,008	105,363	4,000
LNG From Storage		6,100	8,859	46,235	20,899	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	85,033	20,330	105,363	4,000
Propane	Vapor	0	0	31,804	24,905	0	0	0	0	0	0	0	0	56,709	0	56,709	25,466
	Truck	0	0	12,610	24,905	0	0	11,516	7,677	0	0	0	0	37,515	19,193	56,708	0
Total Resources		1,425,194	1,972,737	2,248,347	1,938,120	1,660,031	1,386,410	1,035,387	646,298	658,666	370,386	418,314	757,347	9,244,429	5,272,808	14,517,237	115,431

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2011-12: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,363,158	1,990,240	2,223,939	1,996,466	1,678,581	972,338	504,565	389,719	381,824	380,980	429,913	772,811	9,252,384	3,832,150	13,084,534	112,593
Refill	Underground Storage	78,020	0	0	0	0	488,842	525,795	489,383	497,643	166,539	0	0	78,020	2,168,202	2,246,222	0
	LNG	2,845	11,841	45,972	22,999	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	89,447	24,008	113,455	4,000
	Propane	0	0	34,069	16,625	0	0	11,516	0	0	0	0	0	50,694	11,516	62,210	0
Total Requirements		1,444,023	2,002,081	2,303,980	2,036,090	1,684,371	1,461,180	1,051,349	881,952	882,412	550,464	432,763	775,756	9,470,545	6,035,876	15,506,421	116,593
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	89,907	92,265	124,000	42,407	0	0	0	0	0	0	550,172	42,407	592,579	4,000
	Niagara Supply	93,660	12,716	28,469	17,512	24,976	26,293	0	0	0	0	0	0	177,333	26,293	203,626	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,754	0	2,254,754	24,778
	Dracut Swing	571,383	0	0	0	703,586	771,803	392,151	260,919	240,197	374,842	423,403	764,162	1,274,969	3,227,477	4,502,446	0
	Gulf Supply	640,840	573,520	411,471	385,523	669,476	612,038	630,676	612,093	633,225	166,539	0	0	2,680,830	2,654,571	5,335,401	21,596
	Storage	5,160	490,697	828,446	722,490	145,295	0	0	0	0	0	0	0	2,192,088	0	2,192,088	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	11,841	45,972	22,999	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	89,447	24,008	113,455	4,000
LNG From Storage		2,845	11,841	52,500	22,999	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	93,125	20,330	113,455	4,000
Propane	Vapor	0	0	34,069	28,141	0	0	0	0	0	0	0	0	62,210	0	62,210	26,628
	Truck	0	0	34,069	16,625	0	0	11,516	0	0	0	0	0	50,694	11,516	62,210	0
Total Resources		1,444,023	2,002,080	2,303,980	2,036,092	1,684,371	1,461,181	1,051,349	881,952	882,412	550,464	432,763	775,756	9,470,546	6,035,877	15,506,423	116,593

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2012-13: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,386,036	2,017,089	2,252,183	1,941,890	1,703,591	992,906	522,004	404,906	397,008	396,260	445,920	792,464	9,300,789	3,951,468	13,252,257	113,740
Refill	Underground Storage	78,020	0	0	0	0	480,697	525,795	508,834	497,086	44,322	0	0	78,020	2,056,734	2,134,754	0
	LNG	2,845	14,831	50,932	21,348	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	95,746	24,008	119,754	4,000
	Propane	0	0	38,431	31,358	0	0	0	0	0	0	0	0	69,789	0	69,789	5,607
Total Requirements		1,466,901	2,031,920	2,341,546	1,994,596	1,709,381	1,473,603	1,057,272	916,590	897,039	443,527	448,770	795,409	9,544,344	6,032,210	15,576,554	123,347
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	93,188	89,461	121,718	8,000	0	0	0	0	0	0	548,367	8,000	556,367	4,000
	Niagara Supply	93,660	15,282	29,454	16,923	0	3,449	0	0	0	0	0	0	155,319	3,449	158,768	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	592,345	0	0	0	1,297,177	951,913	514,471	398,816	390,963	390,122	439,410	783,815	1,889,522	3,869,510	5,759,032	0
	Gulf Supply	640,840	581,020	421,441	378,250	236,941	501,601	525,795	508,834	497,086	44,322	0	0	2,258,492	2,077,638	4,336,130	21,596
	Storage	7,076	504,492	833,132	702,099	36,507	0	0	0	0	0	0	0	2,083,306	0	2,083,306	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	14,831	50,932	21,348	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	95,746	24,008	119,754	4,000
LNG From Storage		2,845	14,831	57,460	21,348	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	99,424	20,330	119,754	4,000
Propane	Vapor	0	0	38,431	31,358	0	0	0	0	0	0	0	0	69,789	0	69,789	27,776
	Truck	0	0	38,431	31,358	0	0	0	0	0	0	0	0	69,789	0	69,789	5,607
Total Resources		1,466,901	2,031,921	2,341,546	1,994,595	1,709,381	1,473,603	1,057,272	916,590	897,039	443,527	448,770	795,409	9,544,344	6,032,210	15,576,554	123,348

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2013-14: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,406,809	2,041,516	2,277,902	1,964,617	1,726,320	1,011,560	537,751	418,589	410,670	410,012	460,367	810,262	9,417,164	4,059,211	13,476,375	114,789
Refill	Underground Storage	78,020	0	0	0	0	488,098	525,795	508,834	497,643	48,692	0	0	78,020	2,069,062	2,147,082	0
	LNG	2,845	18,387	50,751	22,226	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	47,115	34,290	0	0	0	0	0	0	0	0	81,405	0	81,405	5,607
Total Requirements		1,487,674	2,059,903	2,375,768	2,021,133	1,732,110	1,499,658	1,073,019	930,273	911,258	461,649	463,217	813,207	9,676,588	6,152,281	15,828,869	124,396
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	97,118	98,508	44,172	8,000	0	0	0	0	0	4	483,798	8,004	491,802	4,000
	Niagara Supply	6,837	17,718	31,150	19,620	4,069	4,197	0	0	0	0	0	0	79,394	4,197	83,591	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,157,600	0	0	0	1,389,780	968,242	530,218	412,499	404,625	403,874	453,857	801,610	2,547,380	3,974,925	6,522,305	0
	Gulf Supply	181,436	587,388	430,271	390,315	240,193	510,579	525,795	508,834	497,643	48,692	0	0	1,829,603	2,091,543	3,921,146	21,596
	Storage	8,821	516,559	835,893	697,208	36,858	0	0	0	0	0	0	0	2,095,339	0	2,095,339	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	18,387	50,751	22,226	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	18,387	57,279	22,226	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	2,497
Propane	Vapor	0	0	47,115	34,290	0	0	0	0	0	0	0	0	81,405	0	81,405	30,328
	Truck	0	0	47,115	34,290	0	0	0	0	0	0	0	0	81,405	0	81,405	5,607
Total Resources		1,487,674	2,059,904	2,375,769	2,021,133	1,732,110	1,499,658	1,073,019	930,273	911,258	461,649	463,217	813,208	9,676,590	6,152,282	15,828,872	124,397

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2014-15: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,427,923	2,066,801	2,304,699	1,988,231	1,749,621	1,030,164	552,862	431,338	423,293	422,742	474,013	827,766	9,537,275	4,162,178	13,699,453	115,909
Refill	Underground Storage	78,020	0	0	0	0	486,478	525,795	508,834	496,490	53,883	0	0	78,020	2,071,480	2,149,500	0
	LNG	2,845	23,121	43,455	24,788	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	63,482	29,976	0	0	6,039	0	0	0	0	0	93,458	6,039	99,497	0
Total Requirements		1,508,788	2,089,922	2,411,636	2,042,995	1,755,411	1,516,642	1,094,169	943,022	922,728	479,570	476,863	830,711	9,808,752	6,263,705	16,072,457	119,909
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	100,625	124,000	115,882	101,820	47,955	8,000	0	0	0	0	0	736	490,282	8,736	499,018	4,000
	Niagara Supply	7,723	20,411	32,916	22,048	9,366	4,966	0	0	0	0	0	0	92,464	4,966	97,430	3,122
	Dracut Baseload	0	768,103	768,103	693,769	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	1,190,642	0	0	1,392	1,400,599	983,989	545,329	425,248	417,248	416,604	467,503	818,381	2,592,633	4,074,302	6,666,935	0
	Gulf Supply	186,166	592,757	439,597	401,683	244,250	511,048	525,795	508,834	496,490	53,883	0	0	1,864,453	2,096,050	3,960,503	21,596
	Storage	10,651	529,047	823,764	698,033	36,202	0	0	0	0	0	0	0	2,097,697	0	2,097,697	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	23,121	43,455	24,788	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	23,121	49,983	24,788	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	1,587
Propane	Vapor	0	0	63,482	36,016	0	0	0	0	0	0	0	0	99,498	0	99,498	32,357
	Truck	0	0	63,482	29,976	0	0	6,039	0	0	0	0	0	93,458	6,039	99,497	0
Total Resources		1,508,787	2,089,922	2,411,638	2,042,993	1,755,410	1,516,643	1,094,169	943,022	922,728	479,570	476,863	830,711	9,808,750	6,263,706	16,072,456	119,909

Resource and Requirements Tables

Normal Year Base Case Demand
High Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2010-11: High Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,341,084	1,963,663	2,195,711	1,892,079	1,654,151	952,994	489,048	376,762	369,017	368,057	415,990	754,701	9,046,688	3,726,569	12,773,257	111,403
Refill	Underground Storage	78,020	0	0	0	0	433,785	525,795	259,032	286,579	0	0	0	78,020	1,505,191	1,583,211	0
	LNG	6,071	8,811	39,602	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	81,173	24,008	105,181	4,000
	Propane	0	0	12,560	24,840	0	0	11,516	7,677	0	0	0	0	37,400	19,193	56,593	0
Total Requirements		1,425,175	1,972,474	2,247,873	1,937,818	1,659,941	1,386,779	1,035,832	646,321	658,541	371,002	418,840	757,646	9,243,281	5,274,961	14,518,242	115,403
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	41,265	0	0	0	0	0	27,757	604,000	69,022	673,022	4,000
	Niagara Supply	93,660	71,806	27,265	11,281	10,606	24,168	0	0	0	0	0	12,922	214,618	37,090	251,708	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	**0**	**0**	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	551,244	0	0	0	821,095	696,314	376,634	**0**	**0**	361,919	409,480	705,373	1,372,339	2,549,720	3,922,059	0
	Gulf Supply	640,840	629,870	497,357	535,119	669,476	616,393	630,676	629,704	649,551	0	0	0	2,972,662	2,526,324	5,498,986	21,596
	Storage	0	351,711	690,130	485,491	17,726	0	0	0	0	0	0	0	1,545,058	0	1,545,058	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	6,071	8,811	39,602	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	81,173	24,008	105,181	4,000
LNG From Storage		6,071	8,811	46,130	20,899	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	84,851	20,330	105,181	4,000
Propane	Vapor	0	0	31,753	24,840	0	0	0	0	0	0	0	0	56,593	0	56,593	25,438
	Truck	0	0	12,560	24,840	0	0	11,516	7,677	0	0	0	0	37,400	19,193	56,593	0
Total Resources		1,425,176	1,972,474	2,247,874	1,937,819	1,659,941	1,386,780	1,035,832	646,321	658,541	371,002	418,840	757,646	9,243,284	5,274,962	14,518,246	115,403

