D.P.U. 93-196 (Phase I)

Investigation by the Department of Public Utilities of the Braintree Electric Light Department Long Range Forecast of Electric Power Needs and Requirements.

APPEARANCES: Kenneth M. Barna, Esq.
Robert D. Shapiro, Esq.
Rubin and Rudman
50 Rowes Wharf
Boston, MA 02110
FOR: Braintree Electric Light Department
Petitioner

Table of Contents

I. INTRODUCTION . . . . . Page 1
- A. Background . . . . . Page 1
- B. Procedural History . . . . . Page 2

II. DEMAND FORECAST REVIEW . . . . . Page 4
- A. Standard of Review . . . . . Page 4
- B. Previous Demand Forecast Review . . . . . Page 4
- C. Energy Forecast . . . . . Page 6
  - 1. Methodology . . . . . Page 6
    - a. The Company's Proposal . . . . . Page 6
    - b. Analysis and Findings . . . . . Page 7
  - 2. Economic and Demographic Forecast . . . . . Page 8
    - a. The Company's Proposal . . . . . Page 8
    - b. Analysis and Findings . . . . . Page 10
  - 3. Electricity Price Forecast . . . . . Page 11
    - a. The Company's Proposal . . . . . Page 11
    - b. Analysis and Findings . . . . . Page 13
    - c. Compliance with Condition One of EFSC 89-32 . . . . . Page 13
  - 4. Residential Energy Forecast . . . . . Page 14
    - a. The Company's Proposal . . . . . Page 14
    - b. Analysis and Findings . . . . . Page 15
    - c. Compliance with Condition Two of EFSC 89-32 . . . . . Page 16
  - 5. Commercial Energy Forecast . . . . . Page 17
    - a. Small Commercial Forecast . . . . . Page 18
      - i. The Company's Proposal . . . . . Page 18
      - ii. Analysis and Findings . . . . . Page 19
    - b. Commercial Heating and Cooling Forecast . . . . . Page 19
      - i. The Company's Proposal . . . . . Page 19
      - ii. Analysis and Findings . . . . . Page 20
    - c. Large Commercial Forecast . . . . . Page 21
      - i. The Company's Proposal . . . . . Page 21
      - ii. Analysis and Findings . . . . . Page 23
    - d. Conclusions on the Commercial Energy Forecast . . . . . Page 23
  - 6. Industrial Forecast . . . . . Page 24
    - a. The Company's Proposal . . . . . Page 24
    - b. Analysis and Findings . . . . . Page 25
    - c. Compliance with Condition Three of EFSC 89-32 . . . . . Page 26
  - 7. Other Energy Forecasts . . . . . Page 27
    - a. The Company's Proposal . . . . . Page 27
      - i. Streetlighting . . . . . Page 27
      - ii. System Losses . . . . . Page 28
      - iii. Internal Use . . . . . Page 29

b. Analysis and Findings . . . . . Page 29
c. Compliance with Conditions Four and Five of EFSC 89-32 Page 30
8. Conclusions on the Energy Forecast . . . . . Page 31

III. PEAK DEMAND FORECAST . . . . . Page 31
A. The Company's Proposal . . . . . Page 31
B. Analysis and Findings . . . . . Page 33
C. Compliance with Conditions Six and Seven of EFSC 89-32 . . . . . Page 34

IV. CONCLUSIONS ON THE DEMAND FORECAST . . . . . Page 36

V. DECISION . . . . . Page 37

TABLE

I. INTRODUCTION

A. Background

Braintree Electric Light Department ("BELD" or "Company") is a municipally-owned electric utility serving the town of Braintree. The Company serves approximately 13,500 retail customers (Exh. BELD-1, at 9). In 1993, the Company sold approximately 355,474 megawatthours ("MWH") of electricity (Exh. DPU-34, at 37). Additionally, in 1993 the Company experienced a summer system peak of about 74.5 megawatts ("MW") and a winter system peak of about 65 MW (id. at 57).

BELD owns and operates a two-unit generating station, the Potter station (Exh. BELD-1, at 9). The station consists of one 2.25 MW diesel unit which operates in a peaking mode, and one 96 MW winter rating dual-fueled (oil and natural gas) combined cycle unit[1] which operates in an intermediate mode under the dispatch of the New England Power Exchange (id.). The Company has other power supply arrangements which are discussed in the supply plan portion of this docket (Phase II).

On January 24, 1992, the Energy Facilities Siting Council ("Siting Council") issued a decision in Braintree Electric Light Department, 24 DOMSC 1 (1992) ("1992 BELD Decision").[2] In the 1992 BELD Decision, the Siting Council approved BELD's 1989 demand forecast, and

---

[1] The combined cycle unit was converted to fire natural gas effective June 19, 1990 (Exh. BELD-1).

[2] The Siting Council's review of the BELD's 1989 Demand forecast and supply plan was the second independent supply plan and its first independent demand forecast to be reviewed by the Siting Council. 1992 BELD Decision at 2. Previously, BELD had been a member of the Massachusetts Municipal Wholesale Electric Company. Id.

rejected BELD's 1989 supply plan. Id. As part of its approval of BELD's demand forecast, the Siting Council issued seven directives relative to that demand forecast. The Company's compliance with these directives is discussed below.

Effective September 1, 1992, pursuant to legislation reorganizing the Department of Public Utilities ("Department") to include the functions of the Energy Facilities Siting Council, the Siting Council and the Department were merged.[3] As a result of the merger, the Department assumed the function of reviewing long-range plans of electric and gas companies. This proceeding represents the first Department review of BELD's demand forecast.

B. Procedural History

On January 24, 1992, the Energy Facilities Siting Council issued a decision approving BELD's demand forecast, rejecting BELD's supply plan, and establishing February 1, 1993 as the date of BELD's next demand forecast and supply plan filing. 1992 BELD Decision at 4, 72. On January 26, 1993, BELD requested an extension until August 1, 1993 to file its next demand forecast and supply plan. On February 8, 1993, the Department granted BELD's request. On July 20, 1993, BELD requested an additional three month extension of time to file. On August 11, 1993, the Department granted a further extension of time to file until October 31, 1993. On November 4, 1993, the Company submitted to the Department its 1993 Demand Forecast.

In its transmittal letter, BELD indicated that it anticipated submitting its supply plan filing at the conclusion of negotiations regarding energy supply resources which were part of the Company's long term resource plan.[4] On March 25, 1994, the Hearing Officer notified the

---

[3] St. 1992, c. 141.

Company that the Department would proceed in this docket in two phases. Phase I consists of a review of BELD's demand forecast, and is the subject of this Order. Phase II will consist of a review of BELD's supply plan, which will be considered at a later date.[5]

On March 28, 1994, the Department issued a Notice of Adjudication. BELD subsequently submitted proof of publication. The Notice set an intervention deadline of April 25, 1994. No petitions to intervene or participate in the proceeding were received by the Department.

