August 6, 1997

D.P.U. 96-98

Petition of Bay State Gas Company for review of certain matters relating to its monitoring and evaluation results concerning demand-side management programs for commercial/industrial and multifamily customers.

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FOR: BAY STATE GAS COMPANY
Petitioner

I. INTRODUCTION

On August 23, 1996, Bay State Gas Company ("Bay State" or "Company") filed with the Department of Public Utilities ("Department"), a petition requesting recovery of lost net revenues and a performance bonus associated with its Multifamily and Commercial and Industrial ("C&I") demand-side management ("DSM") programs. Bay State requests recovery based upon actual measured energy savings demonstrated by the results of its monitoring and evaluation ("M&E") plan, beginning with Bay State's November 1, 1997 cost of gas adjustment clause. The petition was docketed as D.P.U. 96-98.

Pursuant to notice duly issued, the Department held a public hearing on November 12, 1996 at its Boston offices to afford interested persons an opportunity to be heard. The Department conducted an evidentiary hearing on March 12, 1997. No petitions to intervene were filed. In support of its petition, the Company sponsored the testimony of three witnesses: Paul D. Smith, manager of demand-side management; David E. Molzan, manager of energy demand and supply planning; and Allan A. Zebedee, principal of Zebedee & Associates. The evidentiary record includes 13 exhibits and five responses to record requests.

II. STANDARD OF REVIEW

In evaluating savings estimates from gas DSM programs, the Department will draw on its experience with electric DSM programs. The Department has found that many estimates of savings that are not actually measured have been biased upward substantially, and has therefore required companies to measure savings using impact evaluations. Massachusetts Electric Company, D.P.U. 92-217-B, at 4-5 (1994) ("MECo"). The Department has identified and

approved a wide variety of evaluation techniques for estimating savings. See, for example, MECo at 7-16, 35-38, 47-51, 68-74. However, the Department has found many cases where appropriate techniques have not been applied or have been misapplied to produce savings estimates that are biased upward or downward. See, for example, MECo at 5; Boston Edison Company, D.P.U. 96-1-CC, at 3-4, 9-12, 21-22, 24 (1996). Recognizing that obtaining more precise savings estimates has a cost, the Department directed companies to seek increased precision to the extent that the marginal value of more precise estimates exceeds the marginal cost of obtaining the additional precision. MECo at 5.

In MECo the Department introduced a standard of review to be applied to impact evaluations. The Department will use the same standard for gas DSM evaluations: in order for a company's DSM savings estimates to be accepted, the company must demonstrate that its impact evaluations are reviewable, appropriate, and reliable. Id. at 4-6. An impact evaluation is considered reviewable if it is complete, clearly presented, and contains a summary that sufficiently explains all assumptions and data presented. Id. An impact evaluation is considered appropriate if evaluation techniques selected are reasonable given the characteristics of a particular DSM program, the company's resources, and the available methods for determining demand and energy savings estimates. Id. Finally, an impact evaluation is considered reliable if the savings estimates included in the evaluation are sufficiently unbiased and are measured to a sufficient level of precision, again, given the characteristics of a particular DSM program, the company's resources, and the available methods for determining demand and energy savings estimates. Id.

III. THE COMPANY'S IMPACT EVALUATIONS

A. Introduction

The Company submitted impact evaluations of its Multifamily and C&I programs, covering the implementation period from September 1993 through June 1996 (Exh. BSG-7, at 2-4). In both programs, after the program's energy audit of its facility, a customer may hire a contractor selected by the Company to install some or all of the following energy conservation measures or equipment: building insulation, pipe and duct insulation, boiler reset controls, automatic temperature controls, hot water conservation measures, new boilers, and new furnaces (Exh. BSG-7, at 1-1 to 1-4). Customers are required to share the costs of the installations with the Company (id.). Some audited customers had energy conservation measures installed (thus becoming full "participants"), while others did not (Exh. BSG-4, at 3-11).[1] The Company claimed net annual savings of 1,533,499 therms for the Multifamily program and 2,510,309 therms for the C&I program (Exh. BSG-7, at 4-1; RR-DPU-2).

B. Reviewability

Department review shows that the Company's impact evaluations are complete and clearly presented, with all data and assumptions sufficiently explained. Accordingly, the Department finds that the Company's impact evaluations are reviewable.

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[1] The Company reported that only 21 percent of recommended measures were installed by audited Multifamily customers and 15 percent by audited C&I customers (Exh. BSG-4, at 3-11). The Company reported that financing was a problem for many non-participants, and discussed ways it was exploring to ease the financing constraints and improve the participation rate (Tr. at 14-19; Exh. BSG-4, at 5-12, 5-30, 5-31). In fact, the Company reported that it has increased the overall installation rate from 15 and 21 percent to 22 percent since the impact evaluation was filed (RR-DPU-3).