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2011-12: High Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,363,178	1,989,812	2,223,304	1,995,964	1,678,401	972,700	505,456	390,879	383,070	382,213	430,965	773,409	9,250,659	3,838,692	13,089,351	112,538
Refill	Underground Storage	78,020	0	0	0	0	488,856	525,795	489,383	497,643	166,539	0	0	78,020	2,168,216	2,246,236	0
	LNG	2,845	11,746	45,728	22,972	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	89,081	24,008	113,089	4,000
	Propane	0	0	33,967	28,010	0	0	0	0	0	0	0	0	61,977	0	61,977	5,607
Total Requirements		1,444,043	2,001,558	2,302,999	2,046,946	1,684,191	1,461,556	1,040,724	883,112	883,658	551,697	433,815	776,354	9,479,737	6,030,916	15,510,653	122,145
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	89,878	92,252	124,000	42,421	0	0	0	0	0	0	550,130	42,421	592,551	4,000
	Niagara Supply	93,660	12,657	28,438	17,434	24,976	26,306	0	0	0	0	0	0	177,165	26,306	203,471	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,754	0	2,254,754	24,778
	Dracut Swing	571,461	0	0	0	703,643	772,154	393,041	262,079	241,444	376,075	424,455	764,760	1,275,104	3,234,008	4,509,112	0
	Gulf Supply	640,840	573,494	411,253	384,702	669,476	612,036	630,676	612,093	633,225	166,539	0	0	2,679,765	2,654,569	5,334,334	21,596
	Storage	5,102	490,450	828,435	723,056	145,058	0	0	0	0	0	0	0	2,192,101	0	2,192,101	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	11,746	45,728	22,972	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	89,081	24,008	113,089	4,000
LNG From Storage		2,845	11,746	52,256	22,972	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	92,759	20,330	113,089	4,000
Propane	Vapor	0	0	33,967	28,010	0	0	0	0	0	0	0	0	61,977	0	61,977	26,574
	Truck	0	0	33,967	28,010	0	0	0	0	0	0	0	0	61,977	0	61,977	5,607
Total Resources		1,444,043	2,001,558	2,302,999	2,046,946	1,684,191	1,461,557	1,040,723	883,112	883,659	551,697	433,815	776,354	9,479,737	6,030,917	15,510,654	122,146

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2012-13: High Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,386,066	2,016,448	2,251,231	1,941,175	1,703,322	993,448	523,340	406,646	398,878	398,108	447,497	793,360	9,298,242	3,961,277	13,259,519	113,658
Refill	Underground Storage	78,020	0	0	0	0	480,362	525,795	508,834	496,924	44,180	0	0	78,020	2,056,095	2,134,115	0
	LNG	2,845	14,689	50,717	21,306	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	95,347	24,008	119,355	4,000
	Propane	0	0	38,127	11,968	0	0	11,215	7,978	0	0	0	0	50,095	19,193	69,288	0
Total Requirements		1,466,931	2,031,137	2,340,075	1,974,449	1,709,112	1,473,810	1,069,823	926,308	898,747	445,233	450,347	796,305	9,521,704	6,060,573	15,582,277	117,658
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	93,144	89,452	121,746	8,000	0	0	0	0	0	0	548,342	8,000	556,342	4,000
	Niagara Supply	93,660	15,156	29,407	16,818	0	3,437	0	0	0	0	0	0	155,041	3,437	158,478	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	592,462	0	0	0	1,297,204	952,509	515,807	400,556	392,833	391,970	440,987	784,711	1,889,666	3,879,373	5,769,039	0
	Gulf Supply	640,840	580,997	421,115	377,842	236,834	501,224	525,795	508,834	496,924	44,180	0	0	2,257,628	2,076,957	4,334,585	21,596
	Storage	6,990	504,142	833,116	702,146	36,290	0	0	0	0	0	0	0	2,082,684	0	2,082,684	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	14,689	50,717	21,306	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	95,347	24,008	119,355	4,000
LNG From Storage		2,845	14,689	57,245	21,306	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	99,025	20,330	119,355	3,405
Propane	Vapor	0	0	38,127	31,161	0	0	0	0	0	0	0	0	69,288	0	69,288	28,289
	Truck	0	0	38,127	11,968	0	0	11,215	7,978	0	0	0	0	50,095	19,193	69,288	0
Total Resources		1,466,932	2,031,138	2,340,075	1,974,449	1,709,112	1,473,810	1,069,823	926,308	898,747	445,233	450,347	796,305	9,521,706	6,060,573	15,582,279	117,659

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2013-14: High Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,406,849	2,040,661	2,276,632	1,963,665	1,725,961	1,012,284	539,532	420,910	413,162	412,477	462,469	811,457	9,413,768	4,072,291	13,486,059	114,680
Refill	Underground Storage	78,020	0	0	0	0	488,131	525,795	508,834	497,643	48,457	0	0	78,020	2,068,860	2,146,880	0
	LNG	2,845	18,132	51,062	22,170	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	46,112	34,029	0	0	0	0	0	0	0	0	80,141	0	80,141	5,607
Total Requirements		1,487,714	2,058,793	2,373,806	2,019,864	1,731,751	1,500,415	1,074,800	932,594	913,750	463,879	465,319	814,402	9,671,928	6,165,159	15,837,087	124,287
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	96,699	98,489	44,101	8,000	0	0	0	0	0	0	483,289	8,000	491,289	4,000
	Niagara Supply	6,790	17,515	31,038	19,433	3,905	4,182	0	0	0	0	0	0	78,681	4,182	82,863	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,157,927	0	0	0	1,389,925	969,037	531,999	414,820	407,117	406,339	455,959	802,808	2,547,852	3,988,079	6,535,931	0
	Gulf Supply	181,312	587,372	429,870	389,817	240,050	510,556	525,795	508,834	497,643	48,457	0	0	1,828,421	2,091,285	3,919,706	21,596
	Storage	8,705	516,178	836,247	697,277	36,733	0	0	0	0	0	0	0	2,095,140	0	2,095,140	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	18,132	51,062	22,170	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	18,132	57,590	22,170	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	2,550
Propane	Vapor	0	0	46,112	34,029	0	0	0	0	0	0	0	0	80,141	0	80,141	30,166
	Truck	0	0	46,112	34,029	0	0	0	0	0	0	0	0	80,141	0	80,141	5,607
Total Resources		1,487,714	2,058,794	2,373,807	2,019,864	1,731,752	1,500,415	1,074,800	932,594	913,750	463,879	465,319	814,402	9,671,931	6,165,159	15,837,090	124,288

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Normal Year 2014-15: High Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,427,973	2,065,732	2,303,112	1,987,041	1,749,172	1,031,069	555,089	434,239	426,409	425,822	476,641	829,260	9,533,030	4,178,529	13,711,559	115,773
Refill	Underground Storage	78,020	0	0	0	0	486,501	525,795	508,834	496,325	53,590	0	0	78,020	2,071,045	2,149,065	0
	LNG	2,845	22,736	44,035	24,594	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	100,000	24,008	124,008	4,000
	Propane	0	0	61,961	31,497	0	0	4,518	0	0	0	0	0	93,458	4,518	97,976	0
Total Requirements		1,508,838	2,088,468	2,409,108	2,043,132	1,754,962	1,517,570	1,094,875	945,923	925,679	482,357	479,491	832,205	9,804,508	6,278,100	16,082,608	119,773
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	100,746	124,000	115,358	101,797	47,878	8,000	0	0	0	0	0	729	489,779	8,729	498,508	4,000
	Niagara Supply	7,665	20,225	32,852	21,873	9,321	4,947	0	0	0	0	0	0	91,936	4,947	96,883	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,190,930	0	0	1,064	1,400,780	984,987	547,555	428,149	420,364	419,684	470,131	819,882	2,592,774	4,090,752	6,683,526	0
	Gulf Supply	186,011	592,754	439,095	401,127	244,060	510,997	525,795	508,834	496,325	53,590	0	0	1,863,047	2,095,541	3,958,588	21,596
	Storage	10,507	528,554	824,207	698,120	35,885	0	0	0	0	0	0	0	2,097,273	0	2,097,273	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	22,736	44,035	24,594	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	100,000	24,008	124,008	4,000
LNG From Storage		2,845	22,736	50,563	24,594	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,678	20,330	124,008	1,653
Propane	Vapor	0	0	61,961	36,016	0	0	0	0	0	0	0	0	97,977	0	97,977	32,155
	Truck	0	0	61,961	31,497	0	0	4,518	0	0	0	0	0	93,458	4,518	97,976	0
Total Resources		1,508,839	2,088,470	2,409,109	2,043,132	1,754,962	1,517,571	1,094,874	945,923	925,679	482,357	479,491	832,205	9,804,512	6,278,100	16,082,612	119,773

Resource and Requirements Tables: Section II

Design Year and Normal Year High and Low Case Demand With Base Case DSM Scenarios