During the course of discovery, BELD notified the Department that it had identified a need for a technical correction in its demand forecast filing. On May 6, 1994, BELD submitted a revised demand forecast.

On June 23, 1994, the Department conducted an evidentiary hearing. BELD presented three witnesses: Mayhew D. Seavy and Mark J. Cordeiro, consultants with PLM, Inc., and Laurie Pitts, energy services manager for BELD. The evidentiary record includes: one exhibit submitted by the Company, 38 exhibits submitted by the Department, and the Company's responses to three Department record requests. On July 26, 1994, BELD submitted its brief ("Company Brief").

---

[4] These negotiations related to Braintree's 1987 contract for power from the Newbay coal project in Rhode Island, and an alternative supply offered by New England Power Company ("NEP"). On May 2, 1994, the Department approved a March 18, 1994 Offer of Settlement by eleven municipal light departments (including BELD) and Newbay Corporation. Newbay Corporation, et al., D.P.U. 88-265-A (1994). The Settlement terminated BELD's purchase power contract for 6 MW of power from Newbay, and included a 2 MW purchase from NEP.

[5] BELD filed its supply plan with the Department on May 27, 1994.

II. DEMAND FORECAST REVIEW

A. Standard of Review

The regulations set out the specific filing requirements for electric company forecasts, and set out the basis for review of such forecasts. See 980 C.M R. § 7.03. The Department will evaluate forecasts by applying three criteria. First, a demand forecast is reviewable if it contains enough information to allow a full understanding of the forecasting methodology. Second, a forecast is appropriate if the methodology used to produce the forecast is technically suitable to the size and nature of the utility that produced it. Finally, a forecast is reliable if the methodology provides a measure of confidence that its data, assumptions, and judgments produce a forecast of what is most likely to occur. Eastern Utilities Associates Systems, D.P.U. 92-214 (1993); 1992 BELD Decision; Nantucket Electric Company, 21 DOMSC 208 (1991) ("1991 Nantucket Decision"); Massachusetts Municipal Wholesale Electric Company, 20 DOMSC 1 (1990) ("1990 MMWEC Decision").

B. Previous Demand Forecast Review

In BELD's previous demand forecast, EFSC 89-32, the Siting Council directed BELD to:

(1) either (a) provide and use actual annual historic costs for power supply and non-power supply costs as the basis for future costs, or (b) provide an analysis justifying BELD's current methodology, which uses historic averages, a four percent rate of return adjustment, and assumed constant non-power supply costs when forecasting electricity price;

(2) initiate and complete a study of the heating usage of residential electric heating customers, which will assist the Light Department in developing a comprehensive understanding of electric heating usage in its service territory, and commence a process designed to identify BELD's residential customers with electric heat in compliance with Siting Council regulations;

(3) (a) examine alternate methodologies for forecasting MBTA usage; (b) develop a schedule for implementation based on that examination; and (c) develop a reasonable set of criteria for identifying those customers whose patterns of energy consumption suit them for inclusion in the industrial forecast, and include all those customers, and only those customers, in future industrial class forecasts;

(4) identify and analyze the key variables that affect streetlighting usage, and incorporate the results of that identification and analysis into its streetlighting forecast methodology;

(5) provide a description and analysis of its forecasting methodology for energy requirements due to losses and internal use;

(6) develop and present an analysis of alternative peak load forecasting methodologies, which should at least include a summary of: (a) a comparison of the strengths and weaknesses of BELD's present methodology and alternative methodologies; (b) a comparison of the level of disaggregation achieved by each alternative methodology; and (c) a comparison of the manner in which each alternative methodology incorporates the major factors which affect peak load;

(7) provide tests of the sensitivity of its energy and peak-load forecasts to one or more major underlying assumption(s) or parameter(s) of each of those forecasts.

The Company's compliance with each of these seven directives is addressed in the appropriate sections below.

C. Energy Forecast

1. Methodology

a. The Company's Proposal

For the forecast period, BELD estimates average compound growth in energy requirements of 1.98 percent and annual peak demand growth of 1.93 percent (Exh. BELD-1, at 10). See Table 1 (attached) for annual energy requirements, summer and winter peaks, and annual growth rates. BELD stated that it has continued to employ an econometric methodology to develop a linear multiple regression model[6] to forecast energy requirements (id. at 3). BELD

developed separate forecasts for each class[7] utilizing independent variables which are, according to BELD, most likely to forecast accurately the usage behavior in the respective class (id. at 8).

BELD maintains that an econometric methodology, as opposed to end-use modeling, is appropriate for a company of BELD's size and resources (Company Brief at 18). BELD stated that end-use modeling is, in effect, an econometric modeling technique with a much higher level of disaggregation (Tr. at 64). The Company further argues that, for a small utility where the level of disaggregation is already beginning to "push the limits" of the statistics in terms of the customer base, an end-use methodology would produce results which are statistically inferior to aggregating those end-uses by customer class (id. at 64-65). The Company further requests that if the Department wishes to explore the costs and benefits of end-use forecasting for a company of BELD's size and resources, that such an investigation be conducted in the course of BELD's next demand forecast review and that BELD be placed on notice of any such investigation (Company Brief at 18).

---

6 A regression analysis is used to forecast energy demand based upon historical relationships. The analysis involves the construction of an equation in which the value of a dependent variable (e.g., energy demand), is "predicted" by several independent variables (e.g., real per capita income, nominal per capita income, cooling degree days, heating degree days) for each "observation" (e.g., real per capita income in a particular year). The result of a regression analysis is a set of estimates of the influence of each independent variable (as represented by the "coefficients" of the independent variables) on the dependent variable. The extent to which the dependent variable is accurately predicted by the regression equation and is therefore useful for forecasting is commonly represented by two statistics: (1) the coefficient of determination, which indicates the extent to which the variation in the dependent variable is explained by the regression equation; and (2) a confidence interval for each independent variable, which suggests the probability that the independent variable truly affects the dependent variable.

7 The six customer classes are residential, small commercial, commercial heating and cooling, large commercial, industrial, and streetlighting (Exh. BELD-1, at 10).

b. Analysis and Findings

In order to approve a company's forecasting methodology as appropriate, the methodology must be technically suitable to the size and nature of the utility that produced it. While the Department finds regression analysis to be acceptable in certain circumstances, the Department notes that this methodology assumes that the historical relationship between the dependent and independent variables will remain constant. The Department has previously found that one of the limitations of an econometric forecasting methodology is its inability to rapidly incorporate exogenous influences such as the unanticipated loss of customers or government mandated efficiency standards.[8] See Fitchburg Gas and Electric Light Company, 24 DOMSC 322, 339 (1992) ("1992 Fitchburg Decision"); 1992 BELD Decision at 19. The Department notes that another electric company smaller than BELD has utilized an end-use forecast methodology. Nantucket Electric Company's most recent forecast was based on end-use modeling. Nantucket Electric Company, D.P.U. 93-137 (1994). However, the Department also notes that it has previously found econometric forecasts to be acceptable for similarly-sized electric companies. See 1992 Fitchburg Decision; 1992 BELD Decision.