C. Appropriateness

The Company's impact evaluation savings estimates are based on billing analyses which incorporate multiple regression analysis and customer-specific engineering savings estimates (also known as "tracking" estimates)[2] (Exh. BSG-7, at 2-8, 3-18). For the Multifamily program, the Company used a matched comparison group to correct for non-program influences on energy consumption (id. at 3-1). To correct for non-program influences on energy consumption in the C&I program, the Company combined three types of variables in its multiple regression analysis: consumption changes by a comparison group matched according to consumption and building type; a participation decision variable from a separate model; and four variables to adjust for business changes among the sampled customers (id. at 2-5, 2-6).

As stated above, an impact evaluation is considered appropriate if evaluation techniques are reasonable for a particular program, a company's resources, and the available methods for determining savings estimates. The Department has approved the use of multiple regression analysis and comparison groups as being appropriate methods for the types of programs being implemented by the Company. See, for example, MECo at 23-25, 63-64. Accordingly, the Department finds that the impact evaluations filed by the Company are appropriate.

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[2] A DSM tracking system contains estimates of the savings that will be achieved, based on the measures that were actually installed and the original engineering estimate of savings to be achieved by each measure. MECo at 8-9. Later, an impact evaluation estimates how much savings were actually achieved. Id. The ratio of this later estimate to the earlier tracking estimate is called a "realization rate." Id.

D. Reliability

1. Multifamily Program

a. Description

From the population of 330 program participants, the Company eliminated customer data for seven kinds of problems ("data screens") (mostly for lack of at least four months of billing data before installation and four months after) to choose a sample of 121 participants (Exh. BSG-7, at 2-4 to 2-5). Using the same data screens, the Company chose a comparison group of 307 "non-participants" who had been audited but chose not to pay to have recommended measures installed (id.). The Company reported that the non-participants were similar to the participants in terms of building size, age, and number of stories; average consumption and the distribution of consumption across customers; and geographical distribution (id. at 2-7; Exh. DPU-1-2). Three-fourths of the expected (tracking system) savings came from eleven facilities, with individual net realization rates[3] of -10 percent to 217 percent, averaging 95 percent (RR-DPU-4).[4] To prepare data for analysis, the Company estimated the weather-sensitive and -insensitive portions of gas use for each customer in the study, for participants and non-participants alike, and normalized the data for typical weather (Exh. BSG-7, at 2-2 to 2-4).

Based on its regression analysis of energy use per square foot, the Company estimated a

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[3] The individual net realization rate for each facility adjusts changes in energy use at that facility by the average percentage change in energy use by sampled non-participants in a matched comparison group during the study period, then divides by the tracking estimate of savings. MECo at 8-11.

[4] The mean individual net realization rate for the rest was 254 percent, with most individual realization rates many times (positive or negative) the expected savings (id.).

net realization rate[5] of 114 percent for this program; that is, the savings derived via the analysis were 114 percent of the tracking savings estimates (id. at 2-7). The Company reported that it was 90 percent confident that the true savings rate was within 23 percent of the 114 percent rate estimated by the regression (id. at 2-8).

The Company provided six other estimates of the program's savings, ranging from 53 percent to 135 percent, using other regression model specifications (Exh. DPU-1-4; RR-DPU-4). Further, the net realization rate (before weather normalization) using a simple pre-post comparison with the non-participant group, rather than regression analysis, was 125 percent, or 11 percent higher than the Company's estimate (RR-DPU-4).

b. Analysis and Findings

As stated above, an impact evaluation is considered reliable if the savings estimates included in the evaluation are sufficiently unbiased and are measured to a sufficient level of precision. The Department observes that the wide spread in individual realization rates among the large sampled participants explains the wide variety of realization rates for the group as a whole, depending on exactly how the savings are estimated.[6] Noting that some alternative model specifications produce higher savings estimates while others produce lower estimates, the

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[5] A net realization rate estimates savings net of non-program influences such as changes in the economy and conservation measures which would have been installed absent the program. MECo at 8-9. Use of a well-matched comparison group can adjust for all non-program influences, since the comparison group experiences approximately the same changes as the participant group, except for participation in the DSM program. Id. at 11.

[6] The Department recognizes that it is common for individual realization rates to be many times (positive or negative) the expected savings at facilities where savings are a small fraction of energy use, since changes in energy use unrelated to DSM, but often linked to the economy, can be much larger than the savings.

Department finds that the Company's estimated realization rate is reasonable and sufficiently unbiased. Further, noting the wide variation in individual realization rates, especially at the facilities with most of the expected savings, the Department finds that, given the nature of the data, the savings from the Multifamily program are measured to a sufficient level of precision. Accordingly, having found the Company's savings estimate sufficiently unbiased and sufficiently precise, the Department finds the Company's savings estimates for the Multifamily program to be reliable, as well as reviewable and appropriate, and hereby accepts them.