Resource and Requirements Tables

Design Year High Case Demand
Base Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Design Year 2010-11: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,494,849	2,183,248	2,458,188	2,102,593	1,841,221	1,060,060	526,770	385,735	373,778	373,463	436,300	834,860	10,080,099	3,990,966	14,071,065	139,740
Refill	Underground Storage	82,294	0	0	0	0	475,348	525,795	489,383	282,421	14,483	0	0	82,294	1,787,430	1,869,724	0
	LNG	2,845	2,940	67,577	20,847	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	88,020	5,438	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,579,988	2,186,188	2,613,785	2,128,878	1,847,011	1,535,408	1,073,554	885,645	659,144	390,891	439,150	837,805	10,355,850	5,821,597	16,177,447	149,347
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	51,769	105	0	0	0	0	47,995	604,000	99,869	703,869	4,000
	Niagara Supply	93,660	84,971	43,140	32,860	19,683	33,523	0	0	0	0	0	24,509	274,314	58,032	332,346	3,122
	Dracut Baseload	0	768,103	768,102	693,770	0	0	0	0	**0**	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	687,516	61,245	12,475	71,380	962,090	828,456	414,251	256,935	**0**	367,325	429,790	753,707	1,794,706	3,050,464	4,845,170	12,248
	Gulf Supply	640,454	656,415	643,122	564,325	669,476	613,020	630,676	612,093	650,154	14,483	0	0	3,173,792	2,520,426	5,694,218	21,596
	Storage	25,378	476,211	675,057	593,294	54,724	0	0	0	0	0	0	0	1,824,664	0	1,824,664	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	67,577	20,847	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From	Storage	2,845	2,940	74,105	20,847	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	107,213	5,438	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	88,020	5,438	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,579,988	2,186,187	2,613,785	2,128,879	1,847,011	1,535,408	1,073,554	885,645	659,144	390,891	439,150	837,805	10,355,850	5,821,597	16,177,447	149,347

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Design Year 2011-12: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,534,290	2,232,734	2,511,750	2,236,717	1,885,806	1,093,069	550,679	403,673	391,142	391,101	456,409	864,624	10,401,297	4,150,697	14,551,994	142,274
Refill	Underground Storage	86,133	0	0	0	0	476,340	525,795	489,383	497,643	329,005	0	0	86,133	2,318,166	2,404,299	0
	LNG	2,845	2,940	70,938	17,486	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,623,268	2,235,674	2,676,146	2,254,203	1,891,596	1,569,409	1,097,463	903,583	891,730	723,051	459,259	867,569	10,680,887	6,512,064	17,192,951	151,881
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	104,684	102,922	124,000	53,818	1,236	0	0	0	0	4,000	575,606	59,054	634,660	4,000
	Niagara Supply	93,660	35,486	44,090	50,757	28,750	36,111	0	0	0	0	0	13	252,743	36,124	288,867	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,755	0	2,254,755	24,778
	Dracut Swing	725,605	79,087	30,876	129,545	903,466	856,167	437,028	274,873	249,515	384,963	449,899	851,961	1,868,578	3,504,406	5,372,984	14,781
	Gulf Supply	640,107	618,989	504,463	496,831	669,476	612,946	630,676	612,093	633,225	329,005	0	0	2,929,866	2,817,945	5,747,811	21,596
	Storage	30,915	594,767	858,445	711,639	148,865	1,727	0	0	0	0	0	0	2,344,631	1,727	2,346,358	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	70,938	17,486	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	77,466	17,486	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,623,267	2,235,674	2,676,148	2,254,204	1,891,595	1,569,409	1,097,462	903,583	891,730	723,051	459,259	867,568	10,680,888	6,512,062	17,192,950	151,881

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Design Year 2012-13: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,575,389	2,283,759	2,566,762	2,197,015	1,932,033	1,127,857	576,629	423,688	410,674	410,904	478,555	896,323	10,554,958	4,324,630	14,879,588	144,838
Refill	Underground Storage	90,062	0	0	0	0	483,994	525,795	508,834	497,643	220,893	0	0	90,062	2,237,159	2,327,221	0
	LNG	2,845	2,940	71,552	16,872	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,668,296	2,286,699	2,731,772	2,213,887	1,937,823	1,611,851	1,123,413	943,049	911,262	634,742	481,405	899,268	10,838,477	6,604,990	17,443,467	154,445
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	12,457	0	0	0	0	0	4,000	604,000	16,457	620,457	4,000
	Niagara Supply	93,660	37,464	48,537	53,074	14,502	6,244	0	0	0	0	0	1,445	247,237	7,689	254,926	3,122
	Dracut Baseload	0	768,103	768,102	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	765,318	99,684	58,613	144,830	1,410,119	1,054,697	569,096	417,598	404,629	404,766	472,045	882,228	2,478,564	4,205,059	6,683,623	17,345
	Gulf Supply	639,753	629,853	519,761	484,431	282,952	526,223	525,795	508,834	497,643	220,893	0	0	2,556,750	2,279,388	4,836,138	21,596
	Storage	36,585	612,354	846,044	683,358	89,212	3,590	0	0	0	0	0	0	2,267,553	3,590	2,271,143	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	71,552	16,872	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	78,080	16,872	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,668,296	2,286,700	2,731,772	2,213,887	1,937,823	1,611,851	1,123,413	943,049	911,262	634,742	481,405	899,267	10,838,478	6,604,989	17,443,467	154,444

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Design Year 2013-14: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,615,165	2,333,321	2,620,271	2,243,562	1,976,844	1,161,393	601,391	442,606	429,087	429,583	499,581	926,758	10,789,163	4,490,399	15,279,562	147,345
Refill	Underground Storage	94,199	0	0	0	0	483,517	525,795	508,834	497,643	232,946	0	0	94,199	2,248,735	2,342,934	0
	LNG	2,845	2,940	70,760	17,664	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	89,945	3,513	0	0	11,516	8,059	0	0	0	0	93,458	19,575	113,033	5,607
Total Requirements		1,712,209	2,336,261	2,780,976	2,264,739	1,982,634	1,644,910	1,148,175	962,349	929,675	665,474	502,431	929,703	11,076,819	6,782,717	17,859,536	156,952
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	64,960	15,106	0	0	0	0	0	4,885	544,960	19,991	564,951	4,000
	Niagara Supply	9,366	72,825	56,825	53,074	16,799	7,333	0	0	0	0	0	2,832	208,889	10,165	219,054	3,122
	Dracut Baseload	0	768,103	768,103	693,769	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	1,266,790	121,665	92,068	170,835	1,489,267	1,079,411	593,858	436,516	423,042	423,445	493,071	910,391	3,140,625	4,359,734	7,500,359	25,223
	Gulf Supply	260,966	639,345	529,875	493,181	293,143	529,015	525,795	508,834	497,643	232,946	0	0	2,216,510	2,294,233	4,510,743	21,596
	Storage	42,107	595,082	852,740	690,106	101,045	5,404	0	0	0	0	0	0	2,281,080	5,404	2,286,484	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	70,760	17,664	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	77,288	17,664	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	5,158
Propane	Vapor	0	0	108,399	4,253	381	0	0	0	0	0	0	0	113,033	0	113,033	35,000
	Truck	0	0	89,945	3,513	0	0	11,516	8,059	0	0	0	0	93,458	19,575	113,033	5,607
Total Resources		1,712,209	2,336,262	2,780,977	2,264,739	1,982,633	1,644,909	1,148,175	962,349	929,675	665,474	502,431	929,702	11,076,820	6,782,715	17,859,535	156,952

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Design Year 2014-15: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,656,321	2,385,086	2,676,346	2,292,264	2,023,434	1,195,735	626,073	460,991	446,839	447,627	520,266	957,649	11,033,451	4,655,180	15,688,631	150,007
Refill	Underground Storage	100,144	0	0	0	0	481,936	525,795	508,834	497,643	270,372	0	0	100,144	2,284,580	2,384,724	0
	LNG	2,845	2,940	68,564	19,860	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	10,167	0	0	0	0	93,458	21,683	115,141	5,607
Total Requirements		1,759,310	2,388,026	2,838,368	2,312,124	2,029,224	1,677,671	1,172,857	982,842	947,427	720,944	523,116	960,594	11,327,052	6,985,451	18,312,503	159,614
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	113,085	124,000	124,000	112,000	68,886	16,422	0	0	0	0	0	6,265	541,971	22,687	564,658	4,000
	Niagara Supply	9,366	76,154	63,781	54,580	19,738	9,208	0	0	0	0	0	3,122	223,619	12,330	235,949	3,122
	Dracut Baseload	0	768,103	768,102	693,769	0	0	0	0	0	0	0	0	2,229,974	0	2,229,974	24,777
	Dracut Swing	1,295,208	144,754	133,299	198,703	1,505,046	1,103,506	618,540	454,901	440,794	441,489	513,756	938,463	3,277,010	4,511,449	7,788,459	25,223
	Gulf Supply	280,764	646,885	538,510	506,678	304,792	532,586	525,795	508,834	497,643	270,372	0	1,150	2,277,629	2,336,380	4,614,009	21,596
	Storage	47,908	612,889	858,814	689,115	111,235	7,309	0	0	0	0	0	0	2,319,961	7,309	2,327,270	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	68,564	19,860	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	75,092	19,860	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	103,773	8,878	2,489	0	0	0	0	0	0	0	115,140	0	115,140	32,292
	Truck	0	0	93,458	0	0	0	11,516	10,167	0	0	0	0	93,458	21,683	115,141	5,607
Total Resources		1,759,311	2,388,027	2,838,367	2,312,123	2,029,224	1,677,671	1,172,857	982,842	947,427	720,944	523,116	960,594	11,327,052	6,985,451	18,312,503	159,614

Resource and Requirements Tables

Normal Year High Case Demand
Base Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Normal Year 2010-11: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,368,698	2,001,036	2,237,056	1,927,707	1,686,552	974,052	500,458	382,493	373,778	373,091	423,933	772,052	9,221,049	3,799,857	13,020,906	113,399
Refill	Underground Storage	78,020	0	0	0	0	428,324	525,795	253,891	282,421	0	0	0	78,020	1,490,431	1,568,451	0
	LNG	9,033	13,496	49,243	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	98,461	24,008	122,469	4,000
	Propane	0	0	17,231	30,192	0	0	11,516	7,677	0	0	0	0	47,423	19,193	66,616	0
Total Requirements		1,455,751	2,014,532	2,303,530	1,978,798	1,692,342	1,402,376	1,047,242	646,911	659,144	376,036	426,783	774,997	9,444,953	5,333,489	14,778,442	117,399
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	42,633	0	0	0	0	0	31,847	604,000	74,480	678,480	4,000
	Niagara Supply	93,660	71,806	29,012	14,181	12,056	26,728	0	0	0	0	0	13,644	220,715	40,372	261,087	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	**0**	**0**	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	575,895	0	0	0	847,362	707,807	388,044	**0**	**0**	366,953	417,423	717,913	1,423,257	2,598,140	4,021,397	0
	Gulf Supply	640,840	637,134	589,352	540,301	669,476	616,568	630,676	630,294	650,154	0	0	0	3,077,103	2,527,692	5,604,795	21,596
	Storage	0	377,136	623,421	507,683	22,410	0	0	0	0	0	0	0	1,530,650	0	1,530,650	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	9,033	13,496	49,243	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	98,461	24,008	122,469	4,000
LNG From Storage		9,033	13,496	55,771	20,899	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	102,139	20,330	122,469	4,000
Propane	Vapor	0	0	36,424	30,192	0	0	0	0	0	0	0	0	66,616	0	66,616	27,435
	Truck	0	0	17,231	30,192	0	0	11,516	7,677	0	0	0	0	47,423	19,193	66,616	0
Total Resources		1,455,751	2,014,533	2,303,531	1,978,797	1,692,342	1,402,376	1,047,242	646,911	659,144	376,036	426,783	774,998	9,444,954	5,333,490	14,778,444	117,400