The Department finds that the econometric methodology utilized by the Company is acceptable, because it is consistent with the methodology utilized by similarly-sized utilities, and with the 1992 BELD Decision. However, the Company should compare its forecasts and

---

[8] The Company stated that it would consider explicitly incorporating market forces such as the loss of customers in developing its forecasting methodology for its next forecast (Tr. at 112).

methodologies with actual sales and make adjustments to its forecast and methodology as necessary and appropriate to improve forecast accuracy.

2. Economic and Demographic Forecast

a. The Company's Proposal

BELD's economic and demographic forecasts relied primarily on econometric techniques and independent sources of data.

The "number of residential customers" was projected with an econometric equation utilizing the number of households for Norfolk County[9] as an independent variable (Exh. BELD-1, at 20).[10] The data on households for Norfolk County was obtained from the May 26, 1993 long range forecast published by Data Resources, Inc. ("DRI forecast") (id.). This equation has a coefficient of determination equal to 94 percent and the confidence interval for the independent variable is 99.5 percent (id. at 26). The forecast growth for the number of residential customers is 0.6 percent (id.).

The number of "small commercial customers" was projected with an econometric equation utilizing the number of residential customers (id. at 32). The data for residential customers was obtained from BELD's forecast of residential customers described above plus an adjustment (Exh. DPU-31).[11] This equation has a coefficient of determination equal to 91.8 percent and the

---

9 BELD also tested other population data for Norfolk County as well as the Boston metropolitan area (Exh. BELD-1, at 22). However, the Company rejected these inputs due to either inferior statistics or the presence of serial correlation (id.).

10 BELD stated that its source for historical data for the number of residential and small commercial customers was its own customer records for the base period 1982-1992 (Exhs. DPU-2; BELD-1, at 22, 32).

confidence interval for the independent variable is 99.5 percent (Exh. BELD-1, at 36). The forecast growth for the number of small commercial customers is 2.8 percent (id.).

BELD obtained actual cooling degree days ("CDD") and heating degree days ("HDD") for the base period from the Blue Hills Observatory in Canton, Massachusetts (Exhs. DPU-2; BELD-1, at 23, 42, 52). BELD stated that it has installed its own weather station at the Potter Two generating facility and is currently collecting its own weather data[12] (Tr. at 9). Projected CDD and HDD for the forecast period are the average for the 41-year period and 47-year period, respectively, over which records have been kept (Exh. BELD-1, at 23, 42, 52).

All other data, including economic data, come from the DRI forecast (Exh. DPU-2; Tr. at 16). The Company states that the DRI forecast is a base case forecast and that high and low growth scenarios were not available for the data which BELD was using (Tr. at 25-26). Alternatively, BELD developed its own sensitivity analysis by applying a bandwidth of one percent on the annual growth rates of all of the independent variables for the models selected (id. at 26). These adjusted inputs were applied to the models and the overall impact on sales projections was determined (id.).

---

[11] The adjustment equals an additional 24 customers (Exh. DPU-31). This adjustment reflects the amount by which the actual number of 1992 customers exceeded the forecasted number of 1992 customers (id.).

[12] BELD stated that it is attempting to correlate its weather data from the Potter Two station with weather data from the Blue Hills Observatory (Tr. at 70-71). BELD expects to be able to extrapolate the Potter Two weather data back five years based on the accumulated Blue Hills weather information and the correlation between Potter Two and Blue Hills weather data (id. at 69-70).

b. Analysis and Findings

The record indicates that BELD used a regression analysis to forecast both the residential customer and small commercial customer populations and that the statistics for these equations indicate that the independent variables are significant and that the equations are able to explain most of the variation in the dependant variables. In addition, the Department has previously accepted this methodology for forecasting the residential customer population. 1992 BELD Decision at 18. For these reasons, the Department accepts BELD's estimates of the residential and small commercial populations.

The Department further notes that it has previously found the use of weather data from the Blue Hills Observatory in Canton, Massachusetts to be appropriate and reliable. Id. The Department, therefore, finds the weather data derived from the Blue Hills Observatory to be acceptable in the instant case.

The record indicates that BELD utilized several sources to obtain data necessary to calculate the appropriate regression equations and for input to estimate future demand. The Department notes that it has previously accepted the use of economic data forecasted by DRI. Id.

Based on the foregoing, the Department accepts BELD's economic and demographic forecast.

3. Electricity Price Forecast

a. The Company's Proposal

In order to compute the future price of electricity, BELD stated that it utilized a "Revenue Requirements Model" to estimate production costs other than power supply costs (Exh. BELD-1,

at 11). The Revenue Requirements Model consisted of a detailed financial projection using a three-year historic period as a base (id.).[13] BELD performed the following financial projections: (1) operating expenses were determined by escalating historic values at the forecast rate of inflation; (2) plant-in-service was projected using BELD's current capital budget and historic averages of normal additions by plant type; (3) depreciation expense and return on investment were projected based on BELD's policies; and (4) debt service was included based on actual debt service schedules (id.). These projected costs were then allocated to each of BELD's customer classes on the basis of a set of demand, energy, and customer allocation factors (id.).

The foregoing revenue requirements were then combined with projected power supply costs to develop the initial electricity price projection (Company Brief at 15). BELD used this forecast to develop its least-cost resource plan (id.). The revenue requirements of the ensuing least-cost resource plan were then used to calculate a revised electricity price projection (id.). However, BELD stated that it omitted the costs associated with least-cost Demand Side Management ("DSM") measures[14] and the purchase of two megawatts ("MW") of system power from New England Power Company ("NEP")[15] from its revised projection (Tr. at 32-34). BELD

---

13 The Company used actual historic costs for the three-year base period 1990-1992 (Exhs. DPU-4; BELD-1, at 13).

14 BELD stated that the costs of DSM were omitted because the least-cost supply plan had not been fully developed at the time of the demand forecast filing and therefore it was not possible to determine what least-cost DSM would be (Tr. at 32). BELD further stated that the effects of the NEP purchased power were not included because the Department required that the demand forecast be filed prior to the completion of negotiations with NEP for the purchase of that power (Company Brief at 15).

