Customer Energy Efficiency Program
Measurement and Evaluation Program

1998 EXPRESS PROGRAM MARKET EFFECTS STUDY (SMALL/MEDIUM COMMERCIAL FOCUS)

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1998 EXPRESS EFFICIENCY MARKET TRANSFORMATION STUDY (Small/Medium Commercial Focus)

FINAL REPORT

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E EXECUTIVE SUMMARY

At the end of 1998, Pacific Gas and Electric Company ("PG&E") requested a study (hereafter referred to as "Study") to be conducted to characterize the market and determine the near-term market effects of the 1998 PG&E Express Efficiency Program (the "Program"). This report presents the results of the Study.

E.1 PROJECT SCOPE & OBJECTIVES

This Study focuses primarily on the *1998* Express Efficiency Program. All of the *end-user* surveys conducted with program participants are conducted with those who participated in the *1998 program year*. Nonetheless, there are influences on end-user and supply-side market actors attitudes, knowledge, and efficiency-related behaviors that are attributable to PG&E's considerable program interventions throughout the 1990s. Consequently, some aspects of this Study address program and market effects that are attributable to PG&E program activities that occurred prior to 1998.

As emphasized in PG&E's original request for proposals, the target customer population for the 1998 Express Study consists of small and medium commercial end users in existing facilities. Although the 1998 Express Efficiency Program does include some new construction activity, this aspect of the Program is not included in the current Study. With respect to customer size, the definition of small and medium for PG&E customers is those customers with demand of <500 kW. Note that in 1998, customers over 500 kW were permitted to participate in the PG&E Express Program, but that analysis of any program or market effects on large customers are excluded from the scope of this Study. Similarly, this Study focuses exclusively on small and medium commercial end users, and does not include industrial or agricultural customers.

The XENERGY/QC team used several criteria to select the set of measures (and practices) that could be studied adequately within the agreed upon scope of this Study. As a result of applying the screening process we developed, the measures included in the scope are T8 lamps/electronic ballasts, delamping (with T8s and electronic ballasts), compact fluorescent lamps, and high-efficiency packaged air conditioners (A/C). These constitute the four *primary* measures upon which we focus this Express Efficiency Program evaluation.

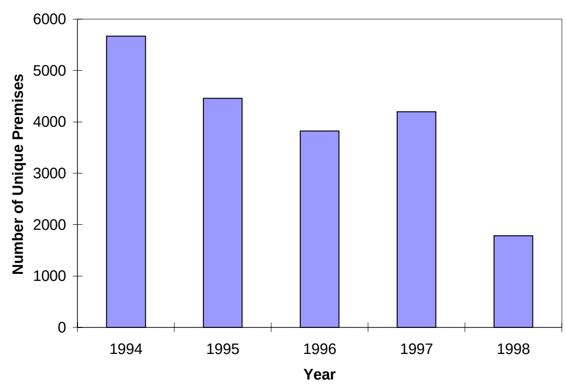
In addition to end users, contractors and distributors of lighting and commercial A/C equipment also were surveyed for this study. These included electrical and lighting-only contractors for lighting work, heating, air conditioning and sheet metal contractors for A/C work, and both lighting and A/C equipment distributors. To remain within scope, not all types of supply-side actors could be included in this Study. Because designers and manufacturers were surveyed in recent, previous market effects studies, these market actors were excluded from this Study.

E.2 OVERVIEW OF EXPRESS EFFICIENCY PROGRAM

The Express Efficiency Program (previously called Retrofit Express) has been available to PG&E's nonresidential customers in one form or another for almost 10 years. PG&E's 1998 Express Efficiency Program is similar to PG&E's former Retrofit Express Program except that it was designed to encourage market transformation, included two new upstream components, and encompassed limited measures for new construction activities.

The 1998 Express Program targeted small to medium commercial and industrial customers, although larger customers were also allowed to participate.[1] Half of the applications in 1998 were for $500 or less; two-thirds were for $1,000 or less, and only 54 were for more than $10,000. The change in the number of participant customers, within the <500 kW group, are shown in Figure E-1 for the 1994 to 1998 period. Note that the number of end user participants has *dropped several fold* over this period.

Figure E-1
Number of Unique Premises <500 kW in the Express Rebate Program, 1994 to 1998



The measures offered and the Express program structure have changed from year to year, but the basic concept of rebating the replacement of inefficient equipment with new energy-efficient equipment has stayed constant. Some of the more significant program changes in recent years include the following:

- significant decreases of several fold in the total amount of rebate dollars expended between 1994 and 1998;
- decreases over the past several years, and particularly for 1998, in the amount rebated per unit for certain measures;
- changes in marketing and outreach efforts;
- a change from end-user to distributor rebates for high-efficiency packaged A/C in 1998;
- a change from end-user to vendor rebates for premium motors in 1998; and

[1] Note, however, that in 1999 customers with loads greater than 500 kW were excluded from eligibility.

- inclusion of selected prescriptive measures for new construction in 1998.

E.3 CONTEXT AND STUDY APPROACH

Our Study assessed the effects of the 1998 Express Efficiency Program.[2] However, *many of the measures/products covered by the Program were included under the preceding Retrofit Efficiency Program* so it was not possible to analyze or even define the Express Efficiency Program in isolation. To address this issue we took several steps. For one, we selected participating customers based on participation data for 1998. In our customer interviews, we documented whether customers said they had participated in the Retrofit Efficiency Program in years prior to 1998. In our analysis, we made every attempt to identify what effects might have been due, in part, to the preceding Program.

The 1998 Program did offer an opportunity to assess a totally new component, which we have termed the "upstream" A/C Program. This component provided incentives to A/C distributors who sold high-efficiency packaged units. The definition and assessment of the upstream Program was less confounded by the long-term existence of similar Program elements. On the other hand, *the fact that the upstream Program was in existence for only one year was problematic for determining long-term market transformation effects*. To take this into account, we developed program theories that distinguished market cause-effect relationships expected in the near-term from those expected over the long-term. Our hypotheses and associated market effects also reflected this chronological split.

The overall objectives of this Study that we carried out were to: characterize the markets, describe market barriers, document market effects, assess sustainability of market effects, and develop a forward-looking assessment of market potential and recommendations. A critical step in our approach was the development of Program theories. As noted earlier, we developed two sets of theories, one to describe the downstream (i.e., activities directed at customers) Program and the second to describe the upstream Program. The theories were crucial in defining the features of the Program, determining the anticipated cause-effect relationships attributable to the Program, identifying market barriers, focusing data collection, and structuring the analysis.

E.4 SUMMARY OF PROGRAM MARKET EFFECTS

Our market effects findings are summarized in Section 2 and presented in detail in Section 7. Our findings are separated into downstream and upstream components. The extent of the evidence depended on the types of data and information that were available and the quality of the information. In some cases, it was too early in the Program, particularly the upstream Program, to have much information available. The degree to which each hypothesis could be confirmed by this study depended on two factors—the extent and strength of the evidence. For example, a

[2] As discussed in Section 1, this Study was coordinated with the market effects study for the Business Energy Management Services (BEMS) Program and the SmarterEnergy Program study (led by Quantum Consulting (QC) with XENERGY as a subcontractor).

hypothesis would be well supported by our results if both extensive evidence was available and the evidence provided strong indications that the hypothesized cause-effect relationship was occurring. Hypotheses would be only partially confirmed if either there was extensive evidence that was weakly supportive (or contradictory) or there was very little evidence but what was available supported the hypothesis. The validity of hypotheses was not supported if the evidence was very limited and what evidence was available did not support the hypothesis. In cases where available evidence was very limited because it was too early to collect extensive evidence or other sources of information might be required, we could not draw any overall conclusions about the validity of the hypothesis.

E.4.1 Downstream Program Effects

Our overall assessment of the downstream component of the 1998 Express Efficiency Program is that it appears to have resulted in moderate end user effects. The majority of the hypotheses for which evidence of effects existed were associated with end users; conversely, there were few effects of the downstream portion of the *1998* Program that could be observed on the supply-side (see Table 2-2 in Section 2 for conclusions on each hypothesis developed). Although we observed a number of differences among our end user comparison groups[3] that point to program-induced effects, there were two caveats to this finding. First, because we had no opportunity to observe the characteristics of end-user participants before they entered the 1998 Program, we could not be absolutely sure that the differences in the indicators of interest were attributable exclusively to the Program and not the fact that participants self-selected into the Program because they already possessed the desired characteristics.[4] Second, the absolute participation level for the 1998 Program was so low as to beg the question of whether any program-induced effects could have spread among the overall population of target customers at the 1998 rate of participation. Small/medium participants in the 1998 Express Efficiency Program represented only 0.5 percent of the PG&E small/medium population of customers and 1.9 percent of the PG&E small/medium energy usage. This level represented a significant drop in participation compared with previous years. Given the relatively low penetration levels in 1998, it is unlikely that significant spillover leading to broad-based market effects was generated.

The lack of near-term effects among supply-side actors was likely attributable to the fact that the Program was very small in 1998, particularly in comparison to previous years. For example, two-thirds of lighting contractors interviewed stated they were unfamiliar with the current program, even though many indicated they participated in previous years. Thus, it was difficult to make a case that the 1998 Program itself had a strong direct influence on contractors. On the other hand, the supply-side actors interviewed continued to report that they promoted efficient lighting products routinely and would continue to do so without rebates. This aspect of our

[3] The comparison groups are: end user participants, in-territory non-participants, and end users in states with low historic levels of DSM or market transformation program.

[4] Note that we have developed self-selection models as part of this Study and made other analytical attempts to identify and control for this possibility. This information is presented in Section 7. Even so, the possibility of self-selection attributable to unobserved factors cannot be ruled out.

findings confirmed the results of the PG&E/SDG&E Commercial Lighting Market Effects Study, which indicated that the 1992 to 1996 rebate programs had an important impact on supply-side actors, and indicated that the effects might be sustainable (at least for larger customers). Thus, we conclude that the downstream component of the 1998 Express Program appeared to have had *few*, if any, *incremental effects*[5] on contractors and distributors but did continue to positively influence participating end users.

E.4.2 Upstream (High-Efficiency A/C) Program Effects

We broke our overall assessment of the upstream component of the 1998 Express Efficiency Program into two parts. ***For the near term, we concluded that the upstream A/C component of the Program has resulted in moderate program effects. In terms of long-term market effects, we concluded that the upstream A/C component has had limited effects to date*** (see Table 2-3 in Section 2 for a summary of conclusions for each hypothesis developed).

The contractor and distributor interviews suggested the Program-related awareness and behavior differed between the two supply-side actor groups. Most PG&E-area contractors were not aware of the 1998 Program, while most distributors were. This was not surprising given that the upstream Program targeted A/C distributors. Because awareness and knowledge of energy efficiency were high in both the PG&E and comparison areas and there was limited Program awareness, we concluded that the Program had not increased awareness and knowledge significantly. Similar results applied to product performance uncertainty. Although the rebate reduced distributor costs, the evidence was limited that these savings were passed along through the supply chain. On the other hand, there was evidence suggesting that the Program had resulted in increased stocking of high-efficiency units and that contractor demand, installations, and promotion of high-efficiency A/Cs was higher in the PG&E area. Similarly, overall satisfaction with sales and installation of high-efficiency units was higher in the PG&E area. We had no information from the interviews about whether the Program had led to increased positive communications by suppliers about high-efficiency units.

Overall, the information from customers on the upstream Program effects was limited. Because the Program targeted distributors, there was little reason to expect significant market effects on the customer side unless the effects carried through the supply chain. As observed above for the supply side, however, the energy-efficiency message promoted by the upstream Program did not appear to extend much beyond the distributors. The customer survey data did not contradict the supply-side findings. Generally, the evidence of Program effects on customers was quite limited. Evidence of effects was highest for customer satisfaction with high-efficiency A/Cs and positive communications about energy-efficient measures and this was consistent with results for the downstream Program.

The effects for which the extent and the strength of the evidence were most significant involved near-term changes in the market. As noted earlier, because our data applied to the first year of

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[5] That is, incremental to those effects previously documented in the study cited above.

the upstream Program it was unlikely that significant long-term market effects would be observed and this was borne out by the data. The information did suggest that near-term effects that could lead to long-term market changes were observable. As discussed in Section 7, it also identified some links in the causal change that would need to be strengthened to increase the likelihood of fundamental market changes.

E.4.3 End User Modeling Results

We conducted end user modeling analyses that addressed several of the important issues encountered in our market effects analyses. Details on the modeling are provided in Section 7 and Appendix B. The purpose of our modeling was twofold: to attempt to control for possible self-selection bias and to provide additional evidence for assessing the market effects hypotheses. As presented in Section 7.5, the modeling results provided support for the existence of both program and market effects. Overall, the modeling results agreed with the results developed from our cross-sectional and qualitative analyses in about three-fourths of the specific cases analyzed. We believe, therefore, that the modeling results generally provide additional support for the program and market effects findings discussed earlier and partially alleviate concerns about self-selection bias.

E.5 SUMMARY OF MARKET INFORMATION

We present here a short summary of results obtained from the primary research activities conducted for this Study (a longer summary is provided in Section 2).

E.5.1 Supply-Side Results

Summaries of the key results from the supply-side interviews are presented in the bullets below:

Air Conditioning-Related

- Large contractors, though representing only two percent of firms, account for about one-fifth of the packaged unit installations.
- Distributors in PG&E's territory stock a higher percentage of qualifying high-efficiency packaged A/C units that distributors in low-DSM states.
- 78 percent of PG&E Territory distributors said they are recommending qualifying high-efficiency packaged units more than they were three years ago (compared with 45percent in low-DSM states).
- PG&E-area contractors and distributors describe themselves as actively promoting high-efficiency packaged A/C significantly more than their counterparts in low-DSM states.
- Contractors reported that on average 35% of their packaged A/C sales for five tons or greater were high-efficiency units, while distributors reported that between 31% and 37% of their sales of all size units were high efficiency.

- The main barrier to increased usage of high-efficiency units that contractors and distributors report on was that the incremental value of the high-efficiency unit is too low to justify the additional cost.
- Contractors generally felt that the upstream distributor-based program was less effective in increasing the market share of high-efficiency A/C units than the previous end user approach; however, distributors tended to think the opposite was true, that is, that the new program was more effective.

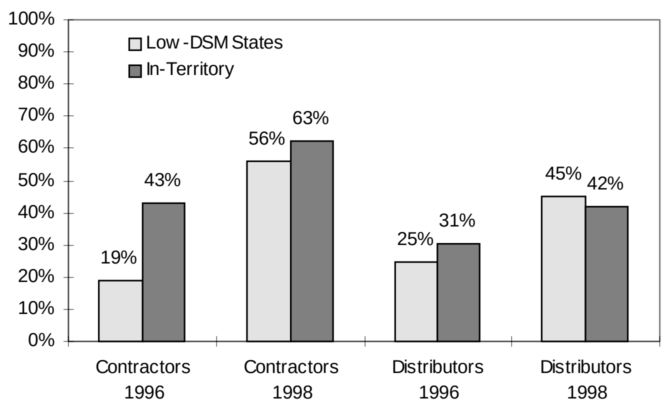
Lighting - General

- Large contractors represent only 2 percent of the firms but account for over a third of the revenues.
- Both in and out of PG&E's Territory, the most important trend over the past three years was reportedly the increased usage of efficient lighting. Technical improvements in products were cited by a majority of contractors as the second most important trend.

Lighting - CFLs

- Fixtures designed to take advantage of the peculiar shapes of CFLs are more common than three years ago.
- According to lighting contractors, from 1996 to 1998 the penetration of CFLs went from 43% to 63% in the PG&E service territory, and from 19% to 56% in low-DSM states (see figure below). Thus, although in-territory penetration continues to increase, the trend in the comparison area is more dramatic. This is likely attributable to the rapid spillover to these areas of market effects generated by utility programs in other areas of the country (including California).

Figure E-2
Percent of Downlight and Sconce Sales With Compact Fluorescent Lamps



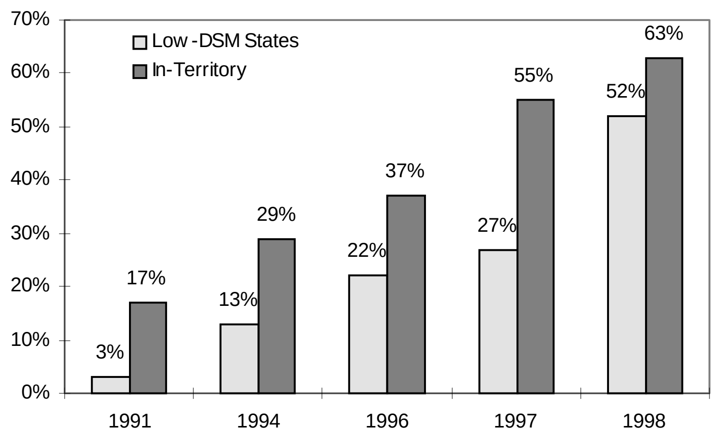
- Technological barriers to the acceptance of CFLs have lessened considerably in the past three years. Improvements were noted with respect to buzzing, color rendition, flicker, and unreliable starting.

- When asked whether utility programs had contributed to reducing barriers to the use of CFLs, 71 percent of in-territory and 44 percent of low-DSM state contractors indicated that they had. In-territory contractors stated that the rebates contributed to increased awareness, reduced the risk of trying a new technology, and generally jump-started the market.
- Remaining barriers to CFLs include customer ignorance of the savings potential and the variety of available fixtures, lack of a very bright source, high first costs (bounded rationality and organizational practices), and (mostly in the low-DSM area) availability.

Lighting - T8 Lamps and Electronic Ballasts

- T8 lamp and electronic ballast usage continue to increase both in PG&E's territory and in low-DSM areas. Despite decreases in rebate levels, previously document market effects (XENERGY, 1998) appear to be persisting (at least for large customers). Dramatic increases in T8/electronic ballast penetration also are reported by vendors in the comparison area. The figure below shows the long-term trends in electronic ballast penetration as reported by lighting distributors (figures for T8s are very similar):

Figure E-3
Long-Term Trend of Electronic Ballast As Percent of 4-foot Ballast Sales
(Based on Distributor Self-Reports from two studies, see footnote)



Sources: For 1991, 1994, and 1997; XENERGY, 1998. For 1996 and 1998, the current Study.

- 67% of PG&E-area contractors and 90% of contractors in low-DSM states said that smaller commercial customers lag significantly behind larger ones in adopting T8 lamps and electronic ballasts. Reasons given center on larger companies having personnel dedicated to energy efficiency and better access to capital.
- Only about one quarter (28%) of in-territory contractors were aware of the 1998 Express Efficiency Program. In contrast, 85 percent of contractors interviewed as part of the PG&E/SDG&E Commercial Lighting Market Effects Study were aware of the previous utility rebate programs. Program awareness appears to have decreased significantly.

E.5.2 Summary of Results from End User Surveys

Selected findings from the customer surveys are summarized below.

- Only 58% of the Program participants that were interviewed actually reported that they had participated in the Program.
- T-8s were installed by 34% of participant respondents and were by far the most common measure installed under the Program.
- Participants said that the Program had a very strong influence on their decision to install energy-efficiency measures, but when asked whether they would have made the change anyway about half said that they would have.
- A majority of participants said that the Program was very important in overcoming cost barriers (63%) and uncertainty about measure performance (55%).
- Forty-five percent (45%) of participants said that the Program had a significant effect on their use of long-term investment analysis for energy-efficiency measures.
- Participants were almost 40% more likely to say that they would pursue energy-efficient investments in the future.
- Participants were 15% to 25% more likely than low-DSM state customers to believe that energy-efficient measures would reduce their utility bill, perform as well or better than standard products, and provide important benefits other than energy savings.
- Participants were much more likely to disagree with statements that it took too much time or hassle to get information or select a contractor for energy-efficiency measures or that the information they obtained was not helpful.
- Low-DSM state customers were twice as likely as participants (32% compared to 16%) to say that they were not knowledgeable about the availability and performance of energy-efficiency measures.
- Participants were 50% more likely to say that their experiences with measures increased their confidence that the measures would reduce their utility bills and, for most measures, participants were more likely to say that they were more satisfied with their performance.
- Participants were significantly more likely to have installed CFLs, reflectors, setback thermostats, and occupancy sensors outside of the Program.
- Participants were nearly twice as likely as out-of-state customers (52% compared to 29%) to state that they actively advocated energy efficiency to others, and were about 25% more likely to say that they regularly heard about energy efficiency from professionals.
- Although the majority of all groups agreed, PG&E customers were nearly 20% more likely to believe that saving energy was part of being a good corporate citizen.

E.5.3 Summary of Market Barriers

One important step in assessing the market effects is confirmation that barriers that the Program is designed to address actually exist. The top four barriers reported by customers across all customer groups consistently were the following: performance uncertainty, asymmetric information and information costs, bounded rationality/organizational practices, and access to financing. These significant barriers reported by customers were consistent with those that we identified as part of the program theory development. Customers reported, however, that transaction/hassle costs were less significant barriers than we anticipated. The least significant of the barriers considered was unavailability of efficient products and this was consistent with our expectations during theory development. In general, the barriers as ranked by customers were consistent with our expectations in developing the program theories.