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Normal Year 2011-12: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,406,331	2,047,986	2,287,586	2,053,659	1,728,935	1,005,776	523,741	400,412	391,142	390,701	443,892	800,815	9,524,497	3,956,479	13,480,976	115,630
Refill	Underground Storage	78,020	0	0	0	0	486,173	525,795	489,383	497,643	206,000	0	0	78,020	2,204,994	2,283,014	0
	LNG	2,845	20,756	43,069	27,539	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	1,285
	Propane	0	0	60,116	24,500	0	0	11,516	0	0	0	0	0	84,616	11,516	96,132	5,607
Total Requirements		1,487,196	2,068,742	2,390,771	2,105,698	1,734,725	1,491,949	1,070,525	892,645	891,730	599,646	446,742	803,760	9,787,132	6,196,997	15,984,129	122,522
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	95,939	94,641	124,000	45,478	0	0	0	0	0	45	558,580	45,523	604,103	4,000
	Niagara Supply	93,660	18,862	32,009	23,491	24,976	30,302	0	0	0	0	0	0	192,998	30,302	223,300	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,754	0	2,254,754	24,778
	Dracut Swing	610,013	0	0	291	758,306	795,347	411,327	271,612	249,515	384,563	437,382	792,122	1,368,610	3,341,868	4,710,478	0
	Gulf Supply	640,840	587,458	433,327	423,748	669,476	612,183	630,676	612,093	633,225	206,000	0	0	2,754,849	2,694,177	5,449,026	21,596
	Storage	9,703	519,445	837,521	720,395	140,928	0	0	0	0	0	0	0	2,227,992	0	2,227,992	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	20,756	43,069	27,539	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	1,285
LNG From Storage		2,845	20,756	49,597	27,539	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	5,810
Propane	Vapor	0	0	60,116	36,016	0	0	0	0	0	0	0	0	96,132	0	96,132	27,856
	Truck	0	0	60,116	24,500	0	0	11,516	0	0	0	0	0	84,616	11,516	96,132	5,607
Total Resources		1,487,196	2,068,742	2,390,771	2,105,698	1,734,724	1,491,950	1,070,525	892,645	891,730	599,646	446,742	803,761	9,787,131	6,196,999	15,984,130	122,523

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Normal Year 2012-13: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,445,658	2,096,526	2,339,635	2,017,420	1,772,995	1,039,315	549,077	420,412	410,674	410,478	465,896	831,532	9,672,234	4,127,384	13,799,618	117,897
Refill	Underground Storage	78,020	0	0	0	0	492,088	525,795	508,834	497,643	60,550	0	0	78,020	2,084,910	2,162,930	0
	LNG	2,845	16,855	45,925	28,584	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	2,363
	Propane	0	0	59,813	33,645	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	0
Total Requirements		1,526,523	2,113,381	2,445,373	2,079,649	1,778,785	1,531,403	1,095,861	939,773	911,262	473,973	468,746	834,477	9,943,711	6,255,495	16,199,206	120,260
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	119,806	112,000	123,880	8,000	0	0	0	0	0	1,424	599,686	9,424	609,110	4,000
	Niagara Supply	93,660	24,628	34,154	25,647	9,366	5,771	0	0	0	0	0	0	187,455	5,771	193,226	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	645,732	13,716	0	6,528	1,336,368	989,760	541,544	414,322	404,629	404,340	459,386	821,459	2,002,344	4,035,440	6,037,784	0
	Gulf Supply	640,840	597,054	452,501	419,432	249,223	519,233	525,795	508,834	497,643	60,550	0	0	2,359,050	2,112,055	4,471,105	21,596
	Storage	13,311	542,808	825,010	686,764	42,911	0	0	0	0	0	0	0	2,110,804	0	2,110,804	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	16,855	45,925	28,584	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	2,363
LNG From Storage		2,845	16,855	52,453	28,584	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	933
Propane	Vapor	0	0	76,636	36,016	0	0	0	0	0	0	0	0	112,652	0	112,652	35,000
	Truck	0	0	59,813	33,645	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	0
Total Resources		1,526,523	2,113,381	2,445,375	2,079,650	1,778,786	1,531,404	1,095,861	939,773	911,262	473,973	468,746	834,477	9,943,715	6,255,496	16,199,211	120,261

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Normal Year 2013-14: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,483,674	2,143,633	2,390,216	2,061,662	1,815,671	1,071,606	573,229	439,315	429,087	429,130	486,781	860,998	9,894,856	4,290,146	14,185,002	120,112
Refill	Underground Storage	78,583	0	0	0	0	490,470	525,795	508,834	497,643	70,117	0	0	78,583	2,092,859	2,171,442	0
	LNG	2,845	2,940	62,377	26,047	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	80,964	12,494	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,565,102	2,146,573	2,533,557	2,100,203	1,821,461	1,562,076	1,120,013	958,676	929,675	502,192	489,631	863,943	10,166,896	6,426,206	16,593,102	129,719
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	57,916	8,858	0	0	0	0	0	2,758	537,916	11,616	549,532	4,000
	Niagara Supply	9,366	65,967	36,834	32,864	10,211	6,244	0	0	0	0	0	0	155,242	6,244	161,486	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	1,202,025	40,497	0	27,241	1,427,777	1,016,290	565,696	433,225	423,042	422,992	480,271	849,592	2,697,541	4,191,108	6,888,649	0
	Gulf Supply	202,674	606,041	470,909	436,380	256,709	522,044	525,795	508,834	497,643	70,117	0	0	1,972,713	2,124,433	4,097,146	21,596
	Storage	18,057	526,723	829,527	692,993	51,810	0	0	0	0	0	0	0	2,119,110	0	2,119,110	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	62,377	26,047	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	68,905	26,047	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	3,147
Propane	Vapor	0	0	80,964	31,687	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	80,964	12,494	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,565,102	2,146,573	2,533,557	2,100,203	1,821,461	1,562,076	1,120,013	958,676	929,675	502,192	489,631	863,944	10,166,896	6,426,207	16,593,103	129,719

COMPARISON OF RESOURCES AND REQUIREMENTS
High Case Normal Year 2014-15: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,522,914	2,192,711	2,443,085	2,107,842	1,859,918	1,104,589	597,258	457,674	446,839	447,145	507,299	890,826	10,126,470	4,451,630	14,578,100	122,453
Refill	Underground Storage	81,049	0	0	0	0	488,245	525,795	508,834	497,643	114,885	0	0	81,049	2,135,402	2,216,451	0
	LNG	2,845	2,940	60,933	27,491	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,606,808	2,195,651	2,597,476	2,135,333	1,865,708	1,592,834	1,144,042	977,035	947,427	564,975	510,149	893,771	10,400,976	6,630,233	17,031,209	132,060
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	107,377	124,000	124,000	112,000	60,919	10,778	0	0	0	0	0	4,000	528,296	14,778	543,074	4,000
	Niagara Supply	9,366	71,735	41,875	42,736	12,028	6,244	0	0	0	0	0	137	177,740	6,381	184,121	3,122
	Dracut Baseload	0	768,102	768,103	693,771	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,237,939	56,703	0	66,596	1,446,675	1,043,285	589,725	451,584	440,794	441,007	500,789	878,040	2,807,913	4,345,224	7,153,137	0
	Gulf Supply	215,648	615,327	488,395	454,256	265,991	523,887	525,795	508,834	497,643	114,885	0	0	2,039,617	2,171,044	4,210,661	21,596
	Storage	23,497	544,542	837,664	694,275	63,056	0	0	0	0	0	0	0	2,163,034	0	2,163,034	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	60,933	27,491	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	67,461	27,491	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	5,489
Propane	Vapor	0	0	104,614	8,037	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,606,807	2,195,651	2,597,477	2,135,333	1,865,707	1,592,834	1,144,042	977,035	947,427	564,975	510,149	893,771	10,400,975	6,630,233	17,031,208	132,061

Resource and Requirements Tables

Design Year Low Case Demand
Base Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Design Year 2010-11: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,436,297	2,104,161	2,370,440	2,027,248	1,772,557	1,015,218	502,161	372,992	363,109	362,208	418,929	797,774	9,710,703	3,832,391	13,543,094	135,194
Refill	Underground Storage	78,020	0	0	0	0	419,348	525,795	421,701	292,252	3,778	0	0	78,020	1,662,874	1,740,894	0
	LNG	2,845	3,622	58,783	28,959	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	62,187	31,271	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	0
Total Requirements		1,517,162	2,107,783	2,491,410	2,087,478	1,778,347	1,434,566	1,048,945	805,220	658,306	368,931	421,779	800,719	9,982,180	5,538,466	15,520,646	139,194
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	48,045	0	0	0	0	0	42,515	604,000	90,560	694,560	4,000
	Niagara Supply	93,660	76,906	35,388	21,701	15,450	31,371	0	0	0	0	0	17,859	243,105	49,230	292,335	3,122
	Dracut Baseload	0	768,102	768,102	693,771	0	0	0	0	**0**	0	0	0	2,229,974	0	2,229,974	24,777
	Dracut Swing	633,551	32,920	7,702	14,549	913,320	728,981	389,747	171,121	**0**	356,070	412,419	728,752	1,602,043	2,787,090	4,389,133	7,702
	Gulf Supply	640,840	650,955	633,150	555,300	669,476	617,530	630,676	617,482	649,316	3,778	0	0	3,149,721	2,518,782	5,668,503	21,596
	Storage	16,131	438,295	644,433	561,017	39,063	0	0	0	0	0	0	0	1,698,939	0	1,698,939	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	3,622	58,783	28,959	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	3,622	65,311	28,959	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	81,380	31,271	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	62,187	31,271	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	0
Total Resources		1,517,162	2,107,784	2,491,410	2,087,478	1,778,347	1,434,567	1,048,945	805,220	658,306	368,931	421,779	800,720	9,982,181	5,538,468	15,520,649	139,194