15 BELD stated that the least-cost DSM was selected on the basis of its positive impact on revenue requirements and therefore it should have had, if anything, a slightly positive

later supplied the Department with a subsequent price forecast, including DSM and the two MW purchase from NEP, the results of which were within five percent of the earlier projection (RR-DPU-1).

b. Analysis and Findings

The Department notes that BELD has disaggregated its production costs into four distinct components and escalated these individual costs based on reasonable escalators. Furthermore, the Department finds that BELD refined its initial price projections to better correlate these to its forecasted resource needs. The Department notes that while the Company initially failed to include the costs of DSM programs and purchased power from NEP, these costs were added later with minimal effect. The Department has previously required BELD to base cost projections on actual annual historic data which, as the record shows, the Company has done in the instant case (see section II.C.3.c. below). Accordingly, the Department accepts BELD's forecast of electricity price.

c. Compliance with Condition One of EFSC 89-32

In EFSC 89-32, BELD was ordered to

> either (a) provide and use actual annual historic costs for power supply and non-power supply costs as the basis for future costs, or (b) provide an analysis justifying BELD's current methodology, which uses historic averages, a four percent rate of return adjustment, and assumed constant non-power supply costs when forecasting electricity price.

---

impact on the price of electricity (Tr. at 32-33). The two MW of system power from NEP was approved by the Department in the Newbay Settlement. See Newbay Corporation et al., D.P.U. 88-265-A (1994).

BELD's basis for forecasting non-power supply costs has been changed from that of its previous filings (Company Brief at 6). Previously, BELD forecasted non-power supply costs as the average of estimated non-power supply costs for 1979 to 1989. 1992 BELD Decision at 14. In the current filing, BELD forecasts non-power supply costs such as operating expenses, plant-in-service, depreciation expenses, and return on investment using its actual annual historic data (Company Brief at 6). Also, BELD uses actual historic power supply and non-power supply costs as a basis for allocating total costs (Exh. BELD-1, at 13). Therefore, the Department finds that BELD has satisfied Condition One of EFSC 89-32.

4. Residential Energy Forecast

a. The Company's Proposal

The residential class consisted of approximately 11,462 customers in the year ending 1992, with an average use of 7,704 Kilowatthours ("KWH") per year per customer, and represented 23.9 percent of total 1992 energy demand (id. at 21, 91). The residential class includes electric heating and electric hot water customers (id. at 20).[16] The forecast growth in the energy forecast for the residential sector is 1.6 percent (id. at 24).

BELD stated that it forecasted aggregate residential electricity demand using an econometric equation with the following independent variables: (1) number of customers; (2) real per capita income for Norfolk County; and (3) CDD (id. at 20).

---

[16] BELD states that it is moving toward disaggregating residential sales into "with" and "without" electric heating and that it has begun a survey of its residential customers to aid in the identification of its electric heating customers (Exh. BELD-1, at 20). See Section II.C.4.c, below.

The selected model for forecasting residential demand has a coefficient of determination equal to 95.9 percent and confidence intervals for all independent variables are 97.5 percent or greater (id. at 24). BELD backcast the equation and found a maximum deviation between actual sales and sales forecast by the equation during the historic period to be 1.4 percent (id.).

In addition to the selected model, the Company tested five other models using various combinations of price, real price, income, real income, number of customers and CDD as independent variables (id. at 29). According to the Company, it did not use these other models due to inferior statistics (id. at 23, 29).

b. Analysis and Findings

The record indicates that BELD forecasted residential demand based on a regression methodology which incorporated the number of customers, real per capita income, and CDD. The Department finds it reasonable for energy demand to be highly correlated with the number of customers. Further, the inclusion of real per capita income allows the forecast to incorporate the effects of changing economic conditions. Finally, CDD allows the forecast to account for some of the effects of weather. The Department finds the selection of the three independent variables to be reasonable indicators of residential demand.

The Department notes BELD's continued aggregation of electric and non-electric heating customers in the residential forecast. The Department previously criticized BELD for its failure to separately forecast usage of residential heating and non-heating customers. See 1992 BELD Decision at 21. While the record indicates BELD has minimally complied with the previous Department directive to study the electric usage of residential electric heating customers, the

Department remains concerned that the Company has not incorporated the results from these studies into its forecast.[17] See Section II.C.4.c, below. The Department notes that electric space heating customers have different energy consumption patterns compared to non-electric space heating customers and therefore the aggregation of these two classes may affect the company's ability to identify significant trends in either customer class. In BELD's next residential forecast, BELD should submit separate forecasts for electric and non-electric space heating customers. The Department expects that data derived from the on-going study described in Section II.C.4.c, below, should provide a basis for this disaggregated forecast.

The Department finds that the statistics provided by the Company provide a high degree of confidence that the forecast should provide reliable estimates in the short term. The Department also notes that the Company has utilized the equation to provide estimates of demand and compared this to the actual demand experienced over the historical period, and the estimates were extremely accurate. Additionally, the record indicates that the Company tested a wide range of models utilizing additional explanatory variables. Accordingly, the Department accepts BELD's forecast of residential demand, but directs the Company to incorporate the results of its residential survey and provide separate forecasts for residential electric and non-electric heat in the next forecast.

---

[17] The Company states that it will present a disaggregated electric heat forecast as part of its next filing (Company Brief at 8).

c. Compliance with Condition Two of EFSC 89-32

In the EFSC 89-32, BELD was ordered to

> initiate and complete a study of the heating usage of residential electric heating customers, which will assist BELD in developing a comprehensive understanding of electric heating usage in its service territory, and commence a process designed to identify BELD's residential customers with electric heat in compliance with Siting Council regulations.

BELD has initiated the required study by identifying from its billing records those customers whose monthly usage during the winter months of December, 1992 and January and February, 1993 seemed representative of the usage levels of a residential electric heating customer (Exh. BELD-1, at 13).[18] BELD also included a residential survey in its October 1993 bills (Exh. DPU-1; Tr. at 8-9). BELD sent 13,409 surveys and received 1,845 responses (Exh. DPU-1, at 1). Finally, BELD has obtained two sets of records from the Braintree Assessors Office; records which indicate whether a particular property has electric heat on the premises (id.). These tax records are currently being analyzed and an attempt is being made to cross-reference them with company records for accuracy (id.). BELD states that once these cross-checks are completed, it should have sufficient data to compile a five-year usage history for each electric heat customer (id.; Company Brief at 8). The Department notes that at this time the Company has not completed its study of the heating usage for residential electric heating customers. However, the Department recognizes the effort put forth by the Company towards completing the study as well as the necessity for ensuring that the final data is accurate. The Department expects that BELD

---

[18] The Company stated that it reviewed all customer records for January and February of 1993 to identify customers who used more than 1,500 KWH per month (Exh. DPU-1).

will complete its study and incorporate the results in its next forecast filing. The Department concludes that BELD has minimally complied with Condition Two of the EFSC 89-32.

5. Commercial Energy Forecast

BELD disaggregated its commercial energy forecast into three categories: small commercial; commercial heating and cooling; and large commercial (Exh. BELD-1, at 19).

a. Small Commercial Forecast

i. The Company's Proposal

The small commercial class consisted of approximately 1,756 customers in the year ending 1992, with an average use of 33,337 KWH per year per customer, and represented 15.8 percent of total 1992 energy demand (id. at 30, 91). According to the Company, customers within this class are primarily necessity stores and similar enterprises serving the local economy (id. at 30). The Company forecasts demand growth for this class to be 2.5 percent over the forecast period (id. at 34).