On the supply side, our program theory description suggested that transaction/hassle and information costs were expected, but not very significant, barriers from the contractor perspective. The contractor surveys identified too little incremental value for the added cost[6] and lack of customer awareness as the main barriers to selling CFLs and high-efficiency A/Cs. Lack of contractor awareness and knowledge was also mentioned as a barrier by A/C contractors. These barriers were consistent with the information cost and organizational practices and bounded rationality barriers. Overall, it appeared that barriers on the supply side were quite dependent on the specific product.

E.6 RECOMMENDATIONS

The recommendations presented below are intended to suggest ways in which the PG&E Express Efficiency Program might be improved or modified with respect to the small/medium nonresidential market. The recommendations are not intended to provide specific program design details, but rather to suggest general areas of improvement upon which we believe policy-makers and program designers should focus their efforts.[7]

1. Improve end user participants' awareness, knowledge, and recognition of the Program and associated benefits
2. Consider increasing funding levels for the small/medium Express Program. Parallel consideration should be given to consolidating the Express/SPC offering
3. Improve the "trickle down" of Program benefits from Distributors to contractors and end users for the upstream packaged unit component of the Express Program
4. Continue working to improve outreach and target marketing to all market actors
5. Identify and target measures for increased Program emphasis

Detailed discussion of these recommendations is presented in Section 8 of this report.

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6 We recognize that "first cost" is not an agreed upon market barrier and, in particular, is not included as a barrier in Eto, et al., 1996. We do believe, however, that it is important to report respondents' assessments of market barriers in their own terms.

7 As evaluators we do not seek to directly participate in the program design process; at the same time, we believe it is incumbent upon us to help improve the programs we assess by making suggestions that arise from our direct research activities.

1 INTRODUCTION

At the end of 1998, Pacific Gas and Electric Company ("PG&E") requested a study (hereafter referred to as "Study") to be conducted to characterize the market and determine the near-term market effects of the 1998 PG&E Express Efficiency Program (the "Program"). PG&E's 1998 Express Efficiency Program grew out of the earlier Retrofit Express program and was specifically designed to encourage market transformation. At around the same time, PG&E also requested that a study be conducted of its Business Energy Management Services (BEMS) Program and Smarter Energy (SE) website. XENERGY Inc. was selected as the Prime Contractor for the Express Study, with Quantum Consulting Inc. as the subcontractor. For the BEMS/SE Study, Quantum Consulting Inc. was selected as the Prime Contractor with XENERGY Inc. as the subcontractor. A primary objective of the XENERGY/Quantum Consulting team was to capture economies of scale and minimize respondent burden by conducting the two studies jointly. Each study is presented in its own stand-alone report.

1.1 PROJECT SCOPE & OBJECTIVES

This Study was designed to focus on *selected aspects* of the 1998 Express Efficiency Program as described below.

1.1.1 Program Years and End Users Included in this Study

This Study focuses primarily on the 1998 Express Efficiency Program. All of the *end-user* surveys conducted with program participants are conducted with those who participated in the *1998 program year*. Although program participants, and to some extent, program effects, can be isolated on the end-user side, this is not the case with supply-side actors (principally because these vendors have been exposed to multiple years of the Express program). Even among end users that participated in the Program in 1998, there are influences on their attitudes, knowledge, and efficiency-related behaviors that are attributable to the considerable program interventions of the 1992 to 1997 period (and even those program years prior to 1992). Consequently, there are some aspects of this Study that will address program and market effects that may be attributable to PG&E program activities that occurred prior to 1998.

As emphasized in PG&E's original request for proposals, the target customer population for the 1998 Express and BEMS/SE studies consists of *small and medium commercial* end users in *existing* facilities. Although the 1998 Express Efficiency Program does include some new construction activity, *this aspect of the Program is <u>not included</u> in the current Study*. With respect to customer size, the definition of "small and medium" for PG&E customers was agreed to be those customers with demand of less than 500 kW as determined by their rate schedule in PG&E's billing system. Note that in 1998, customers with demand over 500 kW were permitted to participate in the PG&E Express Program, but that *analysis of any program or market effects on these customers <u>are excluded</u> from the scope of this Study*. Similarly, this Study focuses exclusively on small and medium commercial end users, and *__does not include__ industrial or agricultural customers*.

The decisions to restrict the scope of this Study were made for two principal reasons: 1) to match the project team's efforts with the timeline and budget requirements; and 2) to focus on those aspects of the 1998 Express Efficiency Program that were known at the end of 1998 to be continuing into 1999 (for example, in 1999, customers with loads over 500 kW are excluded from the Express Program and must instead participate in the Large Nonresidential Standard Performance Contract Program).

1.1.2 Measures Included in this Study

This subsection identifies the energy-efficiency measures that are covered in this Study.[1] The XENERGY/QC team used the following criteria to select the set of measures (and practices) that we felt could be studied adequately within the agreed upon scope of these studies:

1. The measure's contribution to avoided cost for the 1998 Express Efficiency Program
2. The frequency of recommendations made in the 1998 BEMS surveys
3. The historical contribution to avoided cost for previous Retrofit Express Programs
4. The historical frequency of recommendations made in the previous BEMS Program years
5. The cost-effectiveness of the measure
6. The future potential of the measure/practice in terms of the BEMS/Express Programs being able to effectively transform the market for the measure/practice
7. Interest from PG&E staff to conduct a market characterization/process evaluation on specific measures, primarily for the purposes of future program design

As a result of applying the screening process from the steps above, the measures included in the scope of this Study are the following:

- T8 lamps – This measure has always been the highest participation measure for the Retrofit Express/Express Efficiency Program (32% of 1998 Express), and the most commonly recommended measure in BEMS (about 31% of all Business Energy Survey Tool (BEST)) recommendations, meaning almost every customer receives this recommendation). It is a measure with a significant amount of potential remaining in the small business sector.
- Delamping and installation of reflectors - It should first be noted that this measure is almost always done in tandem with T8 installations. This is generally the second highest participation measure for the Retrofit Express/Express Efficiency Program (almost 20% of 1998 Express).

[1] Note that the BEMS study includes an additional set of practices for which data were collected, but they are not discussed in any detail here. See the Quantum Consulting report.

- CFLs - This measure has also been one of the higher participation measures for the Retrofit Express/Express Efficiency Program (almost 20% of 1998 Express), and is a frequently recommended measure in BEMS (about 5% of all BEST recommendations). This measure still has a significant amount of potential in the small business sector.
- CACs - This measure also has been one of the higher participation measures for the Retrofit Express/Express Efficiency Program (almost 15% of 1998 Express), and is a frequently recommended measure in BEMS (about 4% of all BEST recommendation). This measure also has a significant amount of potential in the small business sector. *It is also the primary focus of the upstream portion of this Study*.

These constitute the four *primary* measures upon which we focus this Express Efficiency Program evaluation. We also have created an additional set of measures for which only limited information was collected. This group is comprised of the following:

- ASDs – This measure comprised 2.3% of the avoided cost for the 1998 Express Efficiency Program. Although we initially considered including ASDs within the primary measure group above, we decided to move it to this secondary group because it was not feasible to address enough of the ASD-specific market issues within the constraints of the surveys being conducted for the four primary measures. An entirely different survey and a separate population are needed to cover ASDs.
- Set Back Thermostats – This measure is commonly installed along with an HVAC replacement. Historically, this measure has contributed a fair amount to the program-level avoided cost (1.2% of 1998 Express) and has been a frequently recommended measure for BEMS (about 13% of all BEST recommendations). This measure has a fair amount of remaining potential.

Documentation on measures excluded from the scope of the current Study is provided in Section 9 of this report.

1.1.3 Supply-Side Actors Included in this Study

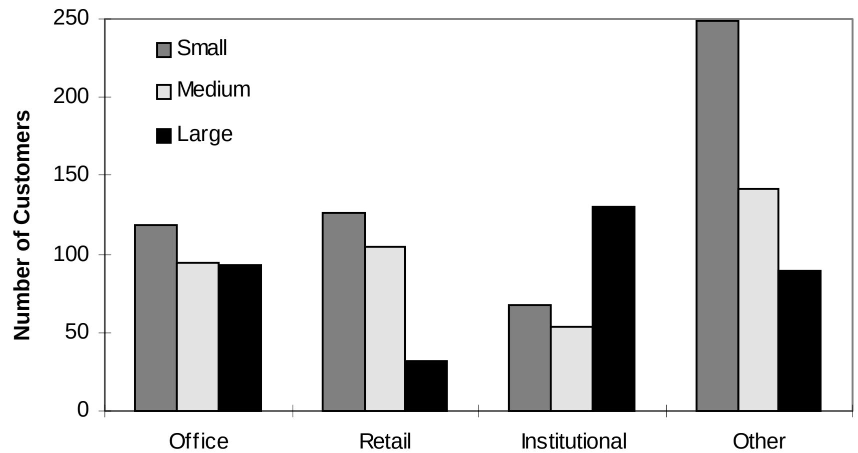
Contractors and distributors of lighting and HVAC equipment were surveyed for this study. These included electrical and lighting-only contractors for lighting work, heating, air conditioning and sheet metal contractors for HVAC work, and both lighting and HVAC equipment distributors. To remain within scope, not all supply-side actor types could be included in this Study. Because designers and manufacturers were surveyed in previous lighting and HVAC market effects studies, these market actors were excluded.

1.2 OVERVIEW OF EXPRESS EFFICIENCY PROGRAM

The Express Efficiency Program (previously called Retrofit Express) has been available to PG&E’s nonresidential customers in one form or another for almost 10 years. PG&E’s 1998 Express Efficiency Program is similar to PG&E's former Retrofit Express Program except that it was designed to encourage market transformation, included two new upstream components, and encompassed limited measures for new construction activities.

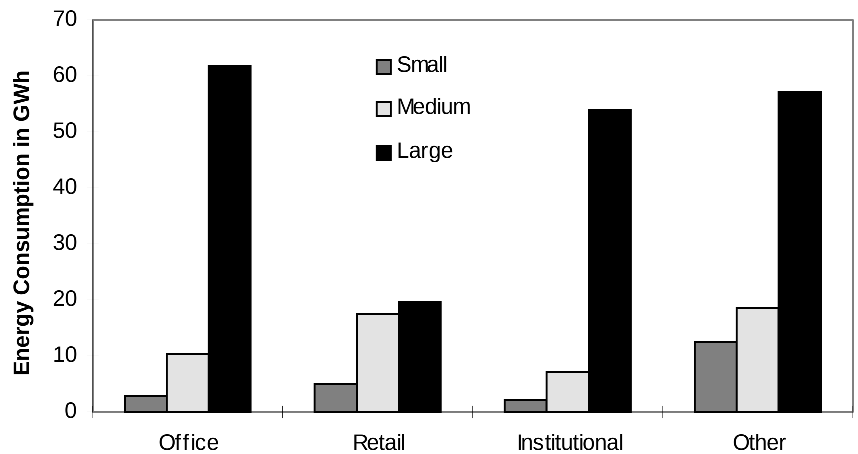
The 1998 Express Program targeted small to medium commercial and industrial customers, although larger customers were also allowed to participate.[2] According to Program staff (and confirmed through analysis of program tracking data) half the applications in 1998 were for $500 or less; two-thirds were for $1,000 or less, and only 54 were for more than $10,000. The number and usage of participant customers, within the <500 kW group, are shown in Figures 1-1 and 1-2. Key markets are owner-occupied office buildings, grocery chains, and non-food retail. In the past, a relatively large number of schools were involved in the program, but participation has declined in this sector.

Figure 1-1
Number of Customers in 1998 Express Program < 500 kW*



*Category definitions are: small (<20 kW), medium (20 to 99 kW); large (100 to 499 kW)

Figure 1-2
Energy Consumption in Gigawatt-hours of 1998 Express Program Participants <500 kW*



*Category definitions are: small (<20 kW), medium (20 to 99 kW); large (100 to 499 kW)

2 Note, however, that in 1999 customers with loads greater than 500 kW were not eligible to participate.

The measures offered and the program structure have changed from year to year, but the basic concept of rebating the replacement of wasteful equipment with new energy efficient equipment has stayed constant. Some of the more significant program changes in recent years include the following:

- Significant decreases of several fold in the number of participants, number of rebated units, and the total amount of rebate dollars expended between 1994 and 1998, as shown in Figures 1-3 through 1-7;
- Decreases over the past several years, and particularly for 1998, in the amount rebated per unit for certain measures (see Tables 1-1 through 1-4);
- Changes in marketing and outreach efforts;
- A change from end-user to distributor rebates for high-efficiency packaged units in 1998;
- A change from end-user to vendor rebates for premium motors in 1998; and
- Inclusion of selected prescriptive measures for new construction in 1998.

Changes have been made to the way the Express Program is marketed. According to Program staff, with the focus moving toward smaller customers, larger numbers of projects are needed to have a significant overall impact on savings. This requirement coupled with reduced Program funding necessitated the introduction of a new marketing approach in 1998—one that would reach large numbers of people at lower cost. The response was to increase targeted mailings and develop a central clearinghouse of information on all the programs with Smarter Energy.

The Express Efficiency marketing effort included several mailed advertisements targeting distributors, contractors, vendors and customers in 1998. The mailings were distributed to PG&E's Trade Ally list of around 5,000 supply-side businesses, all Divisions, the PG&E Energy-Efficiency Resource Center, Pacific Energy Center, and the Learning Center. Advertisements were also mailed to customers who purchased package air conditioners early through the Express distributor program. Most mailings were broad-based, but sometimes new technologies were advertised in direct mailers to targeted customers where technologies were most suitable to just one sector. For example, the new metal halide lamps that replace spotlighting were highlighted in a mailer to retail sectors using spotlighting. The 1998 Express Program also had a monthly newsletter that attempted to shape the market by presenting policy directions the Program managers were considering.

From interviews with Program staff, it was clear that customer demand was seen as the ultimate driving force of program participation. To offset the significant reduction in the use of representatives for marketing the Express Program in 1998 and to foster the Program's increased focus on market transformation, PG&E sent mailers to 13,000 A&E firms stressing the importance and impacts of higher efficiency equipment to motivate the demand side. This outreach included a focus on building engineers for marketing because they are often instrumental in getting the ideas sold to the decision-makers, despite the fact that they usually are not the ultimate decision-makers themselves.

Figure 1-3
Number of Unique Premises <500 kW in the Express Rebate Program, 1994 to 1998*

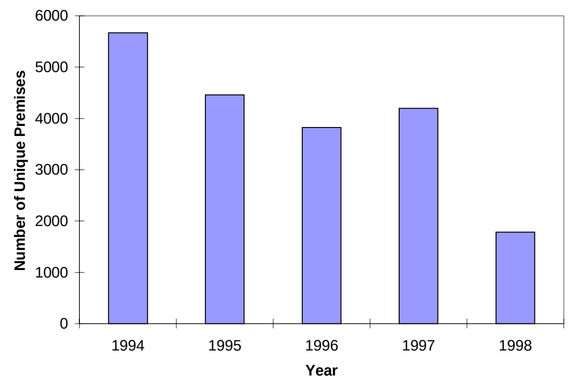


Figure 1-4
Express Rebates, 1994-1998,* Commercial Participants <500 kW

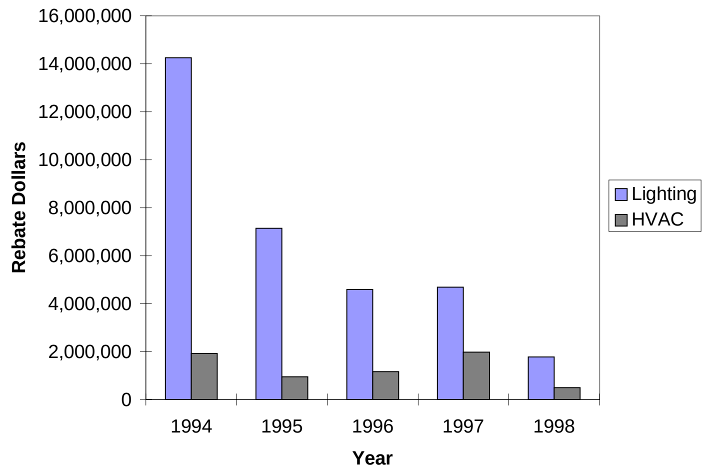
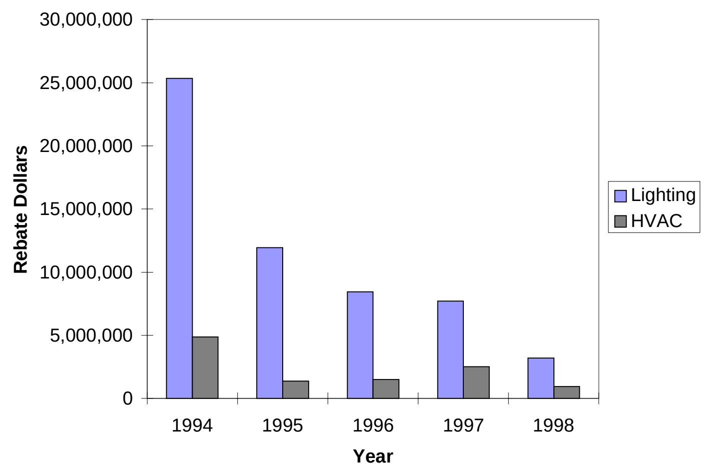


Figure 1-5
Express Rebates, 1994-1998,* All Commercial Participants



*For consistency, 1998 Express data do not include new construction.

Figure 1-6
Lighting Units Rebated Under Express Programs, Commercial Participants <500 kW

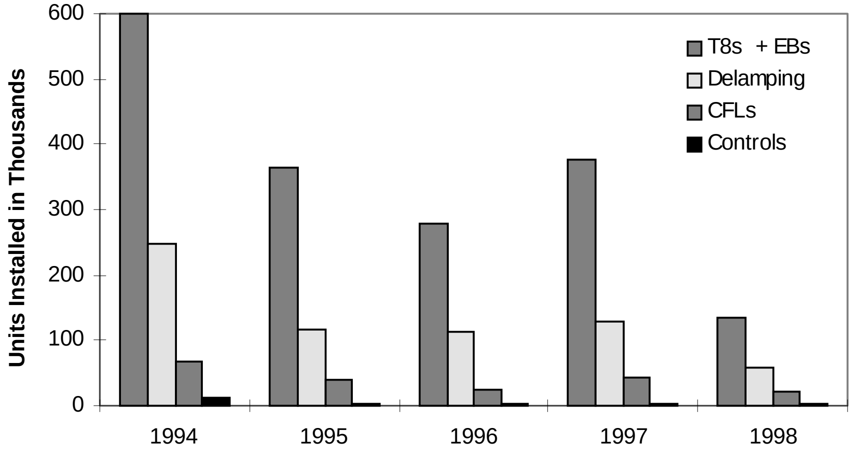
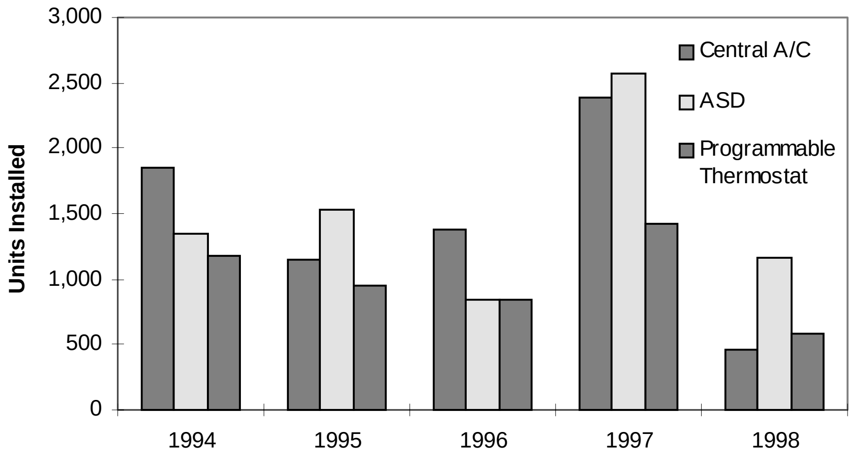


Figure 1-7
HVAC Units Rebated Under Express Programs, Commercial Participants <500 kW



By mid-1998 it was apparent the Program targets would not be met without a significant increase in participation. In response to this problem, Program staff introduced a 10% rebate bonus for customers completing their applications by the 1998 filing deadline. Postcards with the bonus notice were mailed to 30,000 customers, including past program participants, BEST (phone) survey and BusinessEdge (mail audit) recipients. Participation increased markedly in response to the bonus offering and the reiteration of the filing deadline.

In addition to the mailing campaign, the Smarter Energy marketing effort kicked off in 1998 with a toll-free telephone number and web site. Analysis of the Smarter Energy Program is presented in a separate report by Quantum Consulting. But it is important to mention the program here since Express Program staff said this more general advertising approach is expected to expand

and fill some of the gaps left by the significant reduction in the use of representatives for marketing the Express Program, as mentioned above.