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Design Year 2011-12: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,443,379	2,110,599	2,376,465	2,115,767	1,779,491	1,022,950	511,178	382,247	372,792	371,863	427,962	806,202	9,825,701	3,895,194	13,720,895	135,307
Refill	Underground Storage	78,020	0	0	0	0	482,881	525,795	489,383	497,643	237,568	0	0	78,020	2,233,270	2,311,290	0
	LNG	2,845	2,940	59,311	29,113	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	82,525	10,933	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	4,994
Total Requirements		1,524,244	2,113,539	2,518,301	2,155,813	1,785,281	1,505,831	1,057,962	882,157	873,380	612,376	430,812	809,147	10,097,178	6,171,665	16,268,843	144,301
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	101,603	106,308	124,000	48,543	0	0	0	0	0	778	575,911	49,321	625,232	4,000
	Niagara Supply	93,660	30,995	35,870	32,581	25,946	31,753	0	0	0	0	0	0	219,052	31,753	250,805	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,754	0	2,254,754	24,778
	Dracut Swing	640,084	35,028	7,814	27,265	808,787	804,455	398,763	253,447	231,165	365,725	421,452	796,775	1,518,978	3,271,782	4,790,760	7,814
	Gulf Supply	640,840	596,721	459,984	451,166	669,476	612,440	630,676	612,093	633,225	237,568	0	0	2,818,187	2,726,002	5,544,189	21,596
	Storage	16,679	543,450	843,753	711,671	140,034	0	0	0	0	0	0	0	2,255,587	0	2,255,587	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	59,311	29,113	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	65,839	29,113	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	82,525	30,126	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	82,525	10,933	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	4,994
Total Resources		1,524,243	2,113,539	2,518,301	2,155,814	1,785,281	1,505,831	1,057,961	882,157	873,380	612,376	430,812	809,147	10,097,178	6,171,664	16,268,842	144,301

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Design Year 2012-13: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,450,595	2,116,722	2,381,961	2,038,123	1,786,359	1,031,153	521,214	392,756	383,829	382,858	438,140	815,339	9,773,760	3,965,289	13,739,049	135,362
Refill	Underground Storage	78,020	0	0	0	0	491,696	525,795	508,834	497,643	74,689	0	0	78,020	2,098,657	2,176,677	0
	LNG	2,845	2,940	59,761	28,663	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	83,248	10,210	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,531,460	2,119,662	2,524,970	2,076,996	1,792,149	1,522,849	1,067,998	912,117	884,417	460,492	440,990	818,284	10,045,237	6,107,147	16,152,384	144,969
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	8,000	0	0	0	0	0	1,009	604,000	9,009	613,009	4,000
	Niagara Supply	93,660	27,773	36,389	29,566	9,366	6,244	0	0	0	0	0	0	196,754	6,244	202,998	3,122
	Dracut Baseload	0	768,103	768,102	693,771	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	646,824	36,254	7,869	22,808	1,341,137	979,969	513,681	386,666	377,784	376,720	431,630	805,681	2,054,893	3,872,131	5,927,024	7,869
	Gulf Supply	640,839	598,386	462,146	426,086	253,539	519,997	525,795	508,834	497,643	74,689	0	0	2,380,996	2,126,958	4,507,954	21,596
	Storage	17,157	549,904	822,756	687,334	47,069	0	0	0	0	0	0	0	2,124,220	0	2,124,220	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	59,761	28,663	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	66,289	28,663	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	83,436	29,216	0	0	0	0	0	0	0	0	112,652	0	112,652	35,000
	Truck	0	0	83,248	10,210	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,531,460	2,119,662	2,524,970	2,076,997	1,792,149	1,522,850	1,067,998	912,117	884,417	460,492	440,990	818,284	10,045,238	6,107,148	16,152,386	144,968

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Design Year 2013-14: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,455,197	2,119,796	2,384,254	2,040,548	1,790,373	1,036,990	529,215	401,497	393,089	392,065	446,463	822,208	9,790,168	4,021,527	13,811,695	135,280
Refill	Underground Storage	78,062	0	0	0	0	491,185	525,795	508,834	497,643	67,511	0	0	78,062	2,090,968	2,169,030	0
	LNG	2,845	2,940	59,877	28,547	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	83,235	10,223	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,536,104	2,122,736	2,527,366	2,079,318	1,796,163	1,528,175	1,075,999	920,858	893,677	462,521	449,313	825,153	10,061,687	6,155,696	16,217,383	144,887
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	106,680	53,163	8,000	0	0	0	0	0	1,150	527,843	9,150	536,993	4,000
	Niagara Supply	9,366	50,236	36,597	29,731	9,784	6,244	0	0	0	0	0	0	135,714	6,244	141,958	3,122
	Dracut Baseload	0	768,102	768,102	693,770	0	0	0	0	0	0	0	0	2,229,974	0	2,229,974	24,777
	Dracut Swing	1,179,255	36,599	7,788	23,294	1,415,176	985,341	521,682	395,407	387,044	385,927	439,953	812,408	2,662,112	3,927,762	6,589,874	7,788
	Gulf Supply	197,191	599,439	463,224	420,964	254,070	519,949	525,795	508,834	497,643	67,511	0	0	1,934,888	2,119,732	4,054,620	21,596
	Storage	17,311	529,117	823,625	699,771	46,931	0	0	0	0	0	0	0	2,116,755	0	2,116,755	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	59,877	28,547	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	66,405	28,547	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	83,540	29,111	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	83,235	10,223	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,536,103	2,122,735	2,527,367	2,079,318	1,796,162	1,528,174	1,075,999	920,858	893,677	462,521	449,313	825,152	10,061,685	6,155,694	16,217,379	144,887

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Design Year 2014-15: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,459,707	2,123,215	2,387,093	2,043,375	1,794,492	1,042,416	536,264	409,056	401,060	399,998	453,716	828,434	9,807,882	4,070,944	13,878,826	135,257
Refill	Underground Storage	78,131	0	0	0	0	486,332	525,795	508,834	497,643	68,110	0	0	78,131	2,086,714	2,164,845	0
	LNG	2,845	2,940	53,635	34,789	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	89,702	3,756	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,540,683	2,126,155	2,530,430	2,081,920	1,800,282	1,528,748	1,083,048	928,417	901,648	471,053	456,566	831,379	10,079,470	6,200,859	16,280,329	144,864
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	102,589	124,000	124,000	112,000	53,705	8,000	0	0	0	0	0	1,293	516,294	9,293	525,587	4,000
	Niagara Supply	9,366	53,076	36,861	29,963	9,859	6,244	0	0	0	0	0	0	139,125	6,244	145,369	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,200,101	37,151	7,764	24,322	1,417,744	990,277	528,731	402,966	395,015	393,860	447,206	818,493	2,687,082	3,976,548	6,663,630	7,764
	Gulf Supply	198,112	600,475	464,424	422,266	254,648	515,588	525,795	508,834	497,643	68,110	0	0	1,939,925	2,115,970	4,055,895	21,596
	Storage	17,536	528,109	824,488	695,251	47,288	0	0	0	0	0	0	0	2,112,672	0	2,112,672	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	53,635	34,789	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	60,163	34,789	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	90,316	22,335	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	89,702	3,756	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,540,684	2,126,156	2,530,430	2,081,921	1,800,282	1,528,749	1,083,048	928,417	901,648	471,053	456,566	831,380	10,079,473	6,200,861	16,280,334	144,864

Resource and Requirements Tables

Normal Year Low Case Demand
Base Case DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Normal Year 2010-11: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,313,952	1,927,397	2,155,744	1,857,575	1,622,522	931,961	476,962	369,984	363,109	361,895	407,148	737,073	8,877,190	3,648,132	12,525,322	109,497
Refill	Underground Storage	78,020	0	0	0	0	438,130	525,795	265,856	291,366	0	0	0	78,020	1,521,147	1,599,167	0
	LNG	3,823	5,626	30,549	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	66,687	24,008	90,695	4,000
	Propane	0	0	8,889	19,715	0	0	11,516	7,677	0	0	0	0	28,604	19,193	47,797	0
Total Requirements		1,395,795	1,933,023	2,195,182	1,898,189	1,628,312	1,370,091	1,023,746	646,367	657,420	364,840	409,998	740,018	9,050,501	5,212,480	14,262,981	113,497
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	39,837	0	0	0	0	0	24,676	604,000	64,513	668,513	4,000
	Niagara Supply	93,660	71,806	25,462	9,575	9,366	21,508	0	0	0	0	0	12,488	209,869	33,996	243,865	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	**0**	**0**	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	526,359	0	0	0	795,209	684,118	364,548	**0**	**0**	355,757	400,638	691,260	1,321,568	2,496,321	3,817,889	0
	Gulf Supply	640,840	622,728	404,136	529,215	669,476	615,987	630,676	629,750	648,430	0	0	0	2,866,395	2,524,843	5,391,238	21,596
	Storage	0	325,773	757,911	463,720	13,223	0	0	0	0	0	0	0	1,560,627	0	1,560,627	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	3,823	5,626	30,549	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	66,687	24,008	90,695	4,000
LNG From Storage		3,823	5,626	37,077	20,899	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	70,365	20,330	90,695	4,000
Propane	Vapor	0	0	28,083	19,715	0	0	0	0	0	0	0	0	47,798	0	47,798	23,533
	Truck	0	0	8,889	19,715	0	0	11,516	7,677	0	0	0	0	28,604	19,193	47,797	0
Total Resources		1,395,795	1,933,024	2,195,184	1,898,188	1,628,312	1,370,090	1,023,746	646,367	657,420	364,840	409,998	740,018	9,050,503	5,212,479	14,262,982	113,498