The small commercial forecast is based on a linear multiple regression using: (1) the number of small commercial customers; and (2) real per capita income for Norfolk County as independent, explanatory variables (id. at 3, 30). The Company asserts that given the nature of this class as serving the local population, customers and real per capita income are appropriate and reliable independent variables in forecasting consumption of this class (id. at 30). The model has a coefficient of determination equal to 95.3 percent and the confidence intervals for the coefficients of the explanatory variables are 90 percent or larger (id. at 34). BELD backcast the

equation and found a maximum deviation between actual sales and sales forecast by the equation during the historic period to be 3.2 percent (id.).

Both real per capita income and nominal per capita income were tested as variables in separate models, as well as both real and nominal price and the weather variables HDD and CDD (id. at 30). The Company tested a total of eight models (id. at 39). The Company stated that seven of these models were rejected due to inferior statistics relative to the model selected (id. at 33, 39).

ii. Analysis and Findings

The record indicates that BELD has developed a forecast for small commercial customers based on a regression methodology. It is reasonable to expect a high degree of correlation between the small commercial population and energy demand for this rate class. The Department also finds it reasonable to include real per capita income as a variable, because this represents the purchasing power available to the consumer, which translates to activity in this rate class.

The record also indicates that the model selected has valid statistical performance, and that a comparison between estimated and actual demand over the historic period indicated that the equation was reliable. Additionally, the record indicates that the Company tested a wide range of models utilizing additional explanatory variables. Accordingly, based on the foregoing, the Department accepts the Company's forecast of demand for the small commercial sector.

b. Commercial Heating and Cooling Forecast

i. The Company's Proposal

The commercial heating and cooling class consisted of approximately 26 customers in the year ending 1992, with an average use of 1,099,538 KWH per year per customer, and represented 7.8 percent of total 1992 energy demand (Exh. BELD-1, at 40, 91). This class is applicable to any customer: (1) with a demand of 75 KW or more; (2) with heating, cooling and controlled water heating requirements served predominantly by electricity; and (3) where the entire electric service is delivered through one meter (id. at 40). The Company forecasts demand growth for this class to be 3.8 percent over the forecast period (id. at 41).

The commercial heating and cooling forecast is modeled with a linear multiple regression using: (1) employment for the finance, insurance and real estate ("FIRE") sector for Norfolk County; (2) real price; and (3) HDD as independent, explanatory variables (id. at 3, 40). BELD states that electricity usage by the FIRE sector accounts for approximately 43 percent of the usage of this class (id. at 40). BELD further argues that by utilizing FIRE data, BELD is better able to capture significant customer usage characteristics within a forecast class (id.). The model has a coefficient of determination equal to 95.3 percent, and the confidence intervals for the coefficients of the explanatory variables are 90 percent or greater (id. at 47). BELD backcast the equation and found a maximum deviation between actual sales and sales forecast by the equation during the historic period to be 3.9 percent (id. at 44).

The Company tested nominal price, real price, nominal per capita income, real per capita income, HDD, CDD, and service sector employment as independent variables (id. at 40). BELD

examined a total of eleven models, including the selected model, to forecast this class. However, the Company determined that ten of these models had inferior statistics to the selected model and accordingly rejected those ten models (id. at 43, 47-48).

ii. Analysis and Findings

The record indicates that BELD has forecasted demand for the commercial heating and cooling class based on a regression analysis. The record also indicates that the Company included employment statistics for the FIRE sectors and that these sectors represent 43 percent of the demand for this class. The inclusion of this statistic allows the Company to directly incorporate trends in these service sectors into the forecast. The inclusion of real price and HDD allows the model to incorporate the effects of electricity price changes and weather. The Department thus finds the independent variables to be reasonable indicators of demand.

The record shows that the model selected by the Company provided statistics which indicate a high degree of confidence in the accuracy of the equation. Additionally, the Company compared estimated demand with actual demand over the historic period which indicated that the model provided accurate estimates of demand. Finally the record indicates that the Company thoroughly tested other models and explanatory variables. Accordingly, the Department accepts the Company's forecast of demand for the commercial heating and cooling class.

c. Large Commercial Forecast

i. The Company's Proposal

This class consisted of approximately 122 customers in the year ending 1992 with an average use of about 947,549 KWH per year per customer, and represented 31.4 percent of total

1992 energy demand (Exh. BELD-1, at 49, 91). The large commercial class includes any customers having a demand of 75 KW or more for all purposes not specifically provided for in all other classes, and consists mainly of large mall-type stores and commercial office buildings (id. at 49). BELD forecasted average compound growth over the ten year forecast period to be 2.0 percent for this class (id. at 50).

BELD states that although sales in the class decreased approximately 1.5 percent in 1992, a growth trend is expected to exist throughout the forecast period (id. at 49). BELD argues that the historic and forecasted strength of this market is due, in part, to Braintree's geographic proximity to Routes 3 and 128, as well as its placement as the last southerly stop on the MBTA's Red Line (id.). BELD argues that the robustness of this class is further enhanced by the fact that Braintree is the last relatively large town along the Southeast Expressway as one travels south from the Boston metropolitan area (id.). BELD also states that the positive rate of growth for this class is directly attributed to a projected economic resurgence in the area as forecast by DRI and as indicated by projections for employment activity within Norfolk County (id.).

The large commercial class forecast is based on a linear multiple regression using: (1) employment statistics for the service sector within Norfolk County; (2) real price; and (3) CDD as the independent explanatory variables (id. at 3, 49). The model has a coefficient of determination equal to 99.3 percent and the confidence intervals for the coefficients of the explanatory variables are 95 percent or larger (id. at 53). BELD backcast the equation and found a maximum deviation between actual sales and sales forecast by the equation during the period 1987 through 1992 to be 0.3 percent (id.).

The Company tested employment statistics for the FIRE sector as well as real and nominal income as independent variables (id. at 56). BELD examined a total of twelve models, including the selected model, to forecast this class (id. at 56-57). The Company determined that eleven of these models had inferior statistics to the selected model and accordingly rejected those eleven models (id. at 52).

ii. Analysis and Findings

The record indicates that the Company forecasted demand for the large commercial sector using an econometric equation with service sector employment statistics for Norfolk County, real price, and CDD as the explanatory variables. The Department notes that this class consists primarily of large mall-type stores and office buildings. It is therefore reasonable to expect that energy consumption in this sector should be highly correlated to employment.