In 1998 the Express Efficiency program adopted the Consortium for Energy Efficiency (CEE) High Efficiency Commercial Air Conditioning (HECAC) Initiative Tier 1 performance specifications. These specifications are equivalent to those of the ASHRAE 90.1 proposed standard. The CEE standards impose a higher standard for split-system units of less than 5.4-ton capacity and all water-cooled units, and establish part-load performance requirements (using IPLV) for all units with greater than 5.4-ton capacity. In earlier years, the program only required a minimum full-load performance.

Prior to 1998 the Express program offered customers a certain rebate amount per ton multiplied by the difference between the unit's (S)EER and a baseline (S)EER, plus an extra reward to customers who selected units with exceptional energy efficiency ratings. 1998 Express Efficiency program designers chose to offer a "flat" rebate of $50 per ton for two reasons. First, they wanted to keep the program as simple to understand as possible. Second, since the CEE standards were higher than those used by PG&E in the past, it was felt that the difference between the baseline performance and the SEER or EER of units generally available on the market would be fairly small.

Table 1-1
Express Rebate Amounts for T8 Lamps and Electronic Ballasts, 1993 to 1998

		Rebates					
	Basis	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Replace Incand w/ Fluor & Electr Ballast							
Fixture with 1, 2, 3, or 4-lamp ballast	ballast		$25	$15	$15		
Retrofit w/ Electronic Ballast							
2-lamp ballast	ballast	$10	$8	$6	$5.50	$4	$3.50
3-lamp ballast	ballast	$15	$12	$9	$8.50	$6	$5.25
4-lamp ballast	ballast	$20	$16	$12	$11.00	$8	$7.00
Replacement of Lamps & Ballasts							
2-ft, T8 lamp & electr ballast	lamp	$7	$3	$2.25	$2.25	$2.00	$1.50
3-ft, T8 lamp & electr ballast	lamp	$4	$4	$3.00	$3.00	$2.75	$2.00
4-ft, T8 lamp & electr ballast	lamp	$6	$6	$4.50	$4.25	$3.75	$2.70
8-ft, T8 lamp & electr ballast	lamp	$10	$12	$9.00	$8.50	$7.50	$5.40

Table 1-2
Express Rebate Amounts for Delamping Fluorescent Fixtures, 1993 to 1998

		Rebates					
	Basis	**1993**	**1994**	**1995**	**1996**	**1997**	**1998***
Remove Lamps, Ballasts; Install Reflectors							
2-ft lamp removed	lamp	$5	$5	$3.50	$3.25	$3.00	$0.75
3-ft lamp removed	lamp	$6	$6	$4.25	$3.75	$3.25	$0.75
4-ft lamp removed	lamp	$8	$10	$7.00	$6.25	$5.50	$1.25
8-ft lamp removed	lamp	$12	$12	$10.00	$8.75	$7.75	$2.00

**First year reflectors were not required as part of delamping.*

Table 1-3
Express Rebate Amounts for Compact Fluorescent, 1993 to 1998

		Rebates					
	Basis	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Compact Fluorescent Lamp, Screw-in							
Integral 5-13 W	lamp	$2	$1			$3.50	$2.75
Integral 14-26 W	lamp	$2	$2			$5.50	$4.50
Reusable Ballast 5-13 W	lamp	$6	$4	$4	$4	$3.50	$2.75
Reusable Ballast 14-26 W	lamp	$6	$6	$6	$6	$5.50	$4.50
Reusable Ballast ≥26 W	lamp				$7	$6.25	$5.00
Compact Fluorescent Lamp, Hardwired							
5-13 W	fixture	$15	$12	$10	$10	$9.00	$7.25
14-26 W	fixture	$15	$14	$12	$12	$11.00	$8.75
27-50 W*	fixture	$15	$16	$14	$14	$11.50 $12.50	$9.25 $10.00
51-65 W*	fixture					$11.50 $12.50	$9.25 $10.00
66-156 W*	fixture					$17.00 $18.00	$13.50 $14.50
≥157 W*	fixture					$21.50 $22.50	$17.25 $18.00

**Where two rebate levels are given for CFLs, the top number is the rebate paid for CFLs replacing mercury vapor lamps, and the bottom number is the rebate paid for CFLs replacing incandescent lamps.*

Table 1-4
Express Rebate Amounts for High-Efficiency Packaged Units, 1993 to 1998

	Basis	Rebates 1993	1994	1995	1996	1997	1998†
Single Package HVAC Units							
<65 kBtu/h	ton	$65 × (SEER-9.9)	$65 × (SEER-9.9)	$65 × (SEER-9.9)	$65 × (SEER-10)	$60 × (SEER-10)	$50 w/ min 11.0 SEER
≥65 kBtu/h & <135 kBtu/h	ton	$45 × (EER-8.9)	$45 × (EER-8.9)	$45 × (EER-8.9)	$60 × (EER-8.9)	$60 × (EER-8.9)	$50 w/ min 10.3 EER
>=135 kBtu/h & ≤240 kBtu/h	ton	$40 × (EER-8.5)	$40 × (EER-8.5)	$40 × (EER-8.5)	$50 × (EER-8.5)	$50 × (EER-8.5)	$50 w/ min 9.7 EER
>240 kBtu/h & <760 kBtu/h	ton	$40 × (EER-8.5)	$40 × (EER-8.5)	$40 × (EER-8.5)	$50 × (EER-8.5)	$50 × (EER-8.5)	$50 w/ min 9.5 EER

†*In 1998, the rebate for packaged HVAC units was paid to distributors rather than customers, as was the case in earlier years.*
‡*Prior to 1998, an additional $10 per ton was paid for units with exceptionally high efficiency ratings.*

1.3 SUMMARY OF PRIMARY DATA COLLECTION

Primary data was collected for this Study from contractors, distributors, end users, and Program staff. A total of 128 supply-side interviews were conducted in the PG&E and comparison area[3] territories. On the end-user side, 707 surveys were conducted (186 1998 Express participants, 299 in-territory non-participants, and 222 comparison area customers). Each of these sampling groups is summarized below. More detail on the sampling approaches is provided in Section 9 of this report.

The target customer population for this Study consists of small and medium commercial end users. The definition of small and medium for PG&E customers was agreed to be those customers with demand of <500 kW. As discussed in Section 9, the non-PG&E sample was drawn from *Dun & Bradstreet's MarketPlace* database. For these customers, size was estimated based on a conversion calculation that ties kWh consumption to the number of employees by business type. We segmented the populations of small and medium commercial customers into the following four business types for sampling and analysis purposes:

- Offices
- Retail
- Institutional

[3] For the purposes of this study we selected a group of states with low levels of recent (1990s) DSM activity. These states provide a useful point of comparative reference for program and market effects than do those states with very active programs, some of which also have current market transformation efforts. The historically low DSM states that we are using for the out-of-state non-participant sample are Arkansas, Kansas, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Oklahoma, Pennsylvania, South Carolina, and Texas. A second reason for selecting this comparison region is that it is consistent with that employed in the PG&E/SDG&E Commercial Lighting Market Effects Study. This facilitates longitudinal comparisons with the previous study.

- Other

These segments were selected based on past experience analyzing which segments account for most of the observed variation in customers' decision-making patterns for energy efficiency (see, for example, the PG&E/SDG&E Commercial Lighting Study).

Because customer size has been shown to be an extremely strong predictor of energy-efficiency related behaviors, attitudes, and actions, customers were also stratified by size in terms of energy usage. We used three size categories with the following cut-points:

- <20 kW
- 20 kW to <100 kW
- 100 kW to 499 kW

The combination of the 4 segments and 3 size strata results in 12 primary sampling cells. Our goal was to allocate each sample equally among these primary cells. The actual samples achieved are shown in Table 1-5. Note that because there was a finite population of program participants, we were not able to obtain a proportional sample for this group.

Table 1-5
End-User Surveys Conducted

Segment	Size	Participants	PG&E Territory	Low-DSM States
Office	<20 kW	23	25	11
	20-99 kW	10	27	15
	100-499 kW	10	25	23
	Sub total	43	77	49
Retail	<20 kW	12	25	14
	20-99 kW	15	25	25
	100-499 kW	2	25	14
	Sub total	29	75	53
Institution	<20 kW	12	26	21
	20-99 kW	11	25	20
	100-499 kW	19	25	18
	Sub total	42	76	59
Other	<20 kW	26	21	19
	20-99 kW	26	25	23
	100-499 kW	20	25	19
	Sub total	72	71	61
Total	Total	186	299	222

Supply-side sampling frames were developed for each of market actors in the scope of this study (non-residential HVAC and lighting contractors and distributors). Dun & Bradstreet's (D&B) Marketplace database was used as the frame for several of the segments of interest, including

HVAC contractors and out-of-territory distributors. In those cases for which D&B was used as the sample frame, the approach employed was to segment the population of firms within the most appropriate SIC groups on the basis of number of full-time equivalent (FTE) employees as a proxy for the size of the establishment (since FTE are available in D&B for establishments but revenues are not). Supply-side firms were segmented because we expected that the responses of interest for our surveys will vary significantly by size of service provider. Table 1-6 summarizes the sample achieved by respondent type and size and the number of interviews completed.

Table 1-6
Supply-Side Interviews Conducted

Market Actor	Group	FTE Stratification	Actual Sample Completed	Source
HVAC - Contractors	PG&E	0-9	5	D&B
		10-24	7	D&B
		25-99	9	D&B
		≥100	5	D&B
			Total 26	
HVAC - Contractors	Non-CA	0-9	3	D&B
		10-24	6	D&B
		25-99	5	D&B
		≥100	5	D&B
			Total 19	
HVAC - Distributors	PG&E ’98 Participants	None	10	PG&E
HVAC - Distributors	Non-CA	None	11	D&B
Lighting - Contractors	PG&E	2-9	3	D&B
		10-49	6	D&B
		50-99	6	D&B
		≥100	6	D&B
			Total 21	
Lighting - Contractors	Non-CA	2-9	5	D&B
		10-49	4	D&B
		50-99	5	D&B
		≥100	7	D&B
			Total 21	
Lighting - Distributors	PG&E	None	10	D&B
Lighting - Distributors	Non-CA	None	10	D&B
Total HVAC			66	
Total Lighting			62	
Total Supply Side			128	

2 SUMMARY OF RESULTS

This section presents a summary of the results for this Study of the Market Effects of the 1998 Express Efficiency Program. We first provide important background information on the context of the Program and this Study and an overview of our analytic approach. We then summarize the findings from our assessment of the Program's market effects. In the third subsection we discuss findings about the market. This information includes market characteristics and key market data used in this study. The final subsection presents a summary of recommendations resulting from this Study.

2.1 CONTEXT AND STUDY APPROACH

2.1.1 Program and Study Context

As mentioned in Section 1, *this study was coordinated with the market effects study for the Business Energy Management Services (BEMS) Program and the SmarterEnergy Program study* (led by Quantum Consulting (QC) with XENERGY as a subcontractor). The main activities closely coordinated between the studies were the development of survey instruments and integration of the data collection itself. XENERGY and QC also coordinated the sample design efforts, data analysis, and reporting of results.

Our Study assessed the effects of the 1998 Express Efficiency Program. However, *many of the measures/products covered by the Program were included under the preceding Retrofit Express Program* so it was not possible to analyze or even define the Express Efficiency Program in isolation. To address this issue we took several steps. For one, we selected participating customers based on participation data for 1998. In our customer interviews, we documented whether customers said they had participated in the Retrofit Express Program in years prior to 1998. The survey included questions about when the customer participated and which measures were installed when. In our analysis, we made every attempt to identify what effects might have been due, in part, to the preceding Program. Where it was likely, we also endeavored to note where the Retrofit Express Program might have produced positive market changes that minimized the marginal effects that could be attributed to the Express Efficiency Program. Ultimately, however, it was not possible to eliminate or disentangle totally the influences of the Retrofit Express Program.

The 1998 Program did offer an opportunity to assess a totally new component, which we have termed the "upstream" HVAC Program. This component provided incentives to HVAC distributors who sold high-efficiency packaged units. The traditional elements of the Program described above have been defined as the "downstream" (customer) Program. The definition and assessment of the upstream Program was less confounded by the long-term existence of similar Program elements.

On the other hand, *the fact that the upstream Program was in existence for only one year was problematic for determining long-term market transformation effects*. To take this into account, we developed program theories that distinguished market cause-effect relationships expected in the near-term from those expected over the long-term. Our hypotheses and associated market effects also reflected this chronological split. Fundamentally, our emphasis was less on indisputable proof of lasting, program-induced changes in the marketplace (which rarely occur so quickly from any new program intervention) and more on whether there were any early indications that the hypothesized sequences of events had begun to manifest themselves. This perspective was consistent with the theory-based evaluation we used and discuss in Section 3. In our analysis and results, we made the distinction between the near- and long-term effects, and emphasized assessing the expected near-term market effects.

For a number of reasons, but primarily to stay within the study scope, *we limited the Program measures that we examined to a subset of those covered by the Program.* Although the 1998 upstream Program included incentives to distributors for high-efficiency packaged air-conditioners (A/Cs) and to vendors/contractors for high-efficiency motors, we included only packaged A/Cs in this study. The study did not address motors because the number of motors sold under the 1998 Program was relatively small and PG&E modified the Program in 1999 to provide rebates to distributors instead. Further information on the measures included and excluded is presented in Sections 1 and 9 of this report.

2.1.2 Study Approach

Table 2-1 presents an overview of our study approach and the activities conducted. The objectives of this study were the following:

- **Characterize the markets:** Identify products and measures promoted by the Express Efficiency Program; boundaries of the markets for the products; market structure, interactions, market events; and delivery and information channels. Provide estimates of the number of key actors in the markets and annual sales.
- **Describe market barriers:** Identify market barriers to adoption of Program products and measures. Develop hypotheses to describe how the Program can reduce the barriers.
- **Document market effects:** Identify market effects that are attributable to the Program.
- **Assess sustainability of market effects**
- **Develop forward-looking assessment of market potential and recommendations:** Include Program recommendations and recommendations for future market effects and market transformation research.

A critical step in our approach was the development of Program theories. As noted earlier, we developed two theories, one to describe the downstream Program and the second to describe the upstream Program. We developed the theories based on Program materials and interviews with key Program implementers. The theories were crucial in defining the features of the Program, determining the anticipated cause-effect relationships attributable to the Program, identifying market barriers, focusing data collection, and structuring the analysis. Section 3 discusses the Program theories in detail and the theories are illustrated in Figures 2-1 and 2-2. An integral step in generating the theories was the development of the hypotheses that linked Program activities, market barriers, indicators, and market effects.

The main data sources were telephone surveys of customers and interviews of HVAC and lighting contractors and distributors. We developed sample frames for 12 customer groups defined by four segments—retail, office, institutional, and other—and three electricity demand categories—<20 kW, 20 kW to <100 kW, and 100 kW to 499 kW. This study, and the Program, focused on small and medium commercial and industrial customers so that customers with 500 kW demand or higher were not included in our sample. We interviewed customers in the following three groups:

- Program participants,
- PG&E area Program non-participants (i.e., customers who did not participate in the 1998 Express Efficiency Program although they could have participated in the preceding Retrofit Express Program), and
- a comparison group located in the following low-DSM program states: Arkansas, Kansas, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Oklahoma, Pennsylvania, South Carolina, and Texas.

The supply-side actors—HVAC and lighting contractors and distributors—were selected from those in the PG&E territory and the low-DSM states area. The PG&E-area contractors and distributors supplied products to both Program participants and non-participants and some participated in the upstream Program and others did not.

The data from contractors and supply-side actors, along with prior studies and data sources, provided the information needed to characterize the markets included in this study.

Table 2-1
Key Study Steps and Approaches

Key Project Steps	Approach
Clarify and Refine the Study Objectives and Develop a Program Theory	• Conduct project initiation meeting • Review program materials • Coordinate with Business Energy Management Services (BEMS) and SmarterEnergy study (led by Quantum Consulting (QC) with XENERGY as subcontractor) • Interview key Program staff and develop Program theory
Triangulate Among Methods and Market Actors	• Identify and review relevant prior studies and data • Develop complementary data collection and analysis methodologies • Identify key market actors • Develop appropriate sample frames and samples
Prioritize and Explicitly Link Market Effects Indicators to Elements of the Research Plan	• Develop market indicators based on Program theory and study objectives • Prioritize market effects indicators based on significance, usefulness, validity, and reliability • Develop market effects hypotheses
Marshall All Evidence into a Convincing Case For or Against Each Hypothesized Effect	• Conduct customer surveys • Conduct supply-side actor interviews • Compile and analyze all data and information • Structure data analysis around market effects hypotheses • Test hypotheses based on all evidence
Provide Recommendations and Strategies for Future Work	• Present market characterization information • Present market effects findings based on evidence and hypotheses tests • Develop practical recommendations for the Program and future assessments of market effects

Figure 2-1
Model for "Downstream" Express Efficiency Program

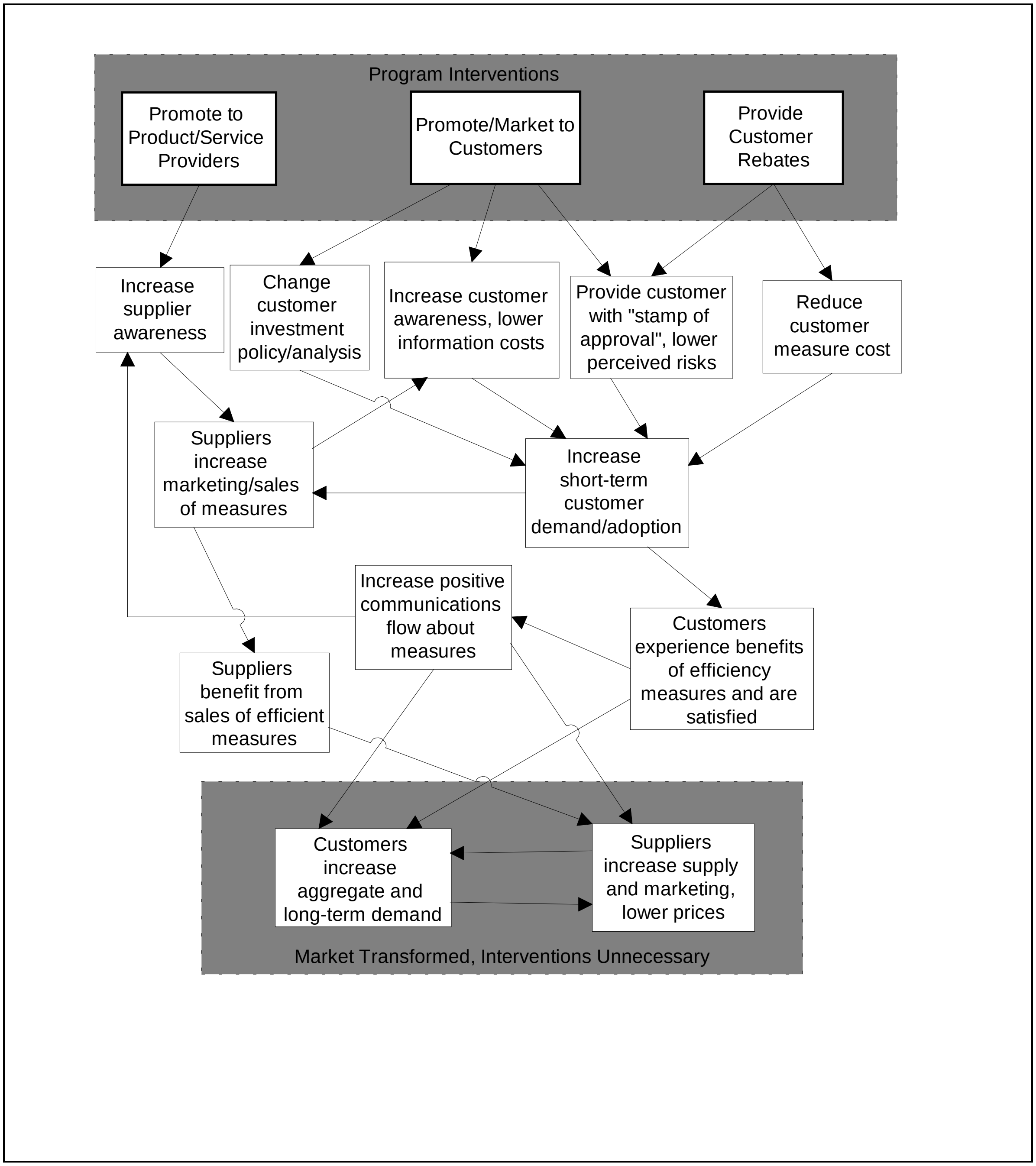
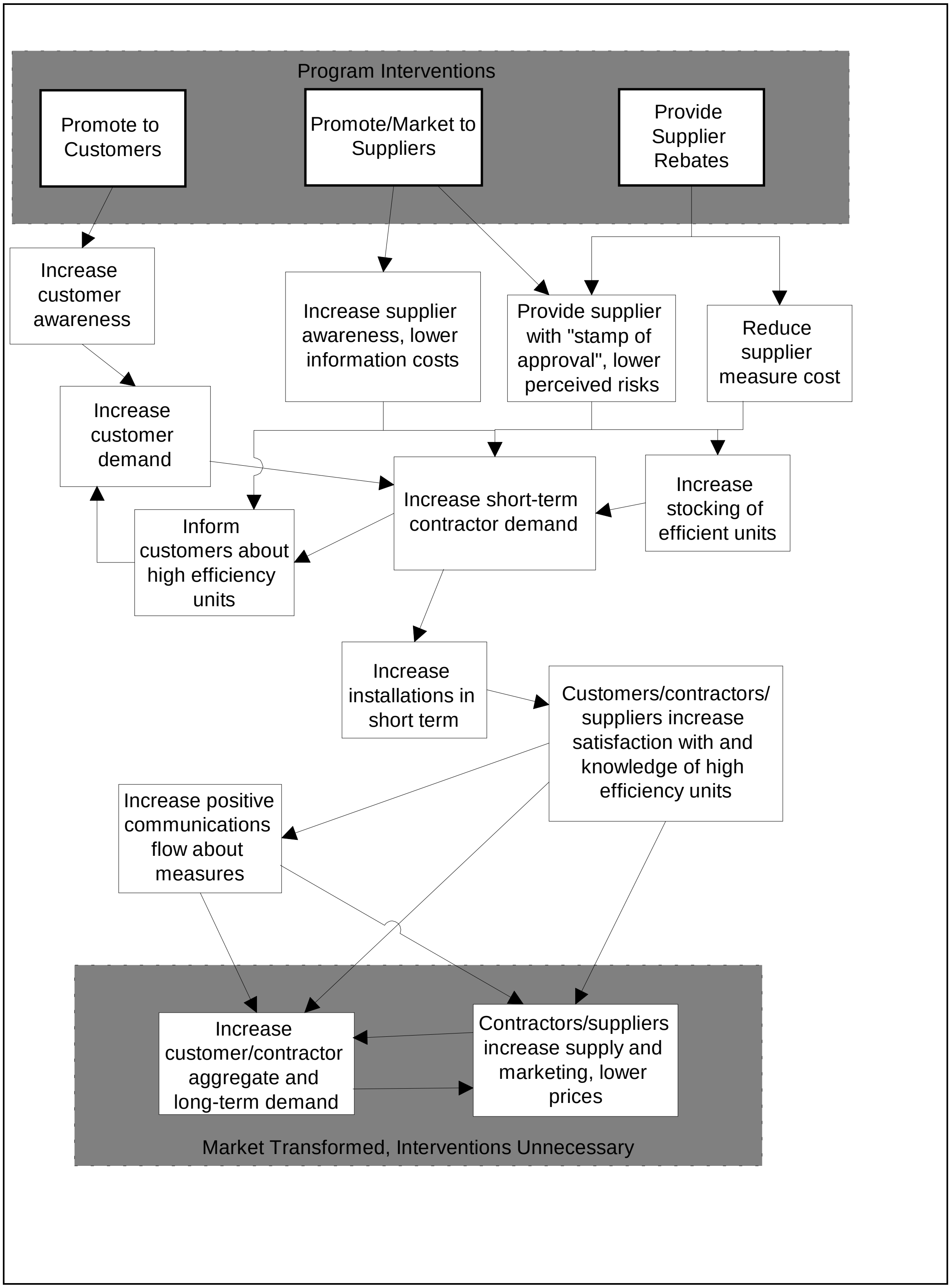