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Normal Year 2011-12: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,321,194	1,934,115	2,162,079	1,940,879	1,629,636	939,835	485,927	379,343	372,792	371,552	416,335	745,591	8,987,903	3,711,375	12,699,278	109,641
Refill	Underground Storage	78,020	0	0	0	0	491,852	525,795	489,383	497,643	166,539	0	0	78,020	2,171,212	2,249,232	0
	LNG	2,845	5,999	31,430	20,994	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	67,058	24,008	91,066	4,000
	Propane	0	0	28,384	1,012	0	0	11,516	7,677	0	0	0	0	29,396	19,193	48,589	5,607
Total Requirements		1,402,059	1,940,114	2,221,893	1,962,885	1,635,426	1,431,687	1,032,711	879,253	873,380	541,036	419,185	748,536	9,162,377	5,925,788	15,088,165	119,248
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	85,341	88,567	124,000	40,341	0	0	0	0	0	0	541,908	40,341	582,249	4,000
	Niagara Supply	93,660	8,236	25,829	12,707	24,976	22,251	0	0	0	0	0	0	165,408	22,251	187,659	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,754	0	2,254,754	24,778
	Dracut Swing	533,425	0	0	0	604,701	748,666	373,513	250,543	231,165	365,414	409,825	736,943	1,138,126	3,116,069	4,254,195	0
	Gulf Supply	640,840	556,525	387,807	351,808	669,476	611,789	630,676	612,093	633,225	166,539	0	0	2,606,456	2,654,322	5,260,778	21,596
	Storage	1,154	461,891	817,683	719,060	195,235	0	0	0	0	0	0	0	2,195,023	0	2,195,023	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	5,999	31,430	20,994	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	67,058	24,008	91,066	4,000
LNG From Storage		2,845	5,999	37,958	20,994	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	70,736	20,330	91,066	10,528
Propane	Vapor	0	0	28,384	20,205	0	0	0	0	0	0	0	0	48,589	0	48,589	17,148
	Truck	0	0	28,384	1,012	0	0	11,516	7,677	0	0	0	0	29,396	19,193	48,589	5,607
Total Resources		1,402,059	1,940,115	2,221,893	1,962,885	1,635,426	1,431,687	1,032,711	879,253	873,380	541,036	419,185	748,537	9,162,378	5,925,789	15,088,167	119,248

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Normal Year 2012-13: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,328,663	1,940,648	2,168,040	1,869,210	1,636,807	948,246	495,941	389,960	383,829	382,552	426,680	754,868	8,943,368	3,782,076	12,725,444	109,741
Refill	Underground Storage	78,020	0	0	0	0	474,621	525,795	489,383	457,556	31,607	0	0	78,020	1,978,962	2,056,982	0
	LNG	2,845	6,325	32,273	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	68,132	24,008	92,140	4,000
	Propane	0	0	22,430	15,556	0	0	11,215	0	0	0	0	0	37,986	11,215	49,201	5,607
Total Requirements		1,409,528	1,946,973	2,222,743	1,905,665	1,642,597	1,422,867	1,042,424	882,193	844,330	417,104	429,530	757,813	9,127,506	5,796,261	14,923,767	119,348
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	85,706	82,839	117,793	6,093	0	0	0	0	0	0	530,338	6,093	536,431	4,000
	Niagara Supply	93,660	8,403	26,061	9,938	0	3,122	0	0	0	0	0	0	138,062	3,122	141,184	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	540,737	0	0	0	1,259,954	914,127	488,408	383,870	377,784	376,414	420,170	746,220	1,800,691	3,706,993	5,507,684	0
	Gulf Supply	640,840	559,368	390,104	334,996	223,979	490,885	525,795	489,383	457,556	31,607	0	0	2,149,287	1,995,226	4,144,513	21,596
	Storage	1,310	465,088	819,684	697,494	23,832	0	0	0	0	0	0	0	2,007,408	0	2,007,408	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	6,325	32,273	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	68,132	24,008	92,140	4,000
LNG From Storage		2,845	6,325	38,801	20,899	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	71,810	20,330	92,140	10,528
Propane	Vapor	0	0	28,606	20,595	0	0	0	0	0	0	0	0	49,201	0	49,201	17,249
	Truck	0	0	22,430	15,556	0	0	11,215	0	0	0	0	0	37,986	11,215	49,201	5,607
Total Resources		1,409,527	1,946,974	2,222,742	1,905,666	1,642,596	1,422,867	1,042,424	882,193	844,330	417,104	429,530	757,814	9,127,505	5,796,262	14,923,767	119,349

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Normal Year 2013-14: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,333,586	1,944,240	2,170,911	1,872,175	1,641,205	954,347	503,939	398,814	393,089	391,764	435,183	761,919	8,962,117	3,839,055	12,801,172	109,718
Refill	Underground Storage	78,020	0	0	0	0	474,549	525,795	489,383	461,348	32,078	0	0	78,020	1,983,153	2,061,173	0
	LNG	2,845	6,433	32,530	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	68,497	24,008	92,505	4,000
	Propane	0	0	28,586	20,637	0	0	0	0	0	0	0	0	49,223	0	49,223	5,607
Total Requirements		1,414,451	1,950,673	2,232,027	1,913,711	1,646,995	1,428,896	1,039,207	891,047	857,382	426,787	438,033	764,864	9,157,857	5,846,216	15,004,073	119,325
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	86,120	83,332	37,233	6,229	0	0	0	0	0	0	450,685	6,229	456,914	4,000
	Niagara Supply	6,083	8,466	26,107	10,006	0	3,122	0	0	0	0	0	0	50,662	3,122	53,784	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,113,404	0	0	0	1,344,188	920,014	496,406	392,724	387,044	385,626	428,673	753,270	2,457,592	3,763,757	6,221,349	0
	Gulf Supply	160,623	561,151	391,206	336,261	224,473	490,891	525,795	489,383	461,348	32,078	0	0	1,673,714	1,999,495	3,673,209	21,596
	Storage	1,362	466,725	820,758	698,589	24,064	0	0	0	0	0	0	0	2,011,498	0	2,011,498	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	6,433	32,530	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	68,497	24,008	92,505	4,000
LNG From Storage		2,845	6,433	39,058	20,899	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	72,175	20,330	92,505	10,528
Propane	Vapor	0	0	28,586	20,637	0	0	0	0	0	0	0	0	49,223	0	49,223	17,225
	Truck	0	0	28,586	20,637	0	0	0	0	0	0	0	0	49,223	0	49,223	5,607
Total Resources		1,414,452	1,950,673	2,232,028	1,913,710	1,646,996	1,428,896	1,039,207	891,047	857,382	426,787	438,033	764,864	9,157,859	5,846,216	15,004,075	119,325

COMPARISON OF RESOURCES AND REQUIREMENTS
Low Case Normal Year 2014-15: Base Case DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,338,330	1,948,050	2,174,185	1,875,420	1,645,597	959,966	510,961	406,479	401,060	399,701	442,600	768,269	8,981,582	3,889,036	12,870,618	109,738
Refill	Underground Storage	78,020	0	0	0	0	474,462	525,795	489,383	460,036	32,614	0	0	78,020	1,982,290	2,060,310	0
	LNG	2,845	6,592	32,945	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	69,071	24,008	93,079	4,000
	Propane	0	0	28,646	20,779	0	0	0	0	0	0	0	0	49,425	0	49,425	5,607
Total Requirements		1,419,195	1,954,642	2,235,776	1,917,098	1,651,387	1,434,428	1,046,229	898,712	864,041	435,260	445,450	771,214	9,178,098	5,895,334	15,073,432	119,345
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	92,421	124,000	86,536	83,732	37,378	6,366	0	0	0	0	0	0	424,067	6,366	430,433	4,000
	Niagara Supply	6,174	8,548	26,178	10,092	3,122	3,122	0	0	0	0	0	0	54,114	3,122	57,236	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,144,679	0	0	0	1,347,565	925,399	503,428	400,389	395,015	393,563	436,090	759,620	2,492,244	3,813,504	6,305,748	0
	Gulf Supply	161,507	562,803	392,464	339,959	225,022	490,900	525,795	489,383	460,036	32,614	0	0	1,681,755	1,998,728	3,680,483	21,596
	Storage	1,433	468,643	821,811	697,508	21,261	0	0	0	0	0	0	0	2,010,656	0	2,010,656	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	6,592	32,945	20,899	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	69,071	24,008	93,079	4,000
LNG From Storage		2,845	6,592	39,473	20,899	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	72,749	20,330	93,079	4,000
Propane	Vapor	0	0	28,646	20,779	0	0	0	0	0	0	0	0	49,425	0	49,425	23,774
	Truck	0	0	28,646	20,779	0	0	0	0	0	0	0	0	49,425	0	49,425	5,607
Total Resources		1,419,194	1,954,643	2,235,776	1,917,097	1,651,386	1,434,427	1,046,229	898,712	864,041	435,260	445,450	771,214	9,178,096	5,895,333	15,073,429	119,346

Resource and Requirements Tables: Section III

Design Year Base Case Demand
Resource Mix With DSM and Marcellus Shale Supply

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2010-11: Resource Mix DSM with Marcellus
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,473,515	2,154,135	2,425,778	2,074,807	1,816,066	1,043,943	518,386	381,832	370,695	370,157	430,636	821,724	9,944,301	3,937,373	13,881,674	138,042
Refill	Underground Storage	79,909	0	0	0	0	314,976	334,744	324,937	335,751	333,750	250,867	0	79,909	1,895,025	1,974,934	0
	LNG	2,845	2,940	64,823	23,601	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	77,553	15,905	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,556,269	2,157,075	2,568,154	2,114,313	1,821,856	1,358,919	874,119	717,296	709,391	706,852	684,353	824,669	10,217,667	5,875,599	16,093,266	147,649
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	57,167	2,927	0	0	0	0	46,551	604,000	106,645	710,645	4,000
	Niagara Supply	93,660	93,660	65,562	78,556	24,976	40,946	0	0	0	0	0	21,585	356,414	62,531	418,945	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	667,006	50,753	10,549	51,738	1,176,031	836,638	507,926	375,742	364,650	364,019	424,126	744,940	1,956,078	3,618,041	5,574,119	10,549
	Gulf Supply	340,669	358,678	359,476	324,688	359,476	325,355	334,744	324,937	335,751	333,750	250,867	0	1,742,987	1,905,404	3,648,391	11,596
	Storage	21,954	461,809	762,406	632,305	48,861	0	0	0	0	0	0	0	1,927,335	0	1,927,335	28,115
Marcellus Shale		300,000	284,830	156,611	133,563	71,474	90,175	0	0	0	0	0	0	946,478	90,175	1,036,653	10,000
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	64,823	23,601	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	71,351	23,601	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	96,746	15,905	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	77,553	15,905	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,556,269	2,157,075	2,568,154	2,114,312	1,821,856	1,358,921	874,119	717,296	709,391	706,852	684,353	824,670	10,217,666	5,875,602	16,093,268	147,649