2. C&I Program

a. Description

From the population of 490 program participants, the Company chose a sample of 83 participants by using eight data screens, principally requiring (1) completion of a telephone survey to gather data on buildings and changes in their use during the study period and (2) at least four months each of pre- and post-installation billing data (Exh. BSG-7, at 3-2, 3-9). Using the same data screens, the Company chose a comparison sample of 87 non-participants matched to the participant population by building type and geographical distribution (id. at 3-9, 3-10). The Company divided each sample into three strata by amount of energy used, and reported that the non-participants were similar to the participants in terms of building type, average consumption, and the distribution of consumption across customers (id. at 3-12 to 3-14). The Company estimated the weather-sensitive and -nonsensitive portions of gas use for each customer in the study, for participants and non-participants alike, and normalized the data for typical weather (id. at 3-4 to 3-5). Finally, the Company used its telephone survey data to estimate the likelihood that

a customer would participate in the program (id. at 3-5 to 3-7, 3-15 to 3-17).

To estimate energy savings, the Company used regression analysis of energy use as a function of the engineering (tracking) estimate of savings, four variables to measure changes in facility size and use unrelated to the program, and the previously estimated likelihood of participation (id. at 3-17, 3-18). The result was a net realization rate of 84 percent for this program (id. at 3-18). The Company reported that it was 90 percent confident that the true savings rate was within 16 percent of the 84 percent rate estimated by the regression (id.).

b. Analysis and Findings

Based on its review of the C&I program study, the Department finds that the Company's estimated realization rate is sufficiently unbiased and measured to a sufficient level of precision. Accordingly, the Department finds the Company's savings estimates for the C&I program to be reliable, as well as reviewable and appropriate, and hereby accepts them.

IV. PROPOSED PERFORMANCE BONUS AND LOST NET REVENUES

A. Description

The Company proposed to collect a performance bonus and lost net revenues ("LBR") based on the results of its impact evaluations for the period September 1993 through June 1996 (Exh. BSG-1, at 10). The Company proposed to collect its performance bonus over one or more years and its LBR over one year, starting with the winter local distribution adjustment factor ("LDAF") for the year beginning November 1, 1996 (Exh. BSG-1, at 8, 10). For each measure and program, Bay State filed (1) expense and value calculations underlying its proposed incentive (Exh. BSG-2); and (2) the savings, total and per degree day, by month of installation and

cumulatively (Exh.BSG-3).

The Company calculated its bonus as seven percent of the benefits less the expenses for the programs (Exhs. BSG-1, at 8; BSG-2). To determine the LBR, the Company calculated the savings by measure per degree day, then multiplied by actual degree days and by the weighted average net revenue rates for the applicable rate codes to which the measures pertain (id. at 9). Then the Company added carrying charges at the rate of 17.5 percent annually (id.; Exh. BSG-3, at 6, 12). The performance bonus calculated by the Company is $736,311 and the LBR calculated by the Company is $699,897 (Exh. BSG-1, at 8, 10).

B. Analysis and Findings

Based on our review, the Department finds that the Company has calculated the performance bonus in accord with the impact evaluation results approved above and the Department's Order authorizing a seven percent bonus. Bay State Gas Company, D.P.U. 91-272, at 118.[7] Accordingly, the Department hereby approves the Company's proposed performance bonus of $736,311.

Based on our review of the LBR calculation, the Department finds that the Company has correctly calculated the LBR, before taking interest into account, in accord with the impact evaluation results approved above and information on degree days and rates. However, the Department allowed a weighted cost of capital of 10.35 percent in the Company's most recent

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[7] The Department approved a settlement in Bay State Gas Company, D.P.U. 96-76 (1997), that provides a performance bonus of two percent of net program benefits for the Company's most recently pre-approved programs. Two percent is significantly lower than the seven percent performance bonus previously approved and applied in D.P.U. 96-98. Id. at 2.

rate case. Bay State Gas Company, D.P.U. 92-111, at 350 (1993). This is much lower than the interest rate used by the Company to calculate carrying charges on LBR. Therefore, the Department finds that the Company's LBR calculation overstates its actual LBR. Accordingly, the Department directs the Company in its compliance filing to recalculate its LBR using the cost of capital from its most recent rate case.

V. ORDER

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

ORDERED: That the savings estimates for the Company's DSM measure installations for the period September 1993 through June 1996 are approved; and it is

FURTHER ORDERED: That the Bay State Gas Company shall provide a compliance filing within thirty days, to include a proposed starting date and a proposed LDAF schedule which incorporates (1) the performance bonus approved herein and (2) lost net revenues recalculated using the Company's cost of capital (including interest on both), together with supporting information.

FURTHER ORDERED: That Bay State Gas Company shall comply with all other directives in this Order.

By Order of the Department,

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John B. Howe, Chairman

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Janet Gail Besser, Commissioner