Figure 2-2
Model for "Upstream" Express Efficiency Program



Our data analysis was based primarily on summarizing and interpreting the data from the customer surveys and supply-side actor interviews. We matched up survey and interview responses with the barriers and the hypotheses that were to be tested. The data for the three groups of customers were used to assess the postulated hypotheses by determining whether the expected differences between the groups existed. Many of the hypotheses were related to the direct effects expected from the Program (e.g., direct effects of the rebates on customer confidence in the performance of rebated measures). Several involved expected indirect effects (e.g., effects of increased confidence in efficiency measures on customer demand for the measures). For the direct effects, we expected to observe different results for the participant and both non-participant groups. For some of the indirect effects, the differences we looked for were between customers who had adopted the measures and those who had not, and whether they had participated in a program or not.

The contractor and distributor data allowed testing the hypotheses that related primarily to supply-side actors. The same general approach applied: some of the hypotheses involved direct effects of the Program and others involved indirect effects that were expected to be observed as a result of customer demand and other factors that could be separated from the direct Program effects.

2.2 PROGRAM MARKET EFFECTS

In this subsection we provide a summary of our assessment of Program market effects. We analyzed the market effects and have presented the findings organized around the hypotheses that emerged in conjunction with the Program theories shown in Figure 2-1 and Figure 2-2. Section 3 discusses the hypotheses in detail, while our detailed assessment of each hypothesis is provided in Section 7.

Our assessment of the Program's market effects are summarized in Tables 2-2 and 2-3. The first table summarizes the findings for the downstream Program and the second presents findings for the upstream Program. The second column in each table provides a summary assessment of the extent of the evidence that was available to test each hypothesis. The extent of the evidence depended on the types of data that were available and the quality of the information. In some cases, it was too early in the Program, particularly the upstream Program, to have much information available. The third column provides a summary assessment of how strongly the evidence supported the hypothesis. The degree to which each hypothesis could be confirmed by this study depended on both factors—the extent and strength of the evidence. For example, a hypothesis would be well supported by our results if both extensive evidence was available and the evidence provided strong indications that the hypothesized cause-effect relationship was occurring. Hypotheses would be only partially confirmed if either there was extensive evidence that was weakly supportive (or contradictory) or there was very little evidence but what was available supported the hypothesis. In cases where available evidence was very limited because it was too early to collect extensive evidence or other sources of information might be required, we could not draw any overall conclusions about the validity of the hypothesis.

2.2.1 Downstream Program Effects

As shown at the bottom of Table 2-2, our overall assessment of the downstream component of the 1998 Express Efficiency Program was that it appeared to have resulted in *moderate effects among end-user participants*. The majority of the hypotheses for which evidence of effects existed were associated with end users; conversely, there were few effects of the downstream portion of the Program that could be observed on the supply-side. Although we observed a number of differences among our end-user comparison groups[1] that point to program-induced effects, there were two caveats to this finding. First, because we had no opportunity to observe the characteristics of end-user participants before they entered the 1998 Program, we could not be sure that the differences in the indicators of interest were attributable exclusively to the Program and not the fact that participants self-selected into the Program because they already possessed the desired characteristics (see Section 7 for further discussion).[2] Second, the absolute participation level for the 1998 Program was low enough to beg the question as to whether any program-induced effects could have spread among the overall population by the time this study was conducted. Small/medium participants in the 1998 Express Efficiency Program represented 0.5 percent of the PG&E small/medium population of customers and 1.9 percent of the PG&E small/medium energy usage. This level represented a significant drop in participation compared with the Retrofit Express Program: In 1994, the number of unique sites participating was 5,670 and between 1995 and 1997 the number fluctuated between about 3,800 and 4,500; in 1998, however, the number of unique sites participating dropped to less than 1,400. In contrast, it was estimated that a cumulative total of about 27,000 establishments representing approximately 64 percent of PG&E-territory floorspace participated in all of PG&E's C&I rebate programs between 1992 and 1996.[3] Given the relatively low penetration levels in 1998 (1.9 percent of energy usage and 0.5 percent of facilities), it is unlikely that significant spillover leading to broad-based market effects would have been generated.

The lack of near-term effects among supply-side actors was likely attributable to the fact that the Program was very small in 1998, particularly in comparison to previous years. For example, two-thirds of lighting contractors interviewed stated they were unfamiliar with the current program, even though many indicated they participated (indirectly since rebates went to end users) in previous years. Thus, it was difficult to make a case that the 1998 Program itself had a strong direct influence on contractors. On the other hand, the supply-side actors interviewed continued to report that they promoted efficient lighting products routinely and would continue to do so without rebates. This aspect of our findings confirmed the results of the PG&E/SDG&E Commercial Lighting Market Effects Study, which indicated that the 1992 to 1996 rebate

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[1] The comparison groups are: end-user participants, in-territory non-participants, and end users in states with low historic levels of DSM or market transformation programs.

[2] Note that we have developed self-selection models as part of this Study and made other analytical attempts to identify and control for this possibility. This information is presented in Section 7. Even so, the possibility of self-selection attributable to unobserved factors cannot be ruled out.

[3] Source: *PG&E/SDG&E Commercial Lighting Market Effects Study*. Note that the figures quoted are for the entire commercial population, i.e., including customers above 500 kW.

programs had an important impact on supply-side actors, and indicated that the effects might be sustainable (at least for larger customers). The downstream component of the 1998 Express Program appeared to be have had *few*, if any, *incremental effects*[4] on contractors and distributors but continued to positively influence participating end users.

Table 2-2
Summary of Market Effects Assessment of the Downstream Component of the 1998 Express Efficiency Program for Customers <500 kW

Hypotheses	Extent of Evidence	Strength of Evidence
Supply-Side Actors		
H1. Program promotion to suppliers increases supplier awareness/knowledge of energy efficiency	Limited	Moderate
H2. H1 leads to increased supplier marketing of energy efficiency	Limited	Weak
H11. H10 leads to increased supplier marketing of efficiency measures	Limited	Weak*
H13. H11 leads to vendors/ contractors benefiting from sales and installation of efficiency measures.	Limited	Weak*
H17. H13 and H14 lead to increased supply and lower costs of efficiency measures	Moderate	Moderate
Customers		
H3. H2 leads to increased customer awareness/knowledge and lower information costs for efficient measures	Moderate	Strong
H4. Program promotion/ marketing to customers increases awareness/knowledge of energy efficiency and lowers information costs for efficient measures	Moderate	Strong
H5. Program promotion/ marketing to customers increase customer use of long-term investment analysis or criteria for efficiency measures	Moderate	Limited
H6. Program promotion/ marketing to customers provides customers with independent, objective measure information	Limited	Moderate
H7. Program rebates increase customer confidence in measure performance	Limited	Moderate

[4] That is, incremental to those effects previously documented in the study cited above.

Table 2-2 continued.

Hypotheses	Extent of Evidence	Strength of Evidence
H8. Program rebates reduce need-for-financing barrier	Moderate	Weak
H9. Program rebates reduce cost barrier for lessees	Moderate	Weak
H10. H4-H9 lead to increased customer efficiency measure adoption in short term	Extensive	Moderate
H12. H10 leads to customers having positive experiences with the efficiency measures they implement	Extensive	Strong
H14. H12 leads to customers who adopt efficiency measures communicating benefits to others	Moderate	Moderate
H15. H14 leads to customers communicating to suppliers about interest in efficiency measures (H1)	Moderate	Moderate
H16. H12 and H14 lead to increased customer long-term demand for measures	Limited	Limited
Customers & Supply-Side Actors		
H18. H16 and H17 lead to increased market for efficiency measures	Moderate	Moderate
OVERALL FOR DOWNSTREAM PROGRAM	**Moderate**	**Moderate**

*Although the evidence associating these hypothesized effects directly to the 1998 Express Efficiency Program was judged to be weak, the preceding years of the Retrofit Express Programs had relatively strong effects. Thus, it would be difficult for the 1998 to generate effects incremental to the previous supply-side effects, particularly given the small size of the Program in 1998.

2.2.2 Upstream Program Effects

As shown at the bottom of Table 2-3, we broke our overall assessment of the upstream component of the 1998 Express Efficiency Program into two parts. For the near term, it appeared that the data supported the conclusion that the Program had resulted in *moderate effects*. In terms of long-term effects, we have concluded the extent and strength of the evidence indicated that the Program has had *limited effects*.

The contractor and distributor interviews suggested the Program-related awareness and behavior differed between the two supply-side actor groups. Most PG&E-area contractors were not aware of the 1998 Program, while most distributors were. This was not surprising given that the upstream Program targeted HVAC distributors. Because awareness and knowledge of energy efficiency were high in both the PG&E and comparison areas and there was limited Program awareness, we concluded that the Program had not increased awareness and knowledge significantly. Similar results applied to product performance uncertainty. Although the rebate reduced distributor costs, the evidence was limited that these savings were passed along through the supply chain. On the other hand, there was evidence suggesting that the Program had

Table 2-3
Summary of Market Effects Assessment of the Upstream Component of the 1998 Express Efficiency Program

Hypotheses	Extent of Evidence	Strength of Evidence
Supply-Side Actors		
H1. Program promotion/marketing to suppliers increases supplier awareness/knowledge of energy efficiency and lowers cost of getting information	Limited	Limited for Distributors/Weak for Contractors
H2. Program promotion/ marketing to supply-side actors reduces uncertainty about product performance	Limited	Limited for Distributors/Weak for Contractors
H3. Rebate reduces supplier costs	Limited	Limited
H4. H1, H2, and H3 lead to increased stocking of efficient units	Moderate	Moderate
H5. H1-H4 and H9 lead to increased vendor/contractor short-term demand	Moderate	Strong
H6. H1-H3 and H5 lead to vendors/ contractors promoting high efficiency units	Extensive	Strong
H7. H5 leads to increased near-term installations of efficient units	Moderate	Strong
H10. H7 leads to vendor/ contractor/distributor satisfaction with sales and installation of high-efficiency products	Moderate	Moderate
H11. H10 and H13 lead to positive communications to vendors/ contractors/distributors about performance, sales, and installation of efficiency measures.	None	Undetermined
H12. H10 and H11 lead to increased supply and lower prices for efficiency products	Very Limited	Limited
Customers		
H8. Promotion to customers increases customer awareness/knowledge of efficient measures	Very Limited	Undetermined
H9. H8 and H6 lead to increased customer demand for efficient measures	Limited	Weak
H13. H7 leads to customer satisfaction with efficient products	Limited	Moderate
H14. H10 and H13 lead to positive communications to customers about efficiency measures	Limited	Moderate
H15. H13 and H14 lead to increased customer long-term and aggregate demand for efficiency measures	Very Limited	Weak
Customers & Supply-Side Actors		
H16. H12 and H15 lead to increased market for efficiency measures	Very Limited	Limited
OVERALL FOR UPSTREAM HVAC PROGRAM	**Moderate for Near-Term Effects** **Limited for Long-Term Effects**	**Moderate for Near-Term Effects** **Limited for Long-Term Effects**

resulted in increased stocking of high-efficiency units and that contractor demand, installations, and promotion of high-efficiency A/Cs was higher in the PG&E area. Similarly, overall satisfaction with sales and installation of high-efficiency units was higher in the PG&E area. We had no information from the interviews about whether the Program had led to increased positive communications by suppliers about high-efficiency units.

Overall, the information from customers on the upstream Program effects was limited. Because the Program targeted distributors, there was little reason to expect significant market effects on the customer side unless the effects carried through the supply chain. As observed above for the supply side, however, the energy-efficiency message promoted by the upstream Program did not appear to extend much beyond the distributors. The customer survey data did not contradict the supply-side findings. Generally, the evidence of Program effects on customers was quite limited. Evidence of effects was highest for customer satisfaction with high-efficiency A/Cs and positive communications about energy-efficient measures and this was consistent with results for the downstream Program.

The effects for which the extent and the strength of the evidence were most significant involved near-term changes in the market. As noted earlier, because our data applied to the first year of the upstream Program it was unlikely that significant long-term market effects would be observed and this was borne out by the data. The information did suggest that near-term effects that could lead to long-term market changes were observable. As discussed in Section 7, it also identified some links in the causal change that would need to be strengthened to increase the likelihood of fundamental market changes.

2.2.3 End User Modeling Results

We conducted modeling analyses that addressed several of the important issues suggested in the preceding subsections. We summarize these results here, with more details provided in Section 7.5 and Appendix B.

In all, we selected 11 of the same relationships examined in the detailed downstream Program market effects discussion (see Section 7.3) for further analysis using statistical modeling. The purpose was twofold: to attempt to control for possible self-selection bias and to provide additional evidence for assessing the market effects hypotheses. These analyses were based on customer survey responses to questions regarding market barriers, attitudes toward and knowledge of energy efficiency, diffusion of information, and organizational policies. In testing these relationships, three comparisons were made to examine immediate *program* effects and immediate *market* effects.

As presented in Section 7.5, these results provided support for the existence of both program and market effects. The participant/in-state comparison yielded 3 statistically significant program effects. The participant/out-of-state comparison yielded 8 statistically significant program effects. Finally, the in-state/out-of-state comparison yielded 6 statistically significant market effects.

Two factors should be noted when considering these results in comparison with those results summarized in Tables 2-2 and 2-3. First, the previous results usually were based on more than just the responses to a single survey question in that they drew upon additional information (principally, the supply-side interview results). Second, some of the previous results were based on specific subgroups of respondents (such as measure adopters and non-adopters) rather than the entire groups used in the modeling analyses reported here, so the results are not completely comparable.

Overall, the modeling results agreed with the results presented in Table 2-2 and 2-3 in 73 percent of the specific cases analyzed. We believe, therefore, that these results generally provide additional support for the market effects and hypotheses findings discussed earlier and partially alleviate concerns about self-selection bias having an overriding influence on the determination of Program and market effects. In conclusion, the modeling analysis provides a complementary and more quantitative technique to this study of the Program's effects. Although it generally provided more evidence supporting the findings presented earlier, it also revealed areas that would be worth exploring further to determine why the two approaches produced differences.

2.3 SUMMARY OF MARKET INFORMATION

In this subsection, we present summaries of results of the primary research activities conducted for this Study. These summaries are organized as follows:

- General Supply-side Characteristics and Trends
- Efficiency-related Supply-Side Results
- Summary of Results from End User Surveys
- Summary of Market Barriers

2.3.1 General Supply-Side Characteristics and Trends

Summaries of the key market characterization-related results from the supply-side interviews conducted for this Study are presented in the subsections that follow.

HVAC

The following bullets summarize the key results from our interviews with HVAC contractors and distributors that concern *general* market characteristics (efficiency-related results are presented subsequently):

- Approximately 40 percent of the small and only four percent of the large HVAC contractors that we screened for interviews from the D&B sample frame reported they did not serve the commercial packaged unit market.

- For the population captured by our surveys, we estimate that small contractors install roughly three quarters of all the commercial package units in PG&E's service territory. large contractors, though representing only two percent of firms, account for about one-fifth of the packaged unit installations. The numbers are similar for the nation.
- Packaged unit-related sales represented 37 and 40 percent of revenues for PG&E contractor and distributor sales, respectively.
- Contractors were asked to identify trends in the packaged HVAC market over the past three years. Contractors in the PG&E territory tended to focus more on technical changes that have occurred in the industry but, in general, there was no real consensus around these trends or obvious differences when compared with the Low-DSM respondents. Similarly, technical changes were the most cited trend for the next three years, but again no strong consensus or differences were clear.

Lighting

Results from our interviews with lighting contractors and distributors that concern *general* market characteristics are presented below (efficiency-related results are presented subsequently):

- For the population captured by our surveys, small contractors account for approximately 98 percent of the firms but only about 63 percent of commercial lighting revenues throughout PG&E's service territory. Large contractors represent only 2 percent of the firms but account for over a third of the revenues. The numbers are similar for the nation.
- Both in and out of PG&E's Territory, the biggest trend over the past three years was reportedly the increased usage of efficient lighting. Technical improvements were cited by a majority of contractors as the second most important trend. Specific examples included the debut of the T5 lamp, improved color rendition in fluorescent lamps, reduced ballast noise, longer lamp life, a greater variety of shapes and styles of CFLs and CFL fixtures, and better low-mercury lamps.
- Distributors also said that the increased usage in efficient fluorescent lighting was the Number 1 trend, but code changes and improvements were also frequently cited as an important trend. EPA programs, Title-24, and other local codes were mentioned by 60% of PG&E Territory distributors and 20% of Low-DSM States distributors as the second-most important trend.

2.3.2 Efficiency-Related Supply-Side Results

HVAC

Interviews were conducted with 45 contractors (26 in PG&E Territory and 19 in Low-DSM States) and 21 (10 in PG&E Territory and 11 in Low-DSM States) distributors involved in the HVAC market. Complete analysis of these interviews is presented in subsection 6.3. The highlights of these interviews are summarized below.