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2011-12: Resource Mix DSM with Marcellus
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,497,504	2,182,396	2,455,661	2,186,695	1,842,386	1,065,374	536,467	397,256	386,163	385,736	446,925	842,138	10,164,642	4,060,059	14,224,701	139,327
Refill	Underground Storage	81,928	0	0	0	0	312,629	333,858	325,040	335,452	335,108	325,087	0	81,928	1,967,174	2,049,102	0
	LNG	2,845	2,940	61,312	27,112	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	92,074	1,384	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,582,277	2,185,336	2,609,047	2,215,191	1,848,176	1,378,003	891,314	732,823	724,560	723,789	774,862	845,083	10,440,027	6,070,434	16,510,461	148,934
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	121,106	125,143	125,143	117,069	125,143	58,747	3,653	0	0	0	0	2,698	613,604	65,098	678,702	4,037
	Niagara Supply	93,660	93,660	65,562	73,829	68,296	41,909	0	0	0	0	0	0	395,007	41,909	436,916	3,122
	Dracut Baseload	0	768,102	768,103	718,547	0	0	0	0	0	0	0	0	2,254,752	0	2,254,752	24,778
	Dracut Swing	887,125	59,629	11,797	80,280	1,150,183	927,857	525,281	391,166	380,118	379,598	440,415	830,792	2,189,014	3,875,227	6,064,241	11,797
	Gulf Supply	340,486	359,356	359,476	331,299	359,476	323,971	333,858	325,040	335,452	335,108	325,087	0	1,750,093	1,978,516	3,728,609	11,596
	Storage	24,876	475,479	770,407	675,148	53,808	0	0	0	0	0	0	0	1,999,718	0	1,999,718	28,115
Marcellus Shale		102,043	288,726	165,093	153,037	74,232	16,878	0	0	0	0	0	0	783,131	16,878	800,009	10,000
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	61,312	27,112	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From	Storage	2,845	2,940	67,840	27,112	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	111,267	1,384	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	92,074	1,384	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,582,276	2,185,337	2,609,048	2,215,191	1,848,176	1,378,002	891,314	732,823	724,560	723,789	774,862	845,084	10,440,028	6,070,434	16,510,462	148,934

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2012-13: Resource Mix DSM with Marcellus
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,511,676	2,197,766	2,471,373	2,115,103	1,857,346	1,079,007	549,705	409,649	398,878	398,471	459,496	855,868	10,153,264	4,151,074	14,304,338	139,900
Refill	Underground Storage	82,991	0	0	0	0	312,337	333,878	325,005	335,427	335,517	324,709	0	82,991	1,966,873	2,049,864	0
	LNG	2,845	2,940	63,405	25,019	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,215	7,978	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,597,512	2,200,706	2,628,236	2,140,122	1,863,136	1,391,344	904,271	745,482	737,250	736,933	787,055	858,813	10,429,712	6,161,148	16,590,860	149,507
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	121,106	125,143	125,143	113,032	125,143	15,032	0	0	0	0	0	3,175	609,567	18,207	627,774	4,037
	Niagara Supply	93,660	93,995	65,562	66,224	25,769	8,027	0	0	0	0	0	0	345,210	8,027	353,237	3,122
	Dracut Baseload	0	768,102	768,103	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	898,799	64,301	15,034	81,273	1,402,164	1,018,086	542,172	403,559	392,833	392,333	452,986	844,043	2,461,571	4,046,012	6,507,583	12,371
	Gulf Supply	340,391	359,476	359,476	320,628	160,869	323,933	333,878	325,005	335,427	335,517	324,709	0	1,540,840	1,978,469	3,519,309	11,596
	Storage	26,425	483,834	775,209	658,209	56,525	260	0	0	0	0	0	0	2,000,202	260	2,000,462	28,115
Marcellus Shale		104,151	290,612	169,288	148,268	75,629	17,365	0	0	0	0	0	0	787,948	17,365	805,313	10,000
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	63,405	25,019	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	69,933	25,019	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,215	7,978	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,597,512	2,200,705	2,628,236	2,140,122	1,863,137	1,391,343	904,271	745,482	737,250	736,933	787,055	858,812	10,429,712	6,161,146	16,590,858	149,507

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2013-14: Resource Mix DSM with Marcellus
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,533,087	2,222,816	2,497,780	2,138,340	1,880,755	1,098,261	566,184	423,854	413,162	412,848	474,429	874,309	10,272,778	4,263,047	14,535,825	141,023
Refill	Underground Storage	84,837	0	0	0	0	312,080	334,713	324,630	335,944	335,610	323,969	15,599	84,837	1,982,545	2,067,382	0
	LNG	2,845	2,940	67,778	20,646	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,620,769	2,225,756	2,659,016	2,158,986	1,886,545	1,410,341	921,886	759,011	752,051	751,403	801,248	892,853	10,551,072	6,288,793	16,839,865	150,630
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	121,106	125,143	125,143	113,032	62,854	15,863	0	0	0	0	0	3,910	547,278	19,773	567,051	4,037
	Niagara Supply	15,610	94,638	65,562	80,377	26,568	8,762	0	0	0	0	0	0	282,755	8,762	291,517	3,122
	Dracut Baseload	0	768,103	768,102	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,777
	Dracut Swing	1,222,703	72,820	23,657	98,082	1,475,490	1,034,120	558,651	417,764	407,117	406,710	467,919	861,750	2,892,752	4,154,031	7,046,783	13,494
	Gulf Supply	186,317	359,476	359,476	321,978	165,380	323,676	334,713	324,630	335,944	335,610	323,969	15,599	1,392,627	1,994,141	3,386,768	11,596
	Storage	29,101	496,978	782,656	645,762	61,920	1,143	0	0	0	0	0	0	2,016,417	1,143	2,017,560	28,115
Marcellus Shale		32,951	293,356	175,253	156,012	77,294	18,137	0	0	0	0	0	0	734,866	18,137	753,003	10,000
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	67,778	20,646	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	74,306	20,646	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,620,768	2,225,756	2,659,016	2,158,985	1,886,544	1,410,341	921,886	759,011	752,051	751,403	801,248	892,853	10,551,069	6,288,793	16,839,862	150,630

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2014-15: Resource Mix DSM with Marcellus
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,554,944	2,248,875	2,525,467	2,162,613	1,904,867	1,117,553	582,056	437,131	426,409	426,205	488,575	892,516	10,396,766	4,370,445	14,767,211	142,237
Refill	Underground Storage	86,786	0	0	0	0	312,631	334,649	325,107	335,944	334,146	324,585	0	86,786	1,967,062	2,053,848	0
	LNG	2,845	2,940	72,533	15,891	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,644,575	2,251,815	2,691,458	2,178,504	1,910,657	1,430,184	937,694	772,765	765,298	763,296	816,010	895,461	10,677,009	6,380,708	17,057,717	151,844
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	108,292	125,143	125,143	113,032	64,000	16,940	0	0	0	0	0	4,037	535,610	20,977	556,587	4,037
	Niagara Supply	16,388	95,282	65,562	81,228	27,398	9,742	0	0	0	0	0	627	285,858	10,369	296,227	3,122
	Dracut Baseload	0	768,103	768,103	693,769	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	1,248,795	82,307	32,830	111,712	1,485,551	1,049,502	574,523	431,041	420,364	420,067	482,065	879,203	2,961,195	4,256,765	7,217,960	14,707
	Gulf Supply	191,598	359,476	359,476	323,158	170,024	324,227	334,649	325,107	335,944	334,146	324,585	0	1,403,732	1,978,658	3,382,390	11,596
	Storage	31,921	510,755	790,318	601,470	67,820	2,071	0	0	0	0	0	0	2,002,284	2,071	2,004,355	28,115
Marcellus Shale		34,601	295,508	181,350	213,671	78,826	19,062	0	0	0	0	0	0	803,956	19,062	823,018	10,000
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	72,533	15,891	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	79,061	15,891	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	10,528
Propane	Vapor	0	0	112,651	0	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	93,458	0	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,644,575	2,251,816	2,691,459	2,178,502	1,910,657	1,430,184	937,694	772,765	765,298	763,296	816,010	895,461	10,677,009	6,380,708	17,057,717	151,844

Resource and Requirements Tables: Section IV

Cold Snap Base Case Demand
No DSM

COMPARISON OF RESOURCES AND REQUIREMENTS
Cold Snap 2010-11: No DSM
(MMBtu)

REQUIREMENTS		11/2010	12/2010	01/2011	02/2011	03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,375,552	2,008,471	2,244,772	2,075,268	1,693,874	980,458	506,833	387,852	379,510	378,838	429,319	778,498	9,397,937	3,841,308	13,239,245	113,684
Refill	Underground Storage	78,020	0	0	0	0	429,405	525,795	258,770	277,107	0	0	0	78,020	1,491,077	1,569,097	0
	LNG	2,845	2,940	50,305	38,119	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	26,558	53,326	0	0	11,516	7,677	0	0	0	0	79,884	19,193	99,077	0
Total Requirements		1,456,417	2,011,411	2,321,635	2,166,713	1,699,664	1,409,863	1,053,617	657,149	659,562	381,783	432,169	781,443	9,655,840	5,375,586	15,031,426	117,684
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	124,000	112,000	124,000	43,072	0	0	0	0	0	33,134	604,000	76,206	680,206	4,000
	Niagara Supply	93,660	71,806	29,272	24,083	12,345	27,397	0	0	0	0	0	13,860	231,166	41,257	272,423	3,122
	Dracut Baseload	0	768,103	768,103	693,770	0	0	0	0	**0**	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	582,205	11,306	0	75,018	853,611	714,247	394,419	10,500	**0**	372,700	422,809	722,855	1,522,141	2,637,530	4,159,671	0
	Gulf Supply	640,840	638,908	619,356	541,446	669,476	616,507	630,676	630,032	650,572	0	0	0	3,110,026	2,527,787	5,637,813	21,596
	Storage	6,732	382,045	598,462	520,847	23,193	0	0	0	0	0	0	0	1,531,279	0	1,531,279	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	50,305	38,119	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	56,833	38,119	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	4,000
Propane	Vapor	0	0	37,773	61,305	0	0	0	0	0	0	0	0	99,078	0	99,078	27,720
	Truck	0	0	26,558	53,326	0	0	11,516	7,677	0	0	0	0	79,884	19,193	99,077	0
Total Resources		1,456,417	2,011,410	2,321,636	2,166,713	1,699,663	1,409,863	1,053,617	657,149	659,562	381,783	432,169	781,443	9,655,839	5,375,586	15,031,425	117,685