The record shows that the model selected by the Company provided statistics which indicate a high degree of confidence in the accuracy of the equation. Additionally, the Company compared estimated demand with actual demand over the historic period, the results of which indicated that the model provided accurate estimates of demand. Finally the record indicates that the Company thoroughly tested other models and explanatory variables. Accordingly, the Department accepts the Company's forecast of demand for the large commercial class.

d. Conclusions on the Commercial Energy Forecast

The Department has accepted BELD's forecast of: (1) the small commercial sector; (2) the commercial heating and cooling class; and (3) the large commercial class.

Accordingly, based on the foregoing, the Department finds BELD's commercial energy forecast to be reviewable, appropriate, and reliable.

6. Industrial Forecast

a. The Company's Proposal

As of 1992, the industrial class consisted of eleven customers with an average use of more than 4,900,000 KWH per year per customer, and represented 14.7 percent of 1992 energy demand (Exh. BELD-1, at 58, 91). The industrial class includes customers whose use is for industrial or manufacturing purposes, whose total demand is 300 kilovoltamperes or more, and whose energy consumption is in excess of 100,000 KWH per month (id. at 58). BELD forecasts average compound growth over the ten-year forecast period to be 2.3 percent for this class (id. at 62).

The industrial class forecast is based on a linear multiple regression model utilizing production indices for Standard Industrial Classification ("SIC") codes 30, 34, and 38[19] for industries in the Commonwealth of Massachusetts as the independent explanatory variables (id. at 3, 58). In this forecast, BELD removed historical usage of two former customers, the MBTA and Industrial Engineering and Machinery (id. at 58).[20] Removing the usage of these two customers

---

[19] SIC code 30 represents the rubber and miscellaneous plastics products industry (Exh. BELD-1, at 58). SIC code 34 represents the fabricated metal products, except machinery and transportation equipment (id.). SIC code 38 represents measuring, analyzing and controlling instruments; photographic, medical and optical goods; watches and clocks (id.).

[20] The MBTA represented 15.2 percent of BELD's 1992 industrial sales (Exh. BELD-1, at 58). However, as of April 15, 1994 the MBTA is no longer a retail customer of BELD (id.).

results in SICs 30, 34, and 38 accounting for 41.4, 26.0, and 17.3 percent of total 1991 industrial sales, respectively (id. at 58-59). The model has a coefficient of determination equal to 97.4 percent and the confidence intervals for the coefficients of the explanatory variables are 99 percent or larger (id. at 62). BELD backcast the equation and found a maximum deviation between actual sales and sales forecast by the equation during the period 1986 through 1992 to be 0.3 percent (id.).

BELD argues that the high growth rate forecasted for its service territory is appropriate for several reasons. BELD states that it has low electricity rates overall (Tr. at 116; Exhs. BELD-1, at 12; DPU-8). The Company also argues that there is support within the town for industrial load as evidenced by the amount of real estate that is industrial-zoned (Tr. at 117). BELD contends that there is a considerable amount of industrial and large commercial development currently and that there is no reason to expect that this trend should not continue (id.). Finally, the Company argues that its proximity to Boston and its transportation access to all of New England make it an attractive location for industry and large commercial development (id.).

The Company tested nominal income, real per capita income, nominal price, real price, HDD and CDD as independent variables (Exh. BELD-1, at 59). BELD examined a total of eight models, including the model selected to forecast this class (id. at 65-66). The Company determined that seven of these models had inferior statistics to the selected model and accordingly rejected those seven models (id. at 61).

b. Analysis and Findings

The record shows that BELD forecasted demand based upon a regression equation using production indices for SIC 30, 34, and 38 as independent variables. The Department notes that the statistics provided indicate that the independent variables are significant. Additionally, the Department notes that the industries on which the Company bases its forecast account for 84.7 percent of the industrial sales of BELD. Incorporating the employment statistics for these key industries should allow BELD to accurately track trends unique to its customer base.

The record shows that the model selected by the Company provided statistics which indicate a high degree of confidence in the accuracy of the equation. Furthermore, the Company compared estimated demand with actual demand over the test period which indicated that the model tracked closely with historic levels of industrial demand. Finally the record indicates that the Company thoroughly tested other models and explanatory variables. Accordingly, the Department finds the Company's industrial forecast to be reviewable, appropriate, and reliable.

c. Compliance with Condition Three of EFSC 89-32

In EFSC 89-32, the Company was ordered to

> (a) examine alternate methodologies for forecasting MBTA usage; (b) develop a schedule for implementation based on that examination; and (c) develop a reasonable set of criteria for identifying those customers whose patterns of energy consumption suit them for inclusion in the industrial forecast, and include all those customers, and only those customers, in future industrial class forecasts;

As of April 15, 1994, the MBTA is no longer a retail customer of BELD (Exh. BELD-1, at 58). This renders requirements (a) and (b) moot.

BELD states that it established new rates and usage-based eligibility criteria for industrial customers on April 1, 1989 (Company Brief at 9). BELD further states that these new criteria essentially quadrupled the usage required to qualify for the industrial rate and thereby established a class criterion consistent with typical industrial usage (id.). BELD argues that this results in ensuring that only industrial customers are included in the industrial forecast (id.). The Department finds that BELD has adjusted the criteria for inclusion in the industrial rate class, and that this adjustment should result in eliminating those customers whose consumption patterns differ from the typical industrial customer. Accordingly, the Department finds that BELD has complied with Condition Three of EFSC 89-32.

7. Other Energy Forecasts

a. The Company's Proposal

i. Streetlighting

BELD completed the conversion of streetlights within its service territory from incandescent and mercury vapor lamps to more energy efficient, high pressure sodium lamps in 1991 (Exh. BELD-1, at 67). This class accounts for 0.9 percent of 1992 energy demand (id. at 91). To forecast streetlighting consumption, BELD used the KWH usage data from 1992 to calculate the average annual consumption of each lamp, which it found to be 783.7 KWH per year (id. at 67; Tr. at 89). BELD then forecasted the number of streetlights based upon a regression analysis of fixtures against total residential and small commercial customers (Exh. BELD-1, at 67). The resulting equation had a coefficient of determination equal to 49 percent and the independent variable had a confidence interval greater than 99 percent (id. at 68). When the

Company tested its forecast by comparing the forecasted 1992 fixtures to actual fixtures, it determined that 1992 actual fixtures exceeded forecasted fixtures by 161, and adjusted its forecast accordingly (id.; Tr. at 89).[21] Demand for the streetlighting sector was estimated as the product of the number of streetlights in each year and the average annual consumption of each lamp (Tr. at 89). The Company estimated average compound growth over the ten year forecast period to be 0.54 percent and that the streetlighting sector would comprise approximately 0.7 percent of total energy requirements by 2002 (Exh. BELD-1, at 67).

ii. System Losses

BELD argues that system losses are directly related to total system load, and that basing projections of future losses on the forecast of total energy requirements is logical (id. at 69). BELD based its projection of total system losses on the 1990-1992 three year average of 4.47 percent (id.). BELD selected this three year history because it reflects the benefits of reduced losses which resulted from the commercial operation of BELD's Churchill Substation #8 (id.).[22] The Company indicated that a second transformer is planned to be added to the Churchill Station for reliability purposes, but that this addition should have no impact on system losses (Tr. at 91).

iii. Internal Use

Internal use consists of energy used in BELD's offices, substations, and generating station (Exh. BELD-1, at 69). The internal use forecast is based upon a regression against total energy

---

21 The Company added this residual of 161 to each year of the forecast (Tr. at 90).

22 BELD further notes that the average of system losses for the period 1983-1988 was 6.35 percent of total energy requirements and that this loss percentage clearly declined when the Company energized the Churchill Substation #8 (Exh. BELD-1, at 69). Churchill Substation #8 commenced operation in December, 1989 (id.).

requirements (id.). This sector accounted for one percent of 1992 energy demand (id. at 91). The selected model has a coefficient of determination equal to 63.2 percent and the confidence interval for the independent variable exceeds 99.5 percent (id. at 70). BELD states that it tested a number of independent variables including total energy requirements, the square of total energy requirements and total generation at Potter Station (id. at 69). Basing its decision on statistical tests, the Company selected total energy requirements as the sole variable (id.).

b. Analysis and Findings

The record indicates that demand in the streetlighting sector was forecast based upon an end use model. The Department notes that the Company based its estimate of annual energy usage per fixture upon actual 1992 data. The Department also notes that the Company had completed its replacement of less efficient fixtures with more efficient sodium lamps. The Department finds that the homogeneity of fixtures allows the Company to determine more accurately average energy usage per fixture. The Department also finds that the use of total residential and commercial customers is an appropriate explanatory variable for the number of fixtures. Accordingly, the Department accepts the Company's forecast for the streetlighting sector.

The record indicates that losses are highly correlated with total system demand. Additionally, the Company has chosen a time period which allows it to incorporate the efficiency gains achieved by the construction of Churchill Station #8. The record also indicates that while the Company intends to install an additional transformer at this station, it is not expected to result

in any change in the magnitude of losses. Accordingly, the Department finds the forecast of losses to be acceptable.

In regard to internal use, the record indicates that this forecast is based upon a regression equation which uses total energy requirements as an explanatory variable. The Department finds that the model selected provided statistics which indicate a high level of confidence in the accuracy of the equation. Additionally, the Department finds it reasonable to expect that increased demand should lead to higher production levels which in turn should result in increased internal use. Based on the foregoing, the Department finds the Company's forecast of other energy forecasts to be reviewable, appropriate, and reliable.

c. Compliance with Conditions Four and Five of EFSC 89-32

Condition Four of EFSC 89-32 ordered BELD to identify and analyze the key variables that affect streetlighting usage, and incorporate the results of that identification and analysis into its streetlighting forecast methodology. 1992 BELD Decision at 71. As discussed above, the replacement of older lamps with efficient high pressure sodium lamps allows BELD to estimate the average energy use per fixture, specifically by using actual KWH usage data. Energy use per streetlight, and the number of residential and small commercial customers are shown in the record to be key variables incorporated into the projection of streetlighting usage by BELD. Therefore, the Department finds that BELD has complied with Condition Four of EFSC 89-32.

Condition Five of EFSC 89-32 directed BELD to provide a description and analysis of its forecasting methodology for energy requirements due to losses and internal use. 1992 BELD Decision at 71. The record shows that BELD based its projection of total system losses on the

three year average of losses for the period 1990-1992 and its forecast of total energy requirements. As described above, the projection of internal use is based on a regression against total energy requirements. The Department finds that BELD sufficiently described and analyzed its methodology for forecasting energy requirements due to losses and internal use and therefore, the Department finds that the Company has complied with Conditions Four and Five of EFSC 89-32.

8. Conclusions on the Energy Forecast

The Department has accepted BELD's economic and demographic forecast. The Department also has accepted BELD's electricity price forecast and residential forecast. In addition, the Department has found: (1) the Company's forecast of commercial energy requirements to be reviewable, appropriate, and reliable; (2) the Company's forecast of industrial energy requirements to be reviewable, appropriate, and reliable; and (3) the Company's other energy forecast to be reviewable, appropriate, and reliable.

Accordingly, based on the foregoing, the Department finds BELD's forecast of energy requirements to be reviewable, appropriate, and reliable.

III. PEAK DEMAND FORECAST

A. The Company's Proposal

BELD forecasted annual peak demand growth of 1.93 percent over the forecast period (Exh. BELD-1, at 10). In the base case scenario, using the average temperature for the summer peak month, peak demand is estimated to be 87.36 MW in 2002 (id. at 77). See Table 1 (attached).

To forecast peak demand, the Company employed a regression analysis using: (1) total annual energy requirements and (2) average temperature for the summer peak month as independent variables (id. at 76). BELD states that the use of average temperature for the summer peak month represents the best available data and correlates with generally accepted practices for weather normalization (id.). The Company asserts that weather normalization usually incorporates some combination of temperature and humidity for the day of the peak and for the one or two days preceding the peak, reflecting the impact of prolonged periods of heat on summer peak demands (id.). BELD further states that the use of average temperature for the month, rather than the highest temperature for the month, is more likely to capture this effect of a prolonged period of hot weather, and in fact, produced much better statistical measures than an alternate model utilizing only peak temperature (id.). The resulting regression equation produced a coefficient of determination equal to 94 percent (id.).

The Company tested the sensitivity of the forecasted peak to economic and weather changes. To represent variations in economic activity, BELD produced low, base, and high growth forecasts as inputs into its peak load model. See Section II.C.1.a, above. BELD developed these alternative forecasts by adjusting the growth rates by one percent of the independent variables within each customer class forecast (id. at 77-79; Tr. at 26). To test the sensitivity of the peak load model to changes in temperature, the Company determined the average temperature for the summer peak month and used the actual temperature distribution to determine the 10th and 90th percentile temperatures (Tr. at 99). The low temperature represents

a temperature that has a 90 percent probability of being exceeded, while the high temperature has a 10 percent probability of being exceeded based on the historic base period (id. at 100).[23]

B. Analysis and Findings

The record indicates that BELD has forecasted peak demand using an econometric equation with annual energy demand and average summer peak month temperature as the explanatory variables. The Department has previously found annual energy demand to be an appropriate indicator of peak demand. 1992 BELD Decision at 30; 1991 Nantucket Decision at 252. The Department has previously found that peak load forecasts should incorporate important peak load determinants such as weather. 1992 BELD Decision at 31; 1991 Nantucket Decision at 251-252; 1990 MMWEC Decision at 39. The record indicates that BELD has included these two important variables in its forecast of peak demand. The Department notes that BELD has provided a low, base, and high growth case for each of its customer class demand forecasts. The Department also notes that BELD has incorporated these low, base, and high growth forecasts along with changes in average temperature into its peak demand forecast. The Department recognizes that the use of high and low growth scenarios are, in general, a useful means of bracketing the range of possibilities inherent in long-range forecasts of electricity demand. 1991 Nantucket Decision at 252. Accordingly, the Department finds the Company's peak load forecast to be reviewable, appropriate, and reliable.

---

[23] The low temperature is 70 degrees fahrenheit, the median is 71.3 degrees fahrenheit, and the high is 72.9 degrees fahrenheit (Exh. BELD-1, at 77-79).

C. Compliance with Conditions Six and Seven of EFSC 89-32

Condition Six of EFSC 89-32 ordered BELD to

> develop and present an analysis of alternative peak load forecasting methodologies, which should at least include a summary of: (a) a comparison of the strengths and weaknesses of BELD's present methodology and alternative methodologies; (b) a comparison of the level of disaggregation achieved by each alternative methodology; and (c) a comparison of the manner in which each alternative methodology incorporates the major factors which affect peak load.

BELD analyzed four alternative peak load forecasting methodologies: (1) time trend of annual load factor; (2) time trend of seasonal load fractions; (3) regression against energy and temperature; and (4) sum of class coincident peaks (Exh. BELD-1, at 16).

The Company states that the time trend of annual load factor methodology does not explain any underlying changes in usage patterns, if any, which cause trends in annual load factor and does not take into account the impact of weather on the system peak demand (id. at 71). BELD attempted to account for the impact of weather by using the weather-normalized historic peak demands instead of actual peak demands in calculating the load factors for time trending (id.). A time trend of the unadjusted load factors had a coefficient of determination equal to 51 percent (id.). Replacing the unadjusted load factors with the adjusted load factors resulted in a coefficient of determination of 87 percent (id.).

The second methodology tested by BELD was a time trend of seasonal load fractions (id. at 74). This methodology attempts to determine whether there is an underlying shift of energy usage from one season to another, and if there is, to project that trend into the future and use the seasonal load factor rather than the annual load factor as the driving variable in determining

annual peak demand (id.). The Company stated that the results of the time trend indicate that there is no discernable trend in usage from one season to another (id.).

The third methodology tested is the selected model and is described in Section III.A above.

The fourth methodology tested by BELD is the sum of class coincident peaks (id. at 80). This represents an attempt to disaggregate the total system peak demand into the individual customer class peaks (id.). This was accomplished by calculating class coincidence factors for each customer class which represent the relationship between annual energy usage for the class and the class peak coincident with BELD's annual system peak (id.) The initial unadjusted coincidence factors utilized were obtained from load research performed by and for the Massachusetts Electric Company (id.). BELD then uniformly increased the unadjusted coincidence factors until the difference between the calculated peaks and the actual peaks for the historic period was minimized (id.). The adjusted class coincidence factors were multiplied by the forecast sales for each class to derive forecast system peak demand (id.).

BELD argues that a review of the error of estimate produced by the backcast of the fourth methodology shows that the magnitude of the error of the backcast is greater than that of the methodology selected (id.). The Company also states that while this method produces greater explanatory power through improved disaggregation, the lack of accurate, system-specific information regarding the contribution of BELD's customers to system peak demand makes this a less reliable methodology than the others (id.).

The record indicates that BELD has performed an analysis of alternative methods of forecasting peak demand and has documented the relative strengths and weaknesses of each. Thus, the Department finds that BELD has complied with Condition Six of EFSC 89-32.

Condition Seven of EFSC 89-32 required BELD to "provide tests of the sensitivity of its energy and peak-load forecasts to one or more major underlying assumption(s) or parameter(s) of each of those forecasts". The record indicates that BELD has increased and decreased the growth rates by one percent for each of the explanatory variables used in the demand forecasts for each of the customer classes. The record also indicates that BELD incorporated these three demand scenarios into its peak forecast along with changes in summer peak month average temperature. Thus, the Department finds that BELD has complied with Condition Seven of EFSC 89-32.

IV. CONCLUSIONS ON THE DEMAND FORECAST

The Department finds that BELD has complied with Directives One, Two, and Four through Seven of EFSC 89-32. In addition, the Department finds that BELD has minimally complied with Directive Three of EFSC 89-32.

The Department has found BELD's energy forecast to be reviewable, appropriate, and reliable. In addition, the Department has found BELD's peak load forecast to be reviewable, appropriate, and reliable. Accordingly, the Department hereby approves BELD's 1993 demand forecast.

V. DECISION

The Department hereby APPROVES the 1993 Demand Forecast of Braintree Electric Light Department for the period of 1993-2002.

By Order of the Department,

_____
Kenneth Gordon, Chairman

_____
Mary Clark Webster, Commissioner

Table 1 SUMMARY OF FORECASTED ENERGY AND PEAK DEMAND

Year	Total Output (MWH)	Annual percent Change	Winter Peak (MW)	Annual percent Change	Summer Peak (MW)	Annual percent Change
1993	373,525	1.38%	65.92	1.42%	74.70	1.16%
1994	381,914	2.25%	67.17	1.90%	76.12	1.90%
1995	390,830	2.33%	68.50	1.98%	77.62	1.98%
1996	399,133	2.12%	69.74	1.81%	79.03	1.81%
1997	409,257	2.54%	71.25	2.16%	80.74	2.16%
1998	418,708	2.31%	72.66	1.98%	82.33	1.98%
1999	426,129	1.77%	73.76	1.52%	83.59	1.52%
2000	434,271	1.91%	74.98	1.65%	84.96	1.65%
2001	441,335	1.63%	76.03	1.40%	86.15	1.40%
2002	448,449	1.61%	77.09	1.39%	87.36	1.39%

Appeal as to matters of law from any final decision, order or ruling of the Commission may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the Order of the Commission be modified or set aside in whole or in part.

Such petition for appeal shall be filed with the Secretary of the Commission within twenty days after the date of service of the decision, order or ruling of the Commission, or within such further time as the Commission may allow upon request filed prior to the expiration of twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the Clerk of said Court. (Sec. 5, Chapter 25, G.L. Ter. Ed., as most recently amended by Chapter 485 of the Acts of 1971).

V. ORDER

Accordingly, after due notice, hearing, and consideration, it is

ORDERED: That the demand forecast submitted by Braintree Electric Light Department for the period 1993 through 2002 is approved; and it is

FURTHER ORDERED: That the Braintree Electric Light Department complete its study of residential electric and non-electric heating customers and incorporate the information derived from this study in its next demand forecast; and it is

FURTHER ORDERED: That the Braintree Electric Light Department shall provide separate forecasts of demand for its residential electric and non-electric heating customers; and it is

FURTHER ORDERED: That the Braintree Electric Light Department shall comply with all directives herein.

By Order of the Department,

_____

Kenneth Gordon, Chairman

_____

Mary Clark Webster, Commissioner