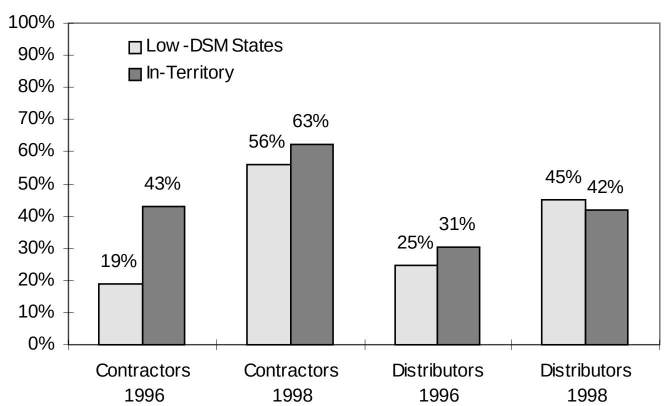
- Distributors in PG&E's territory stock much more qualifying high-efficiency packaged HVAC units that distributors in Low-DSM States. For units less than 5.4 tons, 100% of PG&E-Territory distributors stock them compared with 27% for Low-DSM States. For units between 5.4 tons and 11.3 tons its 90% compared with 18%. Larger units make up a much smaller portion of the packaged HVAC market, but the differences in stocking are still prevalent. For 11.3 - 20 tons, 50% of PG&E Territory distributors stock them, compared with 9% in Low-DSM States, and for package systems over 20 tons its 30% compared with 9%.
- By far the most popular packaged unit installed in commercial buildings has a capacity of 5 tons. According to distributors in PG&E's territory, the average cost difference between a 5-ton standard-efficiency unit and a high-efficiency unit is $335, or $67 per ton. The distributor estimates ranged from $35 per ton to $140 per ton. The average of contractor estimates was nearly double at $122 per ton, but is also less credible because of the large spread in values from $0 to $250 per ton.
- 78% of PG&E Territory distributors said they are recommending qualifying high-efficiency packaged units more than they were three years ago (compared with 45% in Low-DSM States). The rebates have made the cost difference between high-efficiency and standard units negligible, engineers and contractors are demanding them more these days, and the manufacturers they represent now offer these high-efficiency models. The remaining 22% say they are recommending high-efficiency about the same.
- PG&E-area contractors and distributors describe themselves as actively promoting high-efficiency packaged HVAC significantly more than their counterparts in Low-DSM States. PG&E-area contractors say they promote high-efficiency units 77% of the time compared with 47% in Low-DSM States, while PG&E-Territory distributors say they promote high-efficiency units 100% of the time compared with 45% in Low-DSM States.
- Contractors reported that on average 35% of their packaged HVAC sales for five tons or greater were high-efficiency units, while distributors reported selling all sizes of high-efficiency units between 31% and 37% of the time. There was also across the board (for contractor installations and distributor sales in all unit-size categories) increases in the percentages of units that were high efficiency from 1996 to 1998.
- The main barrier to increased usage of high-efficiency units that contractors and distributors report on was that the incremental value of the high-efficiency unit is too low to justify the additional cost.
- Contractors generally felt that the distributor-based program was less effective in increasing the market share of high-efficiency packaged units; however, distributors tended to think the opposite was true, that the new program was more effective. Three of the ten distributors stated, however, that they felt the new distributor-based program is less effective for increasing the amount of packaged units that are high efficiency.

Lighting - Compact Fluorescent Lamps

As mentioned previously in this report, because T8 lamps and electronic ballasts were studied in-depth in the PG&E/SDG&E Commercial Lighting Market Effects Study, our primary research activities for the current Study were focused on compact fluorescent lamps (CFLs). The following is a summary of CFL-related results from our supply-side interviews:

- Fixtures designed to take advantage of the peculiar shapes of CFLs are more common than three years ago. The era of trying to get screw-base integral CFLs into fixtures designed for incandescent lamps is drawing to an end. Designers are using CFLs more because of the new array of choices in fixtures.
- According to lighting contractors, from 1996 to 1998 the penetration of CFLs went from 43% to 63% in the PG&E service territory, and from 19% to 56% in Low-DSM States (see figure below). Thus, although in-territory penetration continues to increase, the trend in the comparison area is more dramatic. This is likely attributable to the rapid spillover to these areas of market effects generated by utility programs in other areas of the country (including California).

Figure 2-3
Percent of Downlight and Sconce Sales With Compact Fluorescent Lamps



- Technological barriers to the acceptance of CFLs have lessened considerably in the past three years. Improvements were noted with respect to buzzing, color rendition, flicker, and unreliable starting.
- When asked whether utility programs contributed to reducing barriers to CFLs, 71 percent of in-territory and 44 percent of Low-DSM State contractors indicated that they had. In-territory contractors stated that the rebates contributed to increased awareness, reduced the risk of trying a new technology, and generally jump-started the market.
- Remaining barriers include customer ignorance of the savings potential and variety of available fixtures, lack of a very bright source, high first costs (bounded rationality and organizational practices), and in some cases (mostly in the low-DSM area) availability.

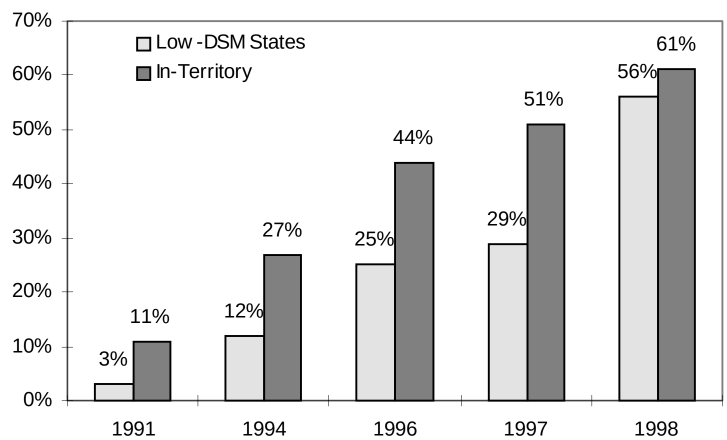
Lighting - T8 Lamps and Electronic Ballasts

Key T8/electronic ballast-related results from our supply-side interviews include the following:

- T8 lamp and electronic ballast usage continue to increase both in PG&E's territory and in low-DSM areas. According to distributors in PG&E's service area, T8s made up 61% of 4-foot linear fluorescent sales in 1998 compared with 44% in 1996. Electronic ballasts showed the same trend at 63% of all ballast sales in 1998 compared with 37% in 1996. Reported trends from contractors were similar. Thus, despite decreases in rebate levels, previously documented market effects (XENERGY, 1998) appear to be sustaining.
- As with CFLs, dramatic increases in T8/electronic ballast penetration are reported by vendors in the comparison area. Penetration of T8s is reported by distributors to have increased from 25 to 56 percent between 1996 and 1998. Results for contractors and electronic ballasts are similar.

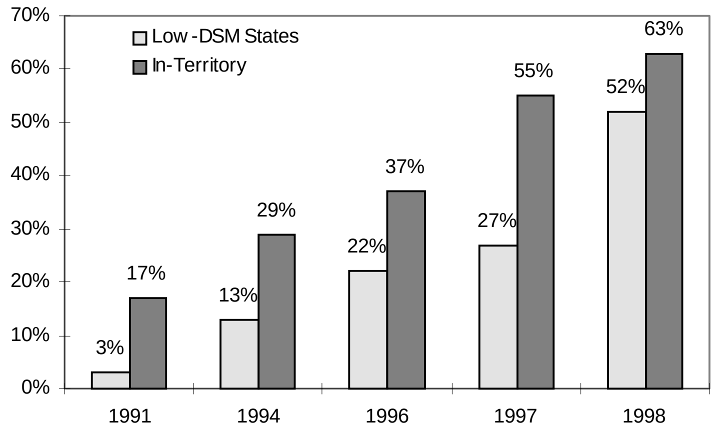
The figures below show the long-term trends in T8 lamp and electronic ballast penetration as reported by lighting distributors:

Figure 2-4
Long-Term Trend of T8 Lamps As Percent of 4-foot Linear Fluorescent Sales (Based on Distributor Self-Reports from two studies, see footnote)



Sources: For 1991, 1994, and 1997; XENERGY, 1998. For 1996 and 1998, the current Study.

Figure 2-5
Long-Term Trend of Electronic Ballast As Percent of 4-foot Ballast Sales
(Based on Distributor Self-Reports from two studies, see footnote)



Sources: For 1991, 1994, and 1997; XENERGY, 1998. For 1996 and 1998, the current Study.

- 67% of PG&E-area contractors and 90% of contractors in low-DSM states said that smaller commercial customers lag significantly behind larger ones in adopting T8 lamps and electronic ballasts. Reasons given center on how larger companies have personnel dedicated to energy efficiency and have better access to the capital needed to purchase efficient lighting equipment.
- Only a quarter (28%) of in-territory contractors were aware of the 1998 Express Efficiency Program - mailed advertisements were the most common way contractors and distributors learned about the program. In contrast, 85 percent of contractors interviewed as part of the PG&E/SDG&E Commercial Lighting Market Effects Study were aware of the previous utility rebate programs (as indicated by the fact that they reported having at least one project supported by rebates between 1992 and 1996).

2.3.3 Summary of Results from End-User Surveys

Selected findings from the customer surveys are highlighted in the following discussion. The major findings are organized as follows: general findings; key findings for Program participants; findings that differed significantly between participants and the non-participant groups; and findings that differed significantly between PG&E-area customers (both participants and non-participants) and low-DSM state customers.

The following general findings applied to all customer groups:

- At least three-fourths of the customers said that they agreed that businesses should actively consider energy-efficiency investments and 85% or more said that energy efficiency was at least somewhat important to their decision-makers.

- However, less than 29% of all groups said that their firm had a policy for selecting energy-efficient equipment.

Key findings for Program participants were the following:

- Only 58% of the Program participants that were interviewed actually reported that they had participated in the Program.
- T-8s were installed by 34% of participants and were by far the most common measure installed under the Program.
- Participants said that the Program had a very strong influence on their decision to install energy-efficiency measures, but when asked whether they would have made the change anyway about half said that they would have.
- A majority of participants said that the Program was very important in overcoming cost barriers (63%) and uncertainty about measure performance (55%).
- Forty-five percent (45%) of participants said that the Program had a significant effect on their use of long-term investment analysis for energy-efficiency measures.

Results that differed significantly between participants and both non-participant groups included these:

- Participants were almost 40% more likely to say that they would pursue energy-efficient investments in the future.
- Participants were 15% to 25% more likely than low-DSM state customers to believe that energy-efficient measures would reduce their utility bill, perform as well or better than standard products, and provide important benefits other than energy savings.
- Participants were much more likely to disagree with statements that it took too much time or hassle to get information or select a contractor for energy-efficiency measures or that the information they obtained was not helpful.
- Low-DSM state customers were twice as likely as participants (32% compared to 16%) to say that they were not knowledgeable about the availability and performance of energy-efficiency measures.
- Participants were 50% more likely to say that their experiences with energy-efficiency measures had increased their confidence that the measures would reduce their utility bills and, for most measures, participants were more likely to say that they were more satisfied with their performance.
- Participants were significantly more likely to have installed CFLs, reflectors, setback thermostats, and occupancy sensors outside of the Program.

- Although fewer than half of any group of respondents agreed strongly that energy-efficient equipment was easy to use and understand, participants were nearly twice as likely to agree than low-DSM state customers.
- Participants were nearly twice as likely as out-of-state customers (52% compared to 29%) to state that they actively advocated energy efficiency to others, and were about 25% more likely to say that they regularly heard about energy efficiency from professionals.

Finally, results that differed significantly between both groups of PG&E customers and low-DSM state respondents included the following:

- Although the majority of all groups agreed, PG&E customers were nearly 20% more likely to believe that saving energy was part of being a good corporate citizen.
- The share of all PG&E customers (about 50%) who said that they applied long-term analysis approaches and criteria when making energy equipment investments was about 40% larger than the share of low-DSM state customers who said that they did. Across all groups, the most common criterion was the payback period.

2.3.4 Summary of Market Barriers

One important step in assessing the market effects is confirmation that barriers the Program is designed to address actually exist. Although our theory and background information support the existence and significance of these barriers, we also used the customer survey data to assess the barriers at an overall level. Based on responses to several questions about generic market barriers, we ranked the barriers for each customer group. Table 2-4 presents the results.

By inspection of Table 2-4, the top four barriers reported by customers across all customer groups consistently were the following:

- performance uncertainty,
- asymmetric information and information costs,
- bounded rationality/organizational practices, and
- access to financing.

These significant barriers reported by customers were consistent with those that we identified as part of the program theory development (see Tables 3-2 and 3-3). Customers reported, however, that transaction/hassle costs were less significant barriers than we anticipated. The least significant of the eight barriers identified in Table 2-4 was unavailability of efficient products and this was consistent with our expectations during theory development. In general, the barriers as ranked by customers were consistent with our expectations in developing the program theories.

Table 2-4
Customer Rankings of Potential Market Barriers

Barrier	Program Participants	PG&E Area Non-Participants	Low-DSM States
Performance uncertainty—bill savings*	1	1	1
Information costs	5	7	6
Transaction/hassle costs	7	5	5
Asymmetric information*	2	2	3
Asymmetric information/ information costs	6	6	7
Access to financing	4	4	4
Unavailable products*	8	8	8
Bounded rationality/ organizational practices	3	3	2

**Note that these rankings are consistent with results obtained in the baseline component of the 1998 NSPC Study (XENERGY, 1999).*

On the supply side, our program theory description suggested that transaction/hassle and information costs were expected (but not very significant) barriers from the contractor perspective. The contractor surveys identified too little incremental value for the added cost[5] and lack of customer awareness as the main barriers to selling CFLs and high-efficiency A/Cs. Lack of contractor awareness and knowledge was also mentioned as a barrier by HVAC contractors. These barriers were consistent with the information cost and organizational practices and bounded rationality barriers. Contractors were also asked about barriers to greater implementation of VSDs. High costs, limited contractor knowledge, and difficulties associated with installing this equipment into existing units were all cited as potential barriers. These barriers were more linked to the unique characteristics of this product. Overall, it appeared that barriers on the supply side were quite dependent on the specific product and this would probably be true of the customer barriers also.[6]

2.4 RECOMMENDATIONS

The recommendations presented below are intended to suggest ways in which the PG&E Express Efficiency Program might be improved or modified with respect to the small/medium nonresidential market. The recommendations are not intended to provide specific program design details, but rather to suggest general areas of improvement upon which we believe policy-makers and program designers should focus their efforts.[7] We recommend that those responsible

[5] We recognize that "first cost" is not an agreed upon market barrier and, in particular, is not included as a barrier in Eto, et al., 1996. We do believe, however, that it also is important to report respondents' assessments of market barriers in their own terms.

[6] The reader should note that supply-side actors were asked about barriers for only selected measures in the survey instruments. For example, respondents were asked about barriers in the CFL market because of a lack of existing data, but no information was sought on barriers to selling T-8s because extensive data were available already from prior studies.

[7] As evaluators we do not seek to directly participate in the program design process; at the same time, we believe it is incumbent upon us to help improve the programs we assess by making suggestions that arise from our direct research activities.

for setting the Express and overall small/medium nonresidential market objectives, design mechanisms, and implementation procedures:

1. ***Improve end-user participants' retention of Program participation and associated energy-efficiency benefits***
2. ***Consider increasing funding levels for the small/medium Express Program. Parallel consideration should be given to consolidating the Express/SPC offering***
3. ***Improve the "trickle down" of Program benefits from Distributors to contractors and end users for the upstream packaged unit component of the Express Program***
4. ***Continue working to improve outreach and target marketing to supply-side actors and end users***

Detailed discussion of these recommendations is presented in Section 8 of this report.

3 PROGRAM THEORY AND HYPOTHESES

3.1 INTRODUCTION AND BACKGROUND

An integral part of the design phase for this Study was development of a program theory, an essential step under a theory-based evaluation (TBE) approach. TBE is a broad descriptor of an evaluation approach that has been used in a number of policy fields for some time, and is especially germane in evaluations of market transformation programs. The first lesson of TBE is that an evaluation must be fully informed by the causal theory that underlies the program intervention; Bickman and Peterson note, "Program theory is essential for deciding what to measure in a program…With a good sense of program theory, the evaluator can move to observing program process and operation, rather than focusing on simple (and frequently uninterpretable) outcomes."[1]

A program theory, or model, provides a framework for understanding the hypothesized mechanisms through which a program is anticipated to influence, and ultimately transform, the market. The model provides a basis for structuring data collection and analyzing the data to determine whether the hypothesized cause-effect relations expected under the program in fact exist and whether they are working as expected. The model also provides the foundation for determining which processes are not working as anticipated and merit further attention and possibly revisions. Many of the early market transformation studies were primarily based upon combining procedures from demand-side management (DSM) evaluations and concepts from the *Scoping Study*.[2]

A broader view of factors relating to market transformation was derived from additionally examining diffusion of innovation theory and its communications implications. Factors of diffusion from diffusion of innovation theory and elements of communication are examined alongside the anticipated market barriers and in the selection of indicators of market transformation (MT) measurement. The difference in emphases between the *Scoping Study* and the diffusion of innovations literature was highlighted in the recent *Market Effects Summary Study* as duplicated in Figure 3-1.[3]

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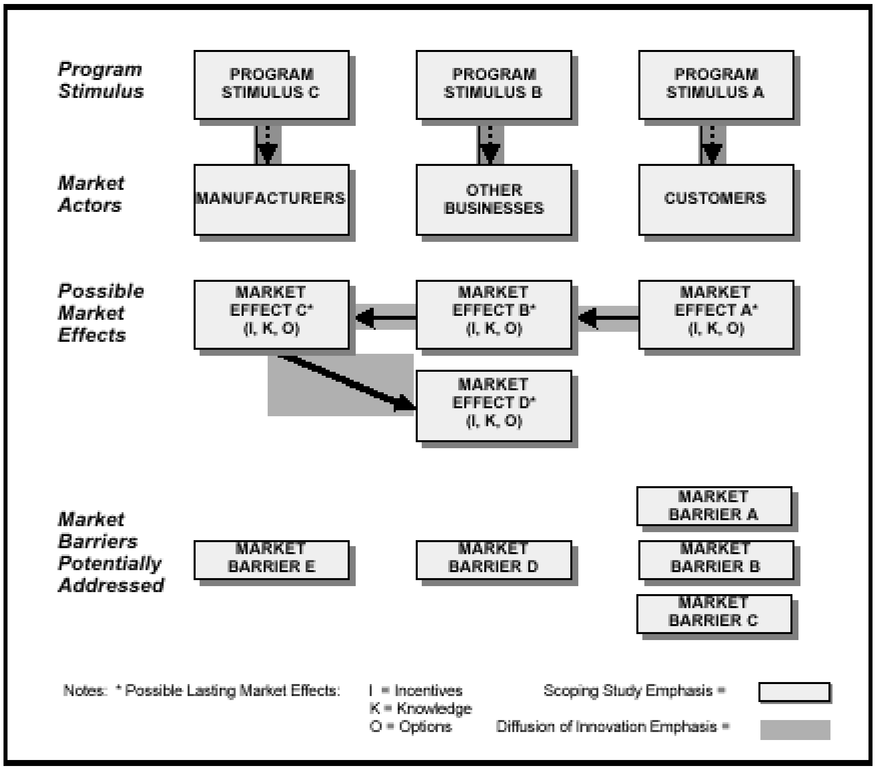
[1] Bickman, Leonard and Keith Peterson, "Using Program Theory to Describe and Measure Program Quality," New direction for Program Evaluation, No. 47, Fall 1990, p. 63.

[2] Eto, Joseph, Ralph Prahl, and Jeff Schlegel. 1996. *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs*, Earnest Orlando Lawrence Berkeley National Laboratory, LBNL-39058 UC-1322, prepared for The California Demand-Side Measurement Advisory Committee, Berkeley, CA.

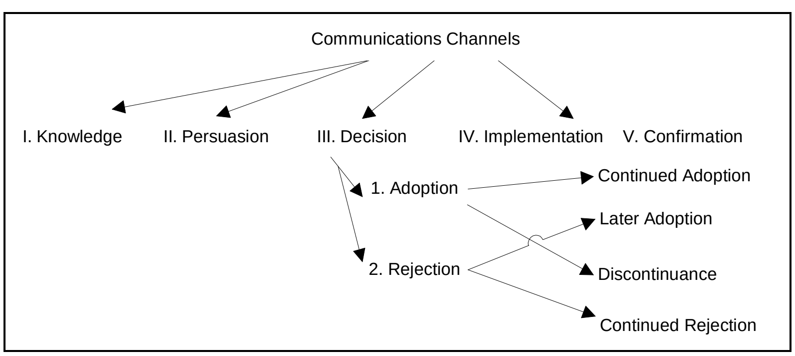
[3] Peters, Jane S., Bruce Mast, Patrice Ignelzi, and Lori M. Megdal. 1998. *Market Effects Summary Study, Final Report, Volume 1*, Research Into Action, prepared for The California Demand-Side Measurement Advisory Committee, Portland, OR: pp. ES-IX

Figure 3-1
Differences Between *Scoping Study* and Diffusion of Innovations Emphases



The most often cited summary of the diffusion of innovation theory is provided by Rogers' diagram as shown in Figure 3-2.

Figure 3-2
Innovation Diffusion Process[4]



The diffusion of innovations literature provides us with a list of six attributes of the product or service that influence the rate of diffusion. These rate of diffusion factors were considered in this

[4] Rogers, Everett M. 1982. *Diffusion of Innovations*, 4th Edition, New York, New York: Free Press, pp. 163.

study, to a limited extent, as important elements in measuring progress towards market transformation. These six factors are the following:[5]

1. Fulfillment of need: The degree to which a perceived need (economic or social) is filled by a new product/service as compared to what it replaces.
2. Compatibility: The degree to which the product/service is perceived to be consistent with existing values, past experience, and needs.
3. Relative advantage: The perceived relative advantage compared to the previous product/service, including economic, social prestige, convenience, and satisfaction.
4. Complexity: The degree of difficulty of understanding the product/service—more difficult takes longer for acceptance/adoption.
5. Observability: The degree to which the product can be observed in use fulfilling similar needs for others
6. Trialability: The degree to which the new product can be tried on an "installment plan" basis.

A sustainable market needs appropriate positive feedback and communication flows. The rate of adoption also can be aided by the development of champions in the marketing process. Research in the communications and marketing fields suggest including in our assessment of market barriers whether a new product/service is developing champions and to what extent there are positive feedback and reinforcing communications (follow-up available) that support the commitment portion of the diffusion chain. We have included these two factors in the later discussion of barriers assessed for this market.

One key step in our approach to analyze the effects of the Express Efficiency Program was to identify probable market barriers that might impede the adoption of the efficiency products promoted by the Program. We started with the generic barriers defined in the *Scoping Study*, which are described in Table 3-1 for reference.

Because the Express Efficiency Program has been designed to include distinct components targeted at customers and supply-side actors, we have developed two program models or theories that are related, but separable. The following subsections present the two theories that we developed for the Express Efficiency Program study and discusses the Program interventions, anticipated market barriers, potential market effects and indicators, and hypotheses linking the interventions, market barriers, market effects, and indicators.

3.2 DOWNSTREAM PROGRAM THEORY AND HYPOTHESES

This subsection discusses the theory and hypotheses that were developed for the "downstream" components of the 1998 Express Efficiency Program. The downstream Program components targeted customers primarily. Based on Program materials and interviews with Program staff, we developed a model of the downstream portion of the Program as shown in Figure 3-3.

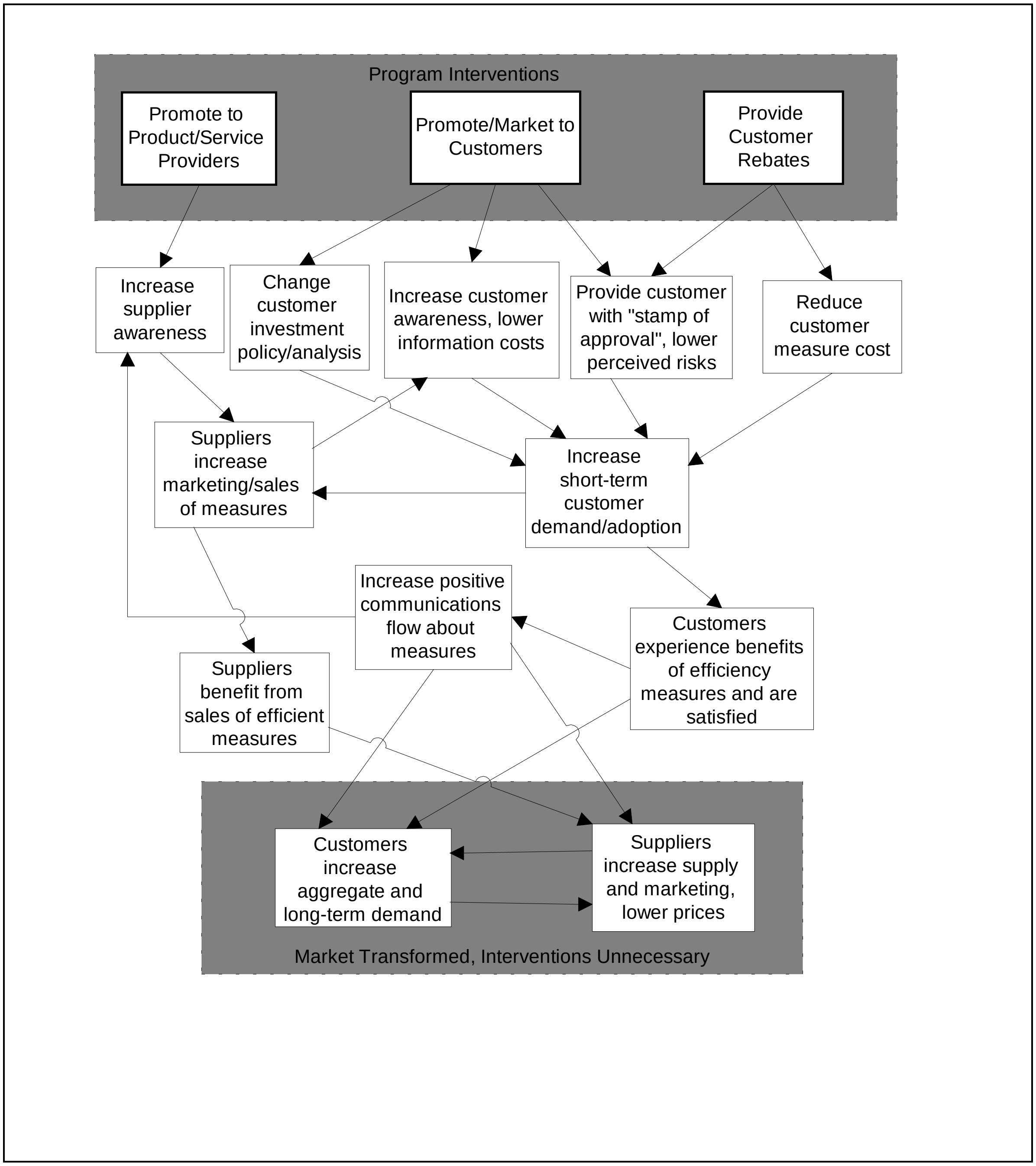
[5] Rogers, Everett M., with F. Floyd Shoemaker. 1971. Communication of Innovations: A Cross-Cultural Approach, New York: Free Press, pp. 137-157.

Table 3-1
Market Barrier Descriptions

Barrier	Description
Information or Search Costs	The costs of identifying energy-efficient products or services or of learning about energy-efficient practices, including the value of time spent finding out about or locating a product or service or hiring someone else to do so.
Performance Uncertainties	The difficulties consumers face in evaluating claims about future benefits. Closely related to high search costs, in that acquiring the information needed to evaluate claims regarding future performance is rarely costless.
Asymmetric Information and Opportunism	The tendency of sellers of energy-efficient products or services to have more or better information about their offerings than do consumers, which, combined with potential incentives to mislead, can lead to sub-optimal purchasing behavior.
Hassle or Transaction Costs	The indirect costs of acquiring energy efficiency, including the time, materials and labor involved in obtaining or contracting for an energy-efficient product or service. (Distinct from search costs in that it refers to what happens once a product has been located.)
Hidden Costs	Unexpected costs associated with reliance on or operation of energy-efficient products or services - for example, extra operating and maintenance costs.
Access to Financing	The difficulties associated with the lending industry's historic inability to account for the unique features of loans for energy savings products (i.e., that future reductions in utility bills increase the borrower's ability to repay a loan) in underwriting procedures.
Bounded Rationality	The behavior of an individual during the decision-making process that either seems or actually is inconsistent with the individual's goals.
Organization Practices or Customs	Organizational behavior or systems of practice that discourage or inhibit cost-effective energy-efficiency decisions - for example, procurement rules that make it difficult to act on energy-efficiency decisions based on economic merit.
Misplaced or Split Incentives	Cases in which the incentives of an agent charged with purchasing energy efficiency are not aligned with those of the persons who would benefit from the purchase.
Product or Service Unavailability	The failure of manufacturers, distributors or vendors to make a product or service available in a given area or market. May result from collusion, bounded rationality, or supply constraints.
Externalities	Costs that are associated with transactions, but which are not reflected in the price paid in the transaction.
Non-Externality Pricing	Factors other than externalities that move prices away from marginal cost. An example arises when utility commodity prices are set using ratemaking practices based on average costs (rather than marginal).
Inseparability of Product Features	The difficulties consumers sometimes face in acquiring desirable energy-efficiency features in products without also acquiring (and paying for) additional undesired features that increase the total cost of the product beyond what the consumer is willing to pay.
Irreversibility	The difficulty of reversing a purchase decision in light of new information that may become available, which may deter the initial purchase - for example, if energy prices decline, one cannot resell insulation that has been blown into a wall.

Source: Eto, et al., 1996.

Figure 3-3
Model for "Downstream" Express Efficiency Program



The "downstream" component of the 1998 Express Efficiency Program included several products in three main categories: lighting, air-conditioning, and refrigeration. Both because of scope limitations and the relatively small number of customers opting for some of the covered measures, we limited our study of the downstream component to lighting measures and a subset of products related to air-conditioning.

The ***primary interventions*** of the downstream components were aimed at the customers. As shown in Figure 3-3, the key interventions included the following:

- promoting and marketing to customers,
- providing rebates to customers, and
- promoting to selected supply-side market actors.

PG&E specified qualifying requirements for each product or measure and rebate amounts for customers who installed the selected measures in existing buildings. Selectively, PG&E used various promotions and outreach efforts to supply-side actors to help increase customer awareness and demand for the covered products.

3.2.1 Market Barriers

Our interviews with Program implementers identified the major barriers that they felt impeded the adoption of efficiency measures in the two primary markets covered by the downstream Program—lighting and air-conditioning products. Based on the taxonomy of market barriers identified in the *Scoping Study*, we categorized these barriers and made preliminary assessments of their expected significance.

Table 3-2 summarizes the barriers by market actor for efficient lighting products. Due in large part to past DSM programs, product unavailability was not considered to be a significant barrier for lighting products in scope. The major barriers for customers were considered to be costs of acquiring information, information asymmetries between customers and providers, bounded rationality , and uncertainty about product performance and the market. The first three of these barriers were expected to be especially significant for smaller customers. Other customer barriers were felt to be transaction and hassle costs, access to financing, and lack of relative advantage as an impediment to diffusion. On the supply side, the expected barriers were relatively minor and of two types: information costs and transaction/hassle costs.

Table 3-3 provides similar information about market barriers by market actor for efficient products related to air-conditioning. For purposes of this study, these products were limited to adjustable speed drives (ASDs) and setback thermostats (packaged air-conditioners are discussed later in the context of the "upstream" Program component). As with lighting products, product unavailability was not considered to be a significant barrier in this market. The major barriers for customers were expected to be costs of acquiring information, information asymmetries between customers and providers, transaction and hassle costs, bounded rationality , and uncertainty about product performance and the market. We expected the last barrier to be the most significant barrier overall. The barriers involving the decision process were expected to be especially problematic for smaller customers. Access to financing was anticipated to be a moderately significant customer barrier. For institutional customers, we expected bounded rationality, access to financing, and hidden costs to be key barriers. On the supply side, the only barrier we anticipated was transaction/hassle costs.

Table 3-2
Primary Energy-Efficiency Market Barriers for Lighting Market

	Customer				Vendor/ Contractor	Distributor
Product/Service Availability						
Unavailable						
Awareness						
Information costs	●●●	S			●●	
Asymmetric information	●●●	S				
Decision Process						
Transaction/Hassle costs	●●	S			●	
Access to financing	●●	S	I			
Bounded rationality	●●●	S				
Organizational practices	●		I			
Split incentives				D		
Perceived Reliability & Uncertainty						
Performance & market uncertainty	●●●					
Hidden costs	●		I			
Inseparability of features						
Irreversibility						
Feedback/ Communication Network						
Championing	●					
Follow-up available	●					
Rate of Diffusion Factors						
Fulfillment of felt need						
Compatibility	●					
Relative advantage	●●					
Complexity						
Observability						
Trialability						

Key:
●●● = Important barrier/ Level impedes market transformation (MT)
●● = Moderate barrier/ Moderate impediment for MT
● = Low level barrier/ Some impediment for MT
S = More important for smaller customers
I = More important for institutional customers
D = Depends on building ownership/ budgeting process for institutional customers.

Table 3-3
Primary Energy-Efficiency Market Barriers for
Air-Conditioning Related Product Market

	Customer				Vendor/ Contractor	Distributor
Product/Service Availability						
Unavailable						
Awareness						
Information costs	●●●					
Asymmetric information	●●●					
Decision Process						
Transaction/Hassle costs	●●●	S			●	
Access to financing	●●	S	I			
Bounded rationality	●●●	S	I			
Organizational practices	●		I			
Split incentives				D		
Perceived Reliability & Uncertainty						
Performance & market uncertainty	●●●					
Hidden costs	●		I			
Inseparability of features						
Irreversibility						
Feedback/ Communication Network						
Championing	●					
Follow-up available	●					
Rate of Diffusion Factors						
Fulfillment of felt need	●					
Compatibility						
Relative advantage	●					
Complexity						
Observability						
Trialability						

Key:
●●● = Important barrier/ Level impedes market transformation (MT)
●● = Moderate barrier/ Moderate impediment for MT
● = Low level barrier/ Some impediment for MT
S = More important for smaller customers
I = More important for institutional customers
D = Depends on building ownership/ budgeting process for institutional customers.

3.2.2 Downstream Program Market Effects and Hypotheses

Figure 3-3 shows the expected effects of the downstream Program. The Program was expected to have several direct effects, which, in turn, were expected to induce other changes in the market. All these direct and indirect effects can be formulated as hypotheses about the expected market effects of the Program.

We separated the effects of the Program into two groups: those that were expected to occur in the near term as participants installed measures under the Program and those that were expected to occur over the longer term. The near-term effects were similar to those usually assessed for conventional DSM programs. Table 3-4 presents hypotheses about the effects of the downstream component of the Program in the near-term. It also lists the specific market barriers addressed by the hypothesized effects and the market actors affected.

Table 3-4
Downstream Program Near-Term Hypothesized Effects

Hypotheses	Description	Barriers Potentially Addressed
Supply-Side Actors		
H1. Program promotion to suppliers increases supplier awareness of energy efficiency	Promotion to designers, vendors, etc. increases supply-side actor awareness of efficiency, measures, and performance	• Supply-side information costs • Supply-side performance uncertainties • Supply-side transaction/hassle costs
H2. H1 leads to increased supplier marketing of energy efficiency	Increased supply-side actor awareness increases marketing of measures to customers	• Supply-side transaction/hassle costs • Supply-side organization practices
H11. H10 leads to increased supplier marketing of efficiency measures	Increased demand convinces supply-side actors to promote additional efficiency measures	• See H2
Customers		
H3. H2 leads to increased customer awareness and lower information costs for efficient measures	Supply-side actor promotion, marketing, and specification of efficient measures informs customers	• Customer information costs • Bounded rationality and organization practices • Performance uncertainty • Hidden costs
H4. Program promotion/ marketing to customers increases awareness of energy efficiency and lowers information costs for efficient measures	Promotion and information provided by Program to customers increases their awareness of efficient measures and reduces effort required to obtain information	• Customer asymmetric information • See H3
H5. Program promotion/ marketing to customers increase customer	Customers' awareness of long-term investment analysis and criteria	• Customer performance uncertainty

Hypotheses	Description	Barriers Potentially Addressed
use of long-term investment analysis or criteria for efficiency measures	increases and they incorporate in decision-making	• Asymmetric information • Hidden costs • Access to financing • Bounded rationality • Organizational practices
H6. Program promotion/ marketing to customers provides customers with independent, objective measure information	Customers view information provided by Program as objective and reliable, increasing confidence in measures and performance	• Customer performance uncertainty • Bounded rationality
H7. Program rebates increase customer confidence in measure performance	Qualification of measure for Program rebate provides "stamp of approval"	• See H6
H8. Program rebates reduce need-for-financing barrier	Rebate either makes financing unnecessary or more feasible	• Customer access to financing
H9. Program rebates reduce cost barrier for lessees	Rebate reduces costs to customers in leased space enough to justify efficient measure investment	• Customer split incentives
H10. H4-H9 lead to increased customer efficiency measure adoption in short term	Direct and indirect Program effects lead to adoption of Program measures and demand for additional efficiency measures	• This is the expected outcome of reducing barriers

As noted, the longer term effects of the Program were identified separately. These effects are more closely linked to the market transformation role of the Program. These effects and associated hypotheses are also based on the model of the Program displayed in Figure 3-3. The hypothesized effects are presented in Table 3-5.

Table 3-5
Downstream Program Long-Term Hypothesized Effects

Hypotheses	Description	Barriers Potentially Addressed
Supply-Side Actors		
H13. H11 leads to vendors/ contractors benefiting from sales and installation of efficiency measures.	Suppliers increase sales, profits, and customer satisfaction as a result of selling/installing efficiency measures.	• Supply-side actor performance uncertainty • Organizational practices
H17. H13 and H14 lead to increased supply and lower costs of efficiency measures	Suppliers increase availability of measures and lower costs because they benefit from sales of measures	• This is one of expected long-term market transformation outcomes
Customers		
H12. H10 leads to customers having positive experiences with the efficiency measures they implement	Customers reduce utility bills, save energy, and experience other benefits of efficiency measures and are satisfied overall	• Customer performance uncertainty • Hidden costs • Bounded rationality and organization practices

Hypotheses	Description	Barriers Potentially Addressed
H14. H12 leads to customers who adopt efficiency measures communicating benefits to others	Customers tell other potential users about positive experiences with efficiency measures	• Customer performance uncertainty • Information costs • Asymmetric information • Hidden costs • Bounded rationality • Organization practices • Championing • Follow up
H15. H14 leads to customers communicating to suppliers about interest in efficiency measures (H1)	Customers inform suppliers about positive experiences with efficiency measures and interest in additional measures in the short run	• See H1
H16. H12 and H14 lead to increased customer long-term demand for measures	Program participants increase demand for efficiency measures in the long-run and non-participants learn about measures and also demand them	• This is one of expected long-term market transformation outcomes
Customers & Supply-Side Actors		
H18. H16 and H17 lead to increased market for efficiency measures	Customer demand and supply reach equilibrium level higher than in the absence of the Program	• This is the overall expected long-term market transformation outcome

3.2.3 Downstream Program Hypotheses, Indicators, and Research Activities

To document and explicitly summarize the relationship between the various primary research activities and the downstream Program hypotheses, we created a matrix of these two critical dimensions of this study. This matrix is presented for the near-term market effects in Table 3-6. An important purpose of developing this matrix was to ensure that the data collection and utilization were implemented in a coordinated and complementary manner.

In the first column of Table 3-6, we list the major *hypotheses* identified previously for the downstream component of the Express Efficiency Program. In the next column, we summarize a set of specific *market effects indicators* that were constructed to aid in the development of the survey instruments necessary for this study. The market effects indicators articulate specific factors that were measured in this study and could be tracked in future evaluations. Analyses of changes in these metrics will serve as empirical evidence for determining whether or not the hypotheses in question are supportable or should be rejected.

The remaining columns identify the key sources of information for this study. The usefulness of each source in addressing the indicators is shown symbolically in the table. No entry indicates that the source was not designed or was not considered to be a likely source of information for the given indicator.

Table 3-6
Downstream Program Near-Term Hypotheses, Indicators, Information Sources

Hypotheses	Market Effects Indicators	Customer Surveys	Contractor/Distributor Interviews		Program Information/ Other Sources
			PG&E Area	Low-DSM States	
SUPPLY-SIDE ACTORS					
H1. Program promotion to suppliers increases supplier awareness of energy efficiency	• Increased awareness of efficiency products		●●	●●	●
H2. H1 leads to increased supplier marketing of energy efficiency	• Increased marketing and promotion of efficient products	●	●●	●●	
H11. H10 leads to increased supplier marketing of efficiency measures	• Increased customer demand for high-efficiency products • Reduced market barriers for efficient products • Increased importance of high-efficiency products to remain competitive	●	●●	●●	
CUSTOMERS					
H3. H2 leads to increased customer awareness and lower information costs for efficient measures	• Increased availability of efficiency information from suppliers • Increased confidence in supplier efficiency information	●●	●	●	
H4. Program promotion/ marketing to customers increases awareness of energy efficiency and lowers information costs for efficient measures	• Increased knowledge and awareness of efficiency measures • Increased understanding of potential energy/utility bill savings • Reduced information barriers • Increased realism of assessment of energy efficiency and potential for improvements	●●	●	●	●

Hypotheses	Market Effects Indicators	Customer Surveys	Contractor/Distributor Interviews		Program Information/ Other Sources
			PG&E Area	Low-DSM States	
H5. Program promotion/ marketing to customers increase customer use of long-term investment analysis or criteria for efficiency measures	• Increased use of long-term investment analyses/criteria	●●			●
H6. Program promotion/ marketing to customers provides customers with independent, objective measure information	• Customers consider Program information to be trustworthy • Program information provides increased confidence in performance of efficiency measures	●●			●
H7. Program rebates increase customer confidence in measure performance	• Availability of rebate provides increased confidence in measure performance	●●			
H8. Program rebates reduce need-for-financing barrier	• Reduced effect of first-cost barrier • Increased availability of funding for efficiency measures	●●			
H9. Program rebates reduce cost barrier for lessees	• Reduced effect of measure cost on lessee efficiency investments	●			
H10. H4-H9 lead to increased customer efficiency measure adoption in short term	• Increased adoption of single and multiple efficiency measures in short term	●●	●	●	●●

●● indicates source is of primary importance for indicator, ● indicates secondary importance

We created a second matrix to address the longer-term effects anticipated from the downstream Program. The information is presented in Table 3-7 in the same format as the near-term effects shown in Table 3-6.

Table 3-7
Downstream Program Longer-Term Hypotheses, Indicators, Information Sources

Hypotheses	Market Effects Indicators	Customer Surveys	Contractor/Distributor Interviews		Program Information/ Other Sources
			PG&E Area	Low-DSM States	
SUPPLY-SIDE ACTORS					
H13. H11 leads to vendors/ contractors benefiting from sales and installation of efficiency measures.	• Increased profits • Improved customer relations		●●	●	
H17. H13 and H14 lead to increased supply and lower costs of efficiency measures	• Increased availability of efficient products • Reduced prices of efficient products	●	●●	●	●
CUSTOMERS					
H12. H10 leads to customers having positive experiences with the efficiency measures they implement	• Increased satisfaction with performance of efficient measures • Increased other benefits of efficiency measures	●●			
H14. H12 leads to customers who adopt efficiency measures communicating benefits to others	• Increased communication to peers about positive aspects of efficiency measures	●●			
H15. H14 leads to customers communicating to suppliers about interest in efficiency measures (H1)	• Increased customer feedback to suppliers about interest in efficiency measures	●			
H16. H12 and H14 lead to increased customer long-term demand for measures	• Increased and sustained long-term demand for efficiency measures	●			●

Hypotheses	Market Effects Indicators	Customer Surveys	Contractor/Distributor Interviews		Program Information/ Other Sources
			PG&E Area	Low-DSM States	
CUSTOMERS & SUPPLY-SIDE ACTORS					
H18. H16 and H17 lead to increased market for efficiency measures	• Established market for increased sales of efficient products	●	●	●	●
●● indicates source is of primary importance for indicator, ● indicates secondary importance					

3.3 UPSTREAM PROGRAM THEORY AND HYPOTHESES

This subsection discusses the theory and hypotheses that were developed for the "upstream" components of the Express Efficiency Program. The upstream Program components are those targeted at upstream market actors. In the 1998 Program, the Program addressed motor vendors and HVAC distributors for sales of high-efficiency products. As noted earlier, the scope of this report precluded studying the motors market, but did address the high-efficiency packaged air-conditioner element of the Program. Based on Program materials and interviews with Program staff, we developed a model of the upstream portion of the Program as shown in Figure 3-4.

The upstream component of the 1998 Express Efficiency Program included two products: motors and packaged air-conditioners (A/Cs). As noted earlier, our scope permitted only a study of the A/C portion of the Program. The ***primary interventions*** of the upstream component were aimed at the distributors. As shown in Figure 3-4, the key interventions included the following:

- promoting to customers,
- promoting and marketing to A/C distributors, and
- providing rebates to distributors.

PG&E specified qualifying requirements for each A/C product and distributor rebates based on the capacity of the A/C. The Program marketing materials included information to customers encouraging them to ask suppliers about the availability of qualifying units.

3.3.1 Market Barriers

Our interviews with Program implementers identified the major barriers that they felt impeded the adoption of efficiency measures in the packaged A/C market. As before, we categorized these barriers and made preliminary assessments of their expected significance. Table 3-6 summarizes the barriers by market actor for packaged A/C products. Unlike the products/measures discussed earlier, unavailability has presented a significant barrier in the high-efficiency A/C market. This has occurred throughout the supply chain, from manufacturers all the way to customers. A second barrier that cuts across all market actors is uncertainty. For customers, it is primarily performance uncertainty. Vendors/contractors and distributors also face uncertainties in terms of equipment performance, but probably a bigger uncertainty on the supply side involves the market for efficient A/Cs. This uncertainty about market demand for efficient products influences distributors and vendors to minimize their inventory of efficient units and this contributes to the unavailability of efficient A/Cs. Another major customer barrier is the cost of acquiring reliable, understandable information on A/C efficiencies. Customer decision-making and organizational practices (e.g., replacing A/Cs with the identical or similar type of unit) are also thought to be significant barriers in this market. Because packaged A/Cs require a large investment, customers also face difficulties financing the purchase of more efficient, more costly units. This is related also to a significant diffusion factor market barrier—trialability: it is difficult and costly to gain experience with an efficient A/C. It also can be difficult to find opportunities to observe or learn from others' experiences with high-efficiency units.

Figure 3-4
Model for "Upstream" Express Efficiency Program

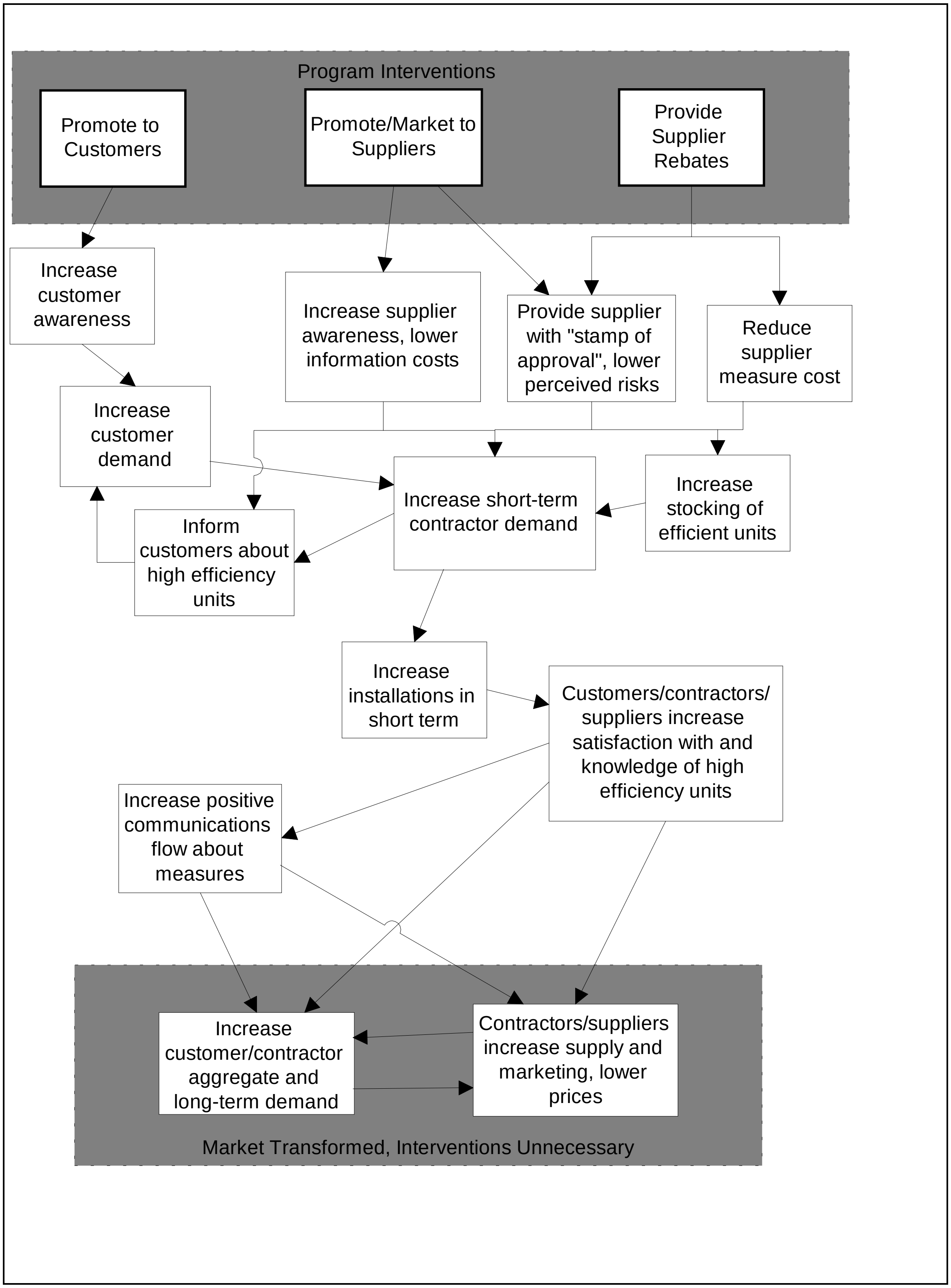


Table 3-8
Primary Energy-Efficiency Market Barriers for Packaged A/C Market

	Customer				Vendor/ Contractor	Distributor
Product/Service Availability						
Unavailable	●●●				●●●	●●●
Awareness						
Information costs	●●●					
Asymmetric information						
Decision Process						
Transaction/Hassle costs					●	
Access to financing	●●	S	I			
Bounded rationality	●●●					
Organizational practices	●●●				●	●
Split incentives				D		
Perceived Reliability & Uncertainty						
Performance & market uncertainty	●●●				●●●	●●●
Hidden costs	●		I			
Inseparability of features						
Irreversibility						
Feedback/ Communication Network						
Championing	●					
Follow-up available	●					
Rate of Diffusion Factors						
Fulfillment of felt need						
Compatibility						
Relative advantage						
Complexity	●					
Observability	●●					
Trialability	●●					

Key:
●●● = Important barrier/ Level impedes market transformation (MT)
●● = Moderate barrier/ Moderate impediment for MT
● = Low level barrier/ Some impediment for MT
S = More important for smaller customers
I = More important for institutional customers
D = Depends on building ownership/ budgeting process for institutional customers.

3.3.2 Upstream Program Market Effects and Hypotheses

Figure 3-3 illustrated the expected direct and indirect effects of the upstream Program. As before, we separated the effects of the upstream Program into two groups: those that were expected to occur in the near term as high-efficiency A/Cs were sold and installed under the Program and those that were expected to occur over the longer term. Table 3-9 presents hypotheses about the effects of the upstream component of the Program in the near term. It also lists the specific market barriers addressed by the hypothesized effects and the market actors affected.

Table 3-9
Upstream Program (Packaged A/C) Near-Term Hypothesized Effects

Hypotheses	Description	Barriers Potentially Addressed
Supply-Side Actors		
H1. Program promotion/marketing to suppliers increases supplier awareness of energy efficiency and lowers cost of getting information	Promotion to designers, vendors, and contractors increases awareness and reduce their information costs. Promotion to distributors increases awareness of efficient products.	• Supply-side information costs • Performance uncertainties • Transaction/hassle costs
H2. Program promotion/ marketing to supply-side actors reduces uncertainty about product performance	Promotion/ marketing provides "stamp of approval" and increases confidence in product	• Supply-side Information costs • Organizational practices
H3. Rebate reduces supplier costs	Distributor rebate makes efficient product costs comparable with standard products and this carries through supply chain	• This is a direct effect of the Program
H4. H1, H2, and H3 lead to increased stocking of efficient units	Distributors are convinced of performance of high-efficiency units and incur no added costs to stock them	• Supply-side unavailability • Organizational practices • Customer unavailability
H5. H1-H4 and H9 lead to increased vendor/contractor short-term demand	Vendors/contractors are convinced of benefits of high-efficiency units and incur little or no risk to demand them	• Supply-side transaction/hassle costs • Organizational practices • Unavailability • Market uncertainty
H6. H1-H3 and H5 lead to vendors/ contractors promoting high efficiency units	Vendors/contractors inform customers about and recommend high-efficiency units	• Supply-side unavailability • Customer unavailability • Information costs • Championing • Complexity
H7. H5 leads to increased near-term installations of high-efficiency units	Vendors/contractors sell and install more high efficiency units in the near term	• This is a desired Program outcome
Customers		

Hypotheses	Description	Barriers Potentially Addressed
H8. Promotion to customers increases customer awareness of efficient measures	General Program promotions and materials increase customer awareness of efficient measures	• Customer information costs • Bounded rationality and organization practices • Performance uncertainty • Hidden costs
H9. H8 and H6 lead to increased customer demand for efficient measures	Increased customer awareness leads to increased demand on vendors/ contractors for efficient products	• Customer bounded rationality and organizational practices • Supply-side market uncertainty

The longer term effects expected from the Program were identified separately. As noted before, these effects are more closely linked to the market transformation role of the Program. These effects and associated hypotheses also are based on the model of the Program displayed in Figure 3-4. The hypothesized effects are presented in Table 3-10.

Table 3-10
Upstream Program (Packaged A/C) Long-Term Hypothesized Effects

Hypotheses	Description	Barriers Potentially Addressed
Supply-Side Actors		
H10. H7 leads to vendor/ contractor/distributor satisfaction with sales and installation of high-efficiency products	Supply-side actors increase profits, market share, and customer satisfaction from selling high-efficiency units	• Supply-side market uncertainty • Organizational practices
H11. H10 and H13 lead to positive communications to vendors/ contractors/distributors about performance, sales, and installation of efficiency measures.	Suppliers and customers make supply-side actors aware of positive experiences with efficiency measures and peers make supply-side actors aware of benefits of selling/installing.	• Supply-side actor performance uncertainty • Market uncertainty
H12. H10 and H11 lead to increased supply and lower prices for efficiency products	Vendors/contractors/distributors increase efficient product availability and lower prices	• This is one of expected long-term market transformation outcomes
Customers		
H13. H7 leads to customer satisfaction with high-efficiency products	Customers experience desired energy and utility bill savings and satisfactory performance and other benefits of efficiency products	• Customer performance uncertainty • Hidden costs • Complexity
H14. H10 and H13 lead to positive communications to customers about efficiency measures	Suppliers and customers make customers aware of positive experiences with efficiency measures	• Customer performance uncertainty • Bounded rationality • Organizational practices • Championing • Observability

Hypotheses	Description	Barriers Potentially Addressed
H15. H13 and H14 lead to increased customer long-term and aggregate demand for efficiency measures	Customer satisfaction and positive feedback increases demand of adopting customers and number of adopters	• This is one of expected long-term market transformation outcomes
Customers & Supply-Side Actors		
H16. H12 and H15 lead to increased market for efficiency measures	Customer demand and supply reach equilibrium level higher than in the absence of the Program	• This is the overall expected long-term market transformation outcome

3.3.3 Upstream Program Hypotheses, Indicators, and Research Activities

Table 3-11 presents the relationships between the various primary research activities and the upstream Program hypotheses for the near-term effects of the Program. As before, the first column of Table 3-11 lists the major *hypotheses* identified for the upstream component of the Express Efficiency Program. In the next column, we summarize a set of specific *market effects indicators* that were constructed to focus the development of the survey instruments necessary for this study. The market effects indicators articulate specific factors that were measured in this study and could be tracked in future evaluations. The remaining columns identify the key sources of information for this study. The usefulness of each source in addressing the indicators is shown symbolically in the table. No entry indicates that the source was not been designed or was not considered to be a likely source of information.

Table 3-11
Upstream Program (Packaged A/C) Near-Term Hypotheses, Indicators, Information Sources

Hypotheses	Market Effects Indicators	Customer Surveys	Contractor/Distributor Interviews		Program Information/ Other Sources
			PG&E Area	Low-DSM States	
SUPPLY-SIDE ACTORS					
H1. Program promotion/marketing to suppliers increases supplier awareness of energy efficiency and lowers cost of getting information	• Increased awareness of efficiency products • Reduced costs of getting information on efficiency products		●	●	●
H2. Program promotion/ marketing to supply-side actors reduces uncertainty about product performance	• Increased confidence in efficiency product performance		●●	●●	
H3. Rebate reduces supplier costs	• Reduced costs of efficient products throughout supply chain		●●	●	●
H4. H1-H3 lead to increased stocking of efficient units	• Increased distributor stocking of efficient products • Increased vendor/contractor stocking of efficient products		●●	●●	
H5. H1-H4 and H9 lead to increased vendor/contractor short-term demand	• Increased vendor/contractor demand for efficient products		●●	●●	
H6. H1-H3 and H5 lead to vendors/ contractors promoting high efficiency units	• Increased marketing and promotion of efficient products to customers		●●	●●	
H7. H5 leads to increased near-term installations of high-efficiency units	• Increased installations of high-efficiency products		●●	●●	
CUSTOMERS					

Hypotheses	Market Effects Indicators	Customer Surveys	Contractor/Distributor Interviews		Program Information/ Other Sources
			PG&E Area	Low-DSM States	
H8. Promotion to customers increases customer awareness of efficient measures	• Increased customer awareness of efficient products • Increased customer understanding of potential energy/utility bill savings	●	●		
H9. H8 and H6 lead to increased customer demand for efficient measures	• Increased customer demand for efficient products	●●	●	●	
●● indicates source is of primary importance for indicator, ● indicates secondary importance					

We created a second matrix to address the longer-term effects anticipated from the upstream Program. The information is presented in Table 3-12 in the same format as the near-term effects shown in Table 3-11.

Table 3-12
Upstream Program (Packaged A/C) Long-Term Hypotheses, Indicators, Information Sources

Hypotheses	Market Effects Indicators	Customer Surveys	Contractor/Distributor Interviews		Program Implementer Interviews
			PG&E Area	Low-DSM States	
SUPPLY-SIDE ACTORS					
H10. H7 leads to vendor/ contractor/distributor satisfaction with sales and installation of high-efficiency products	• Increased profits • Improved customer relations		●	●	
H11. H10 and H13 lead to positive communications to vendors/ contractors/distributors about performance, sales, and installation of efficiency measures.	• Increased supply-side actor communications to other supply-side actors about benefits of high-efficiency products				
H12. H10 and H11 lead to increased supply and lower prices for efficiency products	• Increased availability of efficient products • Reduced prices of efficient products	●	●	●	●
CUSTOMERS					
H13. H7 leads to customer satisfaction with high-efficiency products	• Increased satisfaction with performance of efficient measures • Increased other benefits of efficiency measures	●●			
H14. H10 and H13 lead to positive communications to customers about efficiency measures	• Increased communication to other customers about positive aspects of efficiency measures	●			
H15. H13 and H14 lead to increased customer long-term and aggregate	• Increased demand by participating customers for other efficiency measures	●			

Hypotheses	Market Effects Indicators	Customer Surveys	Contractor/Distributor Interviews		Program Implementer Interviews
			PG&E Area	Low-DSM States	
demand for efficiency measures	• Increased demand by other customers for efficiency measures				
CUSTOMERS & SUPPLY-SIDE ACTORS					
H16. H12 and H15 lead to increased market for efficiency measures	• Established market for increased sales of efficient products	●	●	●	
●● indicates source is of primary importance for indicator, ● indicates secondary importance					

4 MARKET CHARACTERIZATION

4.1 INTRODUCTION

In this section we present a detailed characterization of the *general* market for commercial packaged air conditioners (A/C) and lighting equipment. Note that those aspects of our primary research that address high-efficiency aspects of the in-scope end-user and supply-side markets are presented in Sections 5 and 6 of this report, respectively. Information in Section 4 is drawn from three principal sources: primary research conducted for this Study (consisting of in-depth interviews with end users, contractors, and distributors in Pacific Gas and Electric's service territory and in eleven states with historically low DSM activity[1]); the PG&E/SDG&E Commercial Lighting Market Effects Study (XENERGY, 1998); and the PG&E C/I (HVAC & Motors) Market Effects Baseline Study (Quantum Consulting, 1998). We present information on the structure of each end-use market including estimations of market size, descriptions and roles of market actors, product flows through distribution channels, and perceptions of recent market trends. This section is organized into the following subsections:

- End-User Market Characteristics (4.2)
- Packaged A/C Market Characterization (Section 4.3)
- Efficient Lighting Market Characterization (Section 4.4)

4.2 END-USER MARKET CHARACTERISTICS

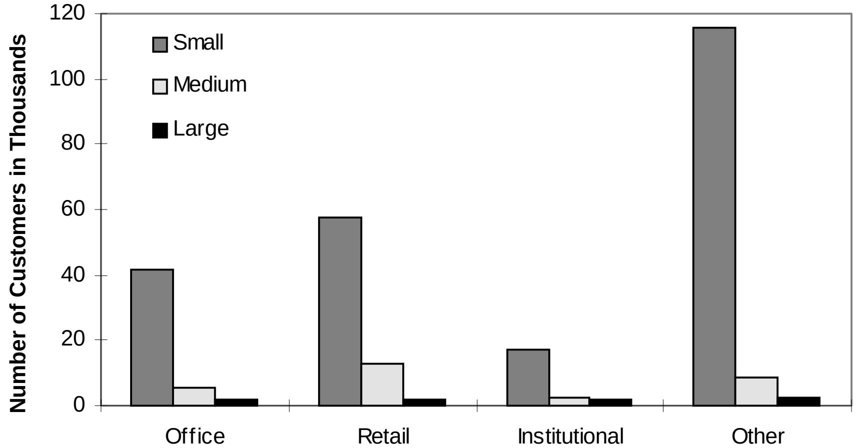
In this subsection we provide information on the commercial end user market in PG&E's service territory focusing, whenever possible, on the small/medium customer market.

We begin by presenting the number of premises and kWh consumption of small/medium customers (<500 kW) in Figures 4-1 and 4-2, respectively. The Figures present the population data broken into the following three size categories: small (<20 kW), medium (20 to 99 kW), large (100 to 499 kW). Consumption is spread fairly evenly among the three size categories, as shown in Figure 4-1, but the number of premises is weighted heavily toward the smallest size customers. Customers between 100 and 499 kW make up only three percent of the Small/Medium population but account for 33 percent of the consumption. The smallest customers account for 86 percent of the premises but only 38 percent of consumption. Consumption is also spread fairly evenly across the four market segments used in this Study (with the exception of Institutional, which is smaller than the other three segments). A

[1] The eleven states with historically low demand-side management program activity included are Arkansas, Kansas, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Oklahoma, Pennsylvania, South Carolina, and Texas. The reasons for choosing this comparison group are discussed in Section 9 of this report.

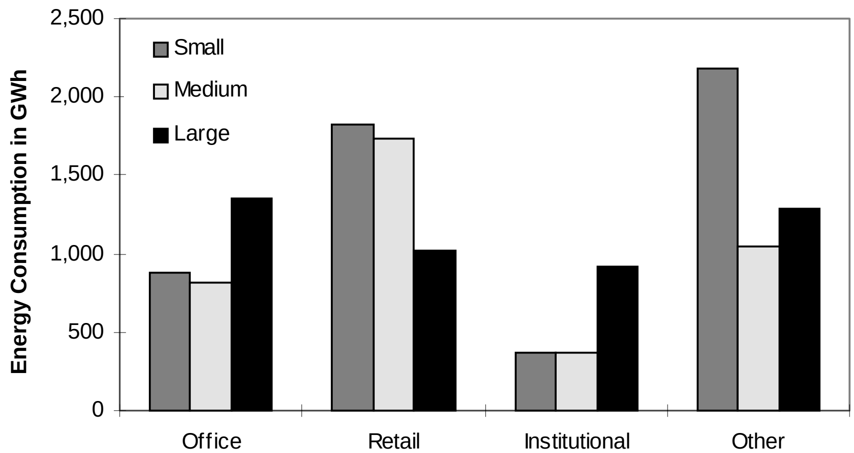
disproportionate number of premises are in the Other category, indicating these premises are smaller in terms of average usage than the premises in the other three segments.

Figure 4-1
Number of Premises for Commercial Customers <500 kW in the PG&E Service Territory*



*Category definitions are: small (<20 kW), medium (20 to 99 kW); large (100 to 499 kW)

Figure 4-2
kWh Consumption of Commercial Customers <500 kW in the PG&E Service Territory*



*Category definitions are: small (<20 kW), medium (20 to 99 kW); large (100 to 499 kW)

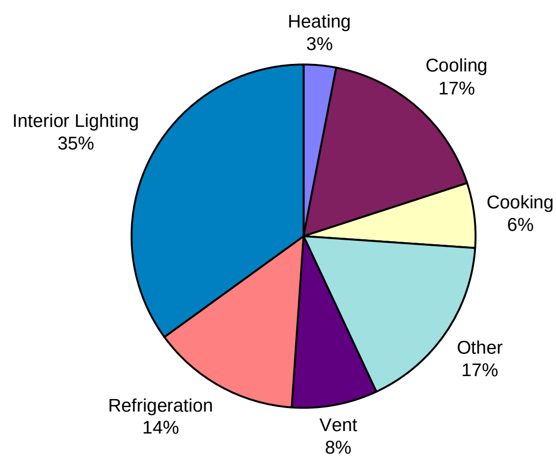
As discussed in Section 5 of this report, our primary data collection for this Study included surveys of small/medium customers that were 1998 Express Participants, PG&E territory non-participants (in both Express and BEMS), and customers in a comparison area of states with historically low levels of DSM program activity. In Table 4-1 we present facility characteristics data for the in-territory non-participants. We include information on the facility size, ownership, and responsibility for energy. The data in this table have been weighted to be representative of the kWh consumption of the PG&E population of small/medium commercial customers.

Table 4-1
Summary of Small/Medium Customer Characteristics (n=299; for lessees n=145)

Item and Response	Percentage
Full-time Equivalent Employees	
1 to 5	30.1%
6 to 10	17.8%
11 to 20	13.4%
21 to 50	19.5%
51 to 100	8.8%
Over 100	10.5%
Square Footage	
Less than 5,000 square feet	31.6%
5,000 but less than 10,000 square feet	24.1%
10,000 but less than 20,000 square feet	14.9%
20,000 but less than 50,000 square feet	15.2%
50,000 but less than 100,000 square feet	7.6%
100,000 but less than 1 million square feet	5.4%
Over 1 million square feet	1.3%
Person Monitors Energy Use	
Yes	32.8%
No	66.0%
Don't know	1.2%
Ownership Status	
Own	48.2%
Lease/rent	49.3%
Don't know	2.1%
Refused	0.3%
Bill Payment Status - Lessees Only	
Pay ALL of bill - NO electric utilities in lease	90.5%
Pay SOME portion of electric utility bills	6.6%
Pay NONE of bill - ALL electric utilities in lease	3.0%
Involvement in Equipment Purchase Decisions - Lessees Only	
Very active - involved in all phases & have veto power	34.5%
Somewhat active - we approve decisions & have some input	27.5%
Slightly active - we have a voice but not dominant	17.3%
Not active at all - we're part of a larger firm	7.7%
Not active at all - our firm isn't involved in high-efficiency issues	13.0%
Remodeled Since 1996	
Yes	27.0%
No	73.0%

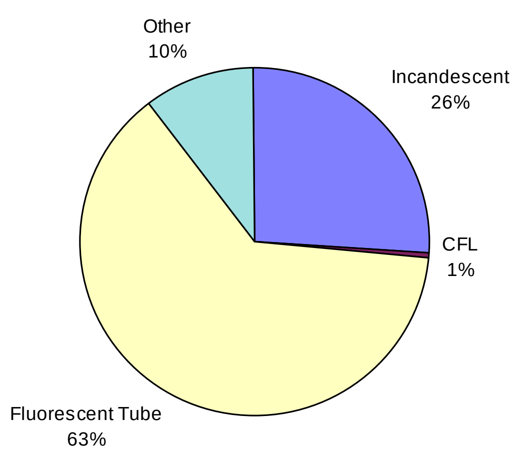
Among all of PG&E's commercial customers, cooling and interior lighting are the largest end uses as shown in Figure 4-3.[2] Within the lighting end use, 63 percent of the installed capacity is fluorescent tube, 26 percent incandescent, and only one percent compact fluorescent.

Figure 4-3
Percent of Annual Electric Sales by End Use, All PG&E Customers



Source: PG&E 1997 Commercial Building Survey Report.

Figure 4-4
Distribution of Installed Lighting Capacity (in kW), All PG&E Commercial Customers



Source: PG&E 1997 Commercial Building Survey Report.

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[2] Note that the these data come from PG&E's latest publication of it Commercial Energy Use Survey (CEUS) published as the 1997 Commercial Building Survey Report. Data are for the entire population of commercial customers. The report does not present results by customer size; however, these results could be developed from the primary data as part of future research efforts on the small/medium commercial market. We expect that the end-use consumption distribution and lighting and cooling inventories will differ significantly between large and small customers.

As shown in Table 4-2, PG&E's CEUS project also provides detailed information regarding the energy characteristics of the commercial cooling market. Key findings from this study include:

- Seventy-one percent of commercial square footage in PG&E's service territory was heated and 58 percent was cooled
- The penetration of cooling equipment ranged from a high of 88 percent of commercial premises in the desert/mountain climate zone to a low of 34 percent in the coastal climate zone
- Packaged electric systems accounted for 2.3 million tons of cooling capacity, or 64 percent of the territory total
- Schools, colleges, hospitals, restaurants, refrigerated warehouses, and offices all had at least 75 percent of premises with packaged electric cooling

Table 4-2
Percentage of Premises with Cooling Capacity

Business Type	Packaged Cooling Capacity ('000 tons)	Percent with Packaged Electric	Percent with any Cooling
Colleges	54.1	74%	76%
Food Stores	54.4	59%	61%
Hospitals	88.7	86%	97%
Hotels/Motels	176.6	47%	51%
Miscellaneous	243.8	46%	47%
Offices	698.4	75%	79%
Refrigerated Warehouses	8.6	79%	80%
Restaurants	251.7	79%	80%
Retail Stores	375.4	57%	62%
Schools	246.3	78%	78%
Warehouses	124.7	63%	63%
Total	2,322.8	64%	67%

Source: PG&E 1997 Commercial Building Survey Report

4.3 PACKAGED A/C MARKET CHARACTERIZATION

This subsection provides a characterization of the commercial packaged air conditioner market based on data from surveys with A/C contractors and distributors in Pacific Gas and Electric's service territory and the comparison area mentioned above.

4.3.1 Overview of Commercial Packaged Unit Market[3]

Nationally, there were approximately 5.35 million packaged A/C units (central air conditioners and air-source heat pumps) shipped in 1997, according to the Air Conditioning and Refrigeration Institute (ARI). Most packaged AC units destined for commercial customers are in the 5-20 ton size range. Domestic shipments by the manufacturers who make up the membership of the ARI are said to account for more than 90 percent of the national market.

All of the major national **manufacturers** are represented in the Northern California market and several have manufacturing/assembly facilities in the region. Despite the presence of a relatively large number of brand names, units are actually manufactured by just a handful of firms. Manufacturers of packaged units sell through a network of **distributors**, although some of those distributors are "captive" – that is, they are owned by the manufacturer and only sell a single manufacturer's products. Within PG&E's service territory there are a total of 47 firms classified as A/C distributors by Dun & Bradstreet (D&B). Distributors provide the stocking function for A/C units other than the most popular models, which may also be stocked by contractors.

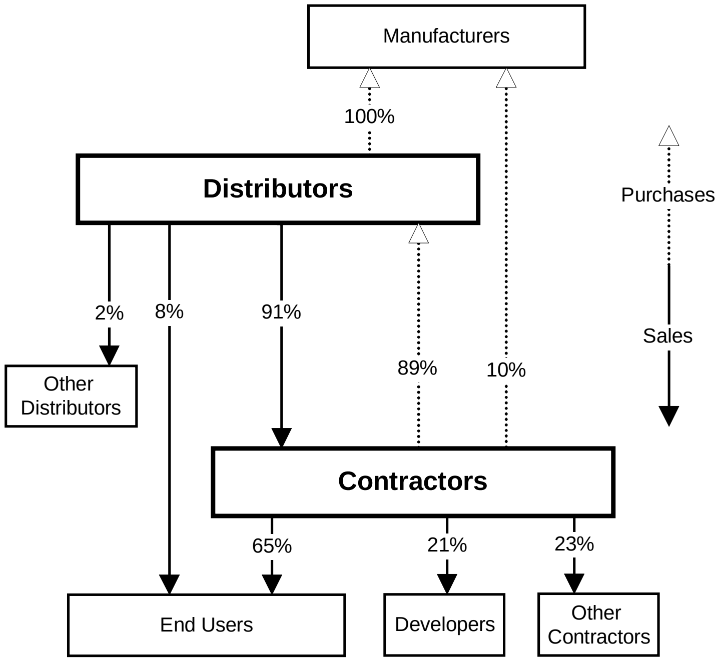
Contractors provide the retail sales function in the market for packaged commercial air conditioners. These are numerous and diverse in Northern California. We estimate that there are more than 2,000 A/C contractors, ranging in size from one-person operations to companies with more than 50 employees in the PG&E service territory. Most of these specialize in residential installations, but even residential contractors typically do some commercial business. Forty percent of the contractors we screened for interviews, however, indicated that they do not install commercial packaged units.

Design professionals, including both consulting engineers and architectural firms, are involved in the A/C market to the extent that they specify the size, type, and efficiency of equipment to be installed. A&E firms often specify equipment to be installed in the new construction market; they are less influential in the replacement market. **Energy Service Company** (ESCO) involvement in the packaged A/C market generally comes about as part of a larger, comprehensive energy project. Despite the broad capabilities that ESCOs offer, their role in the market for packaged air conditioning is still relatively limited.

In Figure 4-5 we present a flow chart of purchases and sales within the packaged A/C market based on our survey data. The percentages for sales and purchases shown in the figure do not add exactly to 100 percent due to rounding and the presence of very small product flows to and from other sources. Note that contractors report that they buy predominantly from distributors and distributors report that they sell predominantly to contractors. Contractors report that they sell packaged A/C units mostly to end users (65 percent), but also to developers (21 percent) and other contractors (23 percent, principally *general* contractors that oversee large jobs).

[3] Most of this subsection is drawn from the PG&E C/I Market Effect Baseline (HVAC/Motors) Study, prepared by Quantum Consulting for PG&E, 1998.

Figure 4-5
Product Flows in the Commercial Packaged A/C Units in PG&E's Service Territory



Source: XENERGY Interviews and analysis.

4.3.2 Analysis of Primary Interview Results

Analysis of the A/C equipment market information developed from our primary research is presented in the following subsections on market size, interviewee characteristics, and market trends.

Size and Composition

As discussed in Section 9, we stratified our A/C contractor surveys into four size categories based on full-time equivalent employees (FTE). These four strata were aggregated into two groups for the purposes of reporting results. Contractors were broken into two size categories: large and small. We defined large contractors as those having at least 50 employees. Small contractors are defined as those with between two and 49 employees. These size categories are used throughout this report to highlight important differences between contractors. For the population captured by our surveys, we estimate that small contractors install roughly three quarters of all the commercial package units in PG&E's service territory. Large contractors, though representing only two percent of firms, account for about one-fifth of the packaged unit installations. The numbers are similar for the nation. Table 4-3 shows the number of A/C contractors and their relative significance in the packaged A/C market as measured by the tonnage of package units they install.

Table 4-3
Contractors: Description of Population†

	Other‡ 1 or unknown FTE	Small 2 - 49 FTE	Large > 49 FTE
Raw HVAC Population			
PG&E Territory	455	1,591	31
Low-DSM States	5128	14,201	194
Entire U.S.	18359	57,179	792
Portion of sample that does not install commercial package units¥	40%	39%	4%
Adjusted HVAC Population			
PG&E Territory	273	978	30
Low-DSM States	3,077	8,731	185
Entire U.S.	11,015	35,154	757
PG&E Territory			
Percent of population	23%	75%	2%
Avg number of employees	1	14	180
Avg total revenues	218,900	3,544,100	33,250,000
Percent commercial pkg units	34%	34%	35%
Commercial packaged unit revenues	1%	76%	22%

† As derived from a search of Dun & Bradstreet's database. SIC groups included are listed in Section 9 of this report.
‡ This category is almost entirely composed of one-person businesses. Only a few are unknown. Complete interviews were conducted only with contractors in the Small and Large categories.
¥ These figures are XENERGY estimates based on results from screening calls of potential interviewees..

Note that the estimates in Table 4-3 do not include firms that are misclassified in Dun & Bradstreet under SIC codes other than those we considered.

Characteristics of Interviewees

The majority of contractors interviewed (77% PG&E Territory and 89% Low-DSM States) classified themselves as HVAC contractors (See Table 4-4). Other contractors described themselves as design-build firms, sheet metal contractors or other types of contracting firms. Table 4-5 shows the breakdown of distributors by self classification. The majority of distributors classified themselves as manufacturer's representatives (60% PG&E Territory and 58% Low-DSM States). The remaining 40 percent of PG&E-area distributors described themselves as simply "distributors" while the remaining 42 percent of low-DSM-area interviewees called themselves general industrial suppliers.

Table 4-4
Contractors: Self-Reported Classification

	PG&E Territory	Low-DSM States
HVAC Contractor	77%	89%
Part of Design-Build Firm	4%	11%
Other	19%	0%
# Respondents	*26*	*18*

Table 4-5
Distributors: Self-Reported Classification

	PG&E Territory	Low-DSM States
Manufacturer representative	60%	58%
General industrial/other distributor	40%	42%
Catalog/mail order firm	0%	0%
# Respondents	*10*	*12*

The average, minimum and maximum number of years contractors and distributors have been in business is shown in Table 4-6. The average age of contractors was very similar between PG&E Territory and Low-DSM States (28 and 30 years, respectively). Distributors were slightly older, 59 years on average for PG&E Territory distributors and 43 years for those distributors in Low-DSM States.

Table 4-6
Age of Businesses

	Contractors		Distributors	
	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
Average	28	30	59	43
Minimum	6	5	7	15
Maximum	90	100	125	70
# Respondents	*26*	*19*	*10*	*11*

The breakdown of FTE employees for contractors and distributors is shown in Table 4-7. The average number of employees are shown by the small and large size strata. Total revenue estimates are shown for contractors in Table 4-8 and for distributors in Table 4-9. Contractor revenues are fairly consistent between PG&E Territory and Low-DSM States. Nearly twice as many PG&E Territory distributors reported having revenues greater than 10 million dollars (70% for PG&E Territory versus 36% for Low-DSM States). Also of note was the fact that there were no PG&E Territory distributors that reported having revenues under $1 million. The large size of the in-territory distributors is likely attributable to the fact that the PG&E distributors interviewed were a non-random sample that consisted of participants in the upstream component of the 1998 Express Program.

Table 4-7
Number of Full-Time-Equivalent Employees

	Contractors				Distributors			
	PG&E Territory		Low-DSM States		PG&E Territory		Low-DSM States	
	Small	*Large*	*Small*	*Large*	*Small*	*Large*	*Small*	*Large*
Average	17	167	11	194	13	79	9	45
Minimum	3	50	2	50	3	25	3	27
Maximum	44	500	27	600	20	190	23	90
# Respondents	17	9	9	10	6	4	5	6

Table 4-8
Contractors: Comparison of Total Revenue

	PG&E Territory	Low-DSM States
<$1 Million	23%	26%
$1-$10 Million	50%	37%
>$10 Million	27%	32%
Don't Know/Proprietary	0%	5%
# Respondents	*26*	*19*

Table 4-9
Distributors: Comparison of Total Revenue

	PG&E Territory	Low-DSM States
<$1 Million	0%	9%
$1-$10 Million	30%	45%
>$10 Million	70%	36%
Don't Know/Proprietary	0%	9%
# Respondents	*10*	*11*

PG&E Territory contractors install more units per year and per job than their counterparts in Low-DSM States. Table 4-10 shows that the average number of installations per year for PG&E territory contractors is 195 while contractors in low-DSM areas reported a somewhat smaller average of 137 units per year. Although PG&E territory companies did report more units installed per job, this difference was slight (5.1 units per job versus 4.7 units per job).

Table 4-10
Contractors: Units Installed Per Year and Per Job

	Installed Per Year		Installed Per Job	
	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
Average	195	137	5.1	4.7
Minimum	15	20	1	1
Maximum	1000	600	30	20
# Respondents	25	15	22	17

The percentage of sales that are accounted for by commercial package A/C units is presented for contractors and distributors in Table 4-11. The level of packaged unit sales was fairly consistent between both PG&E Territory and Low-DSM States for both contractors and distributors. Packaged unit-related sales represented 37 and 40 percent of revenues for PG&E Territory contractor and distributor sales, respectively.

Table 4-11
Commercial Package Units as Percentage of Total Sales

	Contractors		Distributors	
	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
Average	37%	32%	40%	29%
Minimum	1%	5%	20%	1%
Maximum	90%	70%	60%	95%
# Respondents	*26*	*19*	9	11

The breakdown of package unit final destinations is presented in Tables 4-12 and 4-13. The largest percentage of unit sales was in the “new units in new buildings” category for both PG&E territory and low-DSM area contractors (35% and 53%, respectively). The remaining units for both groups of contractors were fairly evenly spread across the three existing-building categories with a small handful of units going towards the “other” category. Distributor sales data is shown in Table 4-13. Distributors reported a markedly larger percentage of units being sold for “planned replacement of existing units” than the contractors’ reported. Like the contractors, the largest category for PG&E Territory distributors was “new units in new buildings.” Distributors in Low-DSM States were slightly different. They reported that “planned replacement of existing units” accounted for more unit sales than any other group (34% of total sales).

Table 4-12
Contractors: Breakdown of Package Unit Sales

	PG&E Territory			Low-DSM States		
	Small	Large	Total	Small	Large	Total
Planned replacement of existing units	24%	26%	24%	6%	15%	7%
Emergency replacement of existing units	30%	10%	23%	27%	3%	22%
New units in existing bldgs (expansion)	13%	25%	17%	18%	13%	17%
New units in new buildings	32%	39%	35%	49%	70%	53%
Other	5%	0%	5%	0%	0%	0%
# Respondents	*17*	*9*	*26*	*9*	*10*	*19*

Table 4-13
Distributors: Breakdown of Package Unit Sales

	PG&E Territory			Low-DSM States		
	Small	Large	Total	Small	Large	Total
Planned replacement of existing units	35%	29%	32%	40%	30%	34%
Emergency replacement of existing units	13%	10%	12%	36%	28%	31%
New units in existing bldgs (expansion)	18%	16%	18%	3%	11%	8%
New units in new buildings	33%	43%	37%	23%	26%	25%
Other	1%	0%	1%	0%	6%	4%
# Respondents	*6*	*4*	*10*	*5*	*6*	*11*

The major market sector for contractors was the commercial market which makes up 64 percent of business for PG&E Territory companies and 55 percent for companies in Low-DSM States. Residential was the next largest market, followed by industrial (see Table 4-14).

Table 4-14
Contractor: Percent of HVAC Business By Market Sector

	PG&E Territory			Low-DSM States		
	Small	Large	Total	Small	Large	Total
Commercial	59%	74%	64%	48%	61%	55%
Residential	36%	23%	31%	45%	12%	28%
Industrial	5%	12%	8%	7%	23%	16%
Other	0