COMPARISON OF RESOURCES AND REQUIREMENTS
Cold Snap 2011-12: No DSM
(MMBtu)

REQUIREMENTS		11/2011	12/2011	01/2012	02/2012	03/2012	04/2012	05/2012	06/2012	07/2012	08/2012	09/2012	10/2012	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,410,616	2,051,533	2,290,903	2,198,884	1,733,095	1,010,459	529,831	406,010	397,369	396,909	449,189	806,093	9,685,031	3,995,860	13,680,891	115,684
Refill	Underground Storage	78,020	0	0	0	0	486,080	525,795	489,383	497,643	206,120	0	0	78,020	2,205,021	2,283,041	0
	LNG	2,845	2,940	49,692	38,732	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	54,206	39,252	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,491,481	2,054,473	2,394,801	2,276,868	1,738,885	1,496,539	1,076,615	905,920	897,957	605,974	452,039	809,038	9,956,508	6,244,082	16,200,590	125,291
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,990	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,924	29,275	74,199	354
TGP	AES-Londonderry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dawn Supply	120,000	124,000	96,322	94,883	124,000	45,931	0	0	0	0	0	179	559,205	46,110	605,315	4,000
	Niagara Supply	93,660	19,162	32,199	33,904	24,976	30,454	0	0	0	0	0	0	203,901	30,454	234,355	3,122
	Dracut Baseload	0	768,103	768,103	718,548	0	0	0	0	0	0	0	0	2,254,753	0	2,254,753	24,778
	Dracut Swing	614,066	18,223	0	95,936	763,404	799,323	417,417	277,210	255,742	390,771	442,679	797,265	1,491,630	3,380,407	4,872,037	0
	Gulf Supply	640,840	588,558	434,542	430,875	669,476	612,190	630,676	612,093	633,225	206,120	0	0	2,764,291	2,694,304	5,458,595	21,596
	Storage	9,935	521,186	838,338	718,569	139,991	0	0	0	0	0	0	0	2,228,019	0	2,228,019	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	49,692	38,732	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	56,220	38,732	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	8,522
Propane	Vapor	0	0	54,206	58,446	0	0	0	0	0	0	0	0	112,652	0	112,652	25,198
	Truck	0	0	54,206	39,252	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,491,481	2,054,474	2,394,802	2,276,867	1,738,885	1,496,538	1,076,615	905,920	897,957	605,974	452,039	809,038	9,956,509	6,244,081	16,200,590	125,292

COMPARISON OF RESOURCES AND REQUIREMENTS
Cold Snap 2012-13: No DSM
(MMBtu)

REQUIREMENTS		11/2012	12/2012	01/2013	02/2013	03/2013	04/2013	05/2013	06/2013	07/2013	08/2013	09/2013	10/2013	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,446,474	2,095,082	2,337,368	2,159,053	1,772,987	1,041,502	554,306	425,817	416,982	416,720	470,616	834,932	9,810,964	4,160,875	13,971,839	117,669
Refill	Underground Storage	78,020	0	0	0	0	492,176	525,795	508,834	497,643	60,136	0	0	78,020	2,084,584	2,162,604	0
	LNG	2,845	2,940	49,482	38,942	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	65,955	27,503	0	0	7,677	11,516	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,527,339	2,098,022	2,452,805	2,225,498	1,778,777	1,533,678	1,097,251	949,017	917,570	479,801	473,466	837,877	10,082,441	6,288,660	16,371,101	127,276
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	345	0	0	0	0	0	0	0	0	345	0	345	0
	Dawn Supply	120,000	124,000	118,688	112,000	123,936	8,000	0	0	0	0	0	1,429	598,624	9,429	608,053	4,000
	Niagara Supply	93,660	24,356	34,062	31,900	9,366	5,755	0	0	0	0	0	0	193,344	5,755	199,099	3,122
	Dracut Baseload	0	768,102	768,103	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	646,710	26,877	0	124,692	1,337,111	992,038	546,773	419,727	410,937	410,582	464,106	824,854	2,135,390	4,069,017	6,204,407	0
	Gulf Supply	640,840	597,187	451,784	421,093	248,975	519,245	525,795	508,834	497,643	60,136	0	0	2,359,879	2,111,653	4,471,532	21,596
	Storage	13,149	542,258	826,185	686,543	42,351	0	0	0	0	0	0	0	2,110,486	0	2,110,486	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	49,482	38,942	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	56,010	38,942	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	705
Propane	Vapor	0	0	71,563	41,088	0	0	0	0	0	0	0	0	112,651	0	112,651	35,000
	Truck	0	0	65,955	27,503	0	0	7,677	11,516	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,527,339	2,098,022	2,452,806	2,225,498	1,778,777	1,533,678	1,097,251	949,017	917,570	479,801	473,466	837,877	10,082,442	6,288,660	16,371,102	127,277

COMPARISON OF RESOURCES AND REQUIREMENTS
Cold Snap 2013-14: No DSM
(MMBtu)

REQUIREMENTS		11/2013	12/2013	01/2014	02/2014	03/2014	04/2014	05/2014	06/2014	07/2014	08/2014	09/2014	10/2014	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,480,227	2,136,209	2,381,307	2,198,800	1,810,597	1,070,632	577,089	444,121	435,072	435,004	490,484	861,916	10,007,140	4,314,318	14,321,458	119,555
Refill	Underground Storage	78,283	0	0	0	0	490,946	525,795	508,834	497,643	68,679	0	0	78,283	2,091,897	2,170,180	0
	LNG	2,845	2,940	57,092	31,332	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	72,386	21,072	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,561,355	2,139,149	2,510,785	2,251,204	1,816,387	1,561,578	1,123,873	963,482	935,660	506,628	493,334	864,861	10,278,880	6,449,416	16,728,296	129,162
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	4,383	0	0	0	0	0	0	0	0	4,383	0	4,383	0
	Dawn Supply	120,000	124,000	124,000	107,752	57,492	8,708	0	0	0	0	0	2,608	533,244	11,316	544,560	4,000
	Niagara Supply	9,366	65,645	36,132	35,308	9,380	6,244	0	0	0	0	0	0	155,831	6,244	162,075	3,122
	Dracut Baseload	0	768,102	768,103	693,770	0	0	0	0	0	0	0	0	2,229,975	0	2,229,975	24,778
	Dracut Swing	1,200,921	37,606	9,305	145,039	1,426,342	1,016,111	569,556	438,031	429,027	428,866	483,974	850,659	2,819,213	4,216,224	7,035,437	0
	Gulf Supply	200,969	605,155	468,097	433,901	255,835	521,875	525,795	508,834	497,643	68,679	0	0	1,963,957	2,122,826	4,086,783	21,596
	Storage	17,118	523,398	828,690	698,370	50,300	0	0	0	0	0	0	0	2,117,876	0	2,117,876	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	57,092	31,332	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	63,620	31,332	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	4,000
Propane	Vapor	0	0	72,386	40,265	0	0	0	0	0	0	0	0	112,651	0	112,651	33,591
	Truck	0	0	72,386	21,072	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,561,354	2,139,148	2,510,785	2,251,204	1,816,387	1,561,578	1,123,873	963,482	935,660	506,628	493,334	864,861	10,278,878	6,449,416	16,728,294	129,163

COMPARISON OF RESOURCES AND REQUIREMENTS
Cold Snap 2014-15: No DSM
(MMBtu)

REQUIREMENTS		11/2014	12/2014	01/2015	02/2015	03/2015	04/2015	05/2015	06/2015	07/2015	08/2015	09/2015	10/2015	Heating Season (Nov-Mar)	Non-Heating Season (Apr-Oct)	TOTAL	Peak Day
Firm Sendout		1,514,321	2,178,193	2,426,325	2,239,533	1,848,779	1,099,712	599,236	461,490	452,124	452,265	509,551	888,606	10,207,151	4,462,984	14,670,135	121,513
Refill	Underground Storage	79,909	0	0	0	0	489,114	525,795	508,834	497,643	99,369	0	0	79,909	2,120,755	2,200,664	0
	LNG	2,845	2,940	57,092	31,332	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
	Propane	0	0	68,363	25,095	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Requirements		1,597,075	2,181,133	2,551,780	2,295,960	1,854,569	1,588,826	1,146,020	980,851	952,712	554,579	512,401	891,551	10,480,517	6,626,940	17,107,457	131,120
RESOURCES																	
PNGTS		7,290	9,362	10,974	8,680	8,308	5,790	4,588	3,240	3,100	3,193	3,660	5,704	44,614	29,275	73,889	354
TGP	AES-Londonderry	0	0	0	8,589	0	0	0	0	0	0	0	0	8,589	0	8,589	0
	Dawn Supply	107,236	124,000	124,000	112,000	60,517	10,046	0	0	0	0	0	3,801	527,753	13,847	541,600	4,000
	Niagara Supply	9,366	71,361	40,357	41,182	11,417	6,244	0	0	0	0	0	0	173,683	6,244	179,927	3,122
	Dracut Baseload	0	768,103	768,102	693,771	0	0	0	0	0	0	0	0	2,229,976	0	2,229,976	24,778
	Dracut Swing	1,234,128	50,945	31,925	155,816	1,443,031	1,040,047	591,703	455,400	446,079	446,127	503,041	876,156	2,915,845	4,358,553	7,274,398	5,222
	Gulf Supply	211,622	613,209	483,249	451,068	263,495	523,849	525,795	508,834	497,643	99,369	0	0	2,022,643	2,155,490	4,178,133	21,596
	Storage	21,741	538,273	835,735	692,807	59,071	0	0	0	0	0	0	0	2,147,627	0	2,147,627	28,115
Other Purchased Resources		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CityGate	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMAC	Liquid	2,845	2,940	57,092	31,332	5,790	0	9,473	2,850	2,945	2,945	2,850	2,945	99,999	24,008	124,007	4,000
LNG From Storage		2,845	2,940	63,620	31,332	2,940	2,850	2,945	2,850	2,945	2,945	2,850	2,945	103,677	20,330	124,007	95
Propane	Vapor	0	0	68,363	44,288	0	0	0	0	0	0	0	0	112,651	0	112,651	34,231
	Truck	0	0	68,363	25,095	0	0	11,516	7,677	0	0	0	0	93,458	19,193	112,651	5,607
Total Resources		1,597,073	2,181,133	2,551,780	2,295,960	1,854,569	1,588,826	1,146,020	980,851	952,712	554,579	512,401	891,551	10,480,515	6,626,940	17,107,455	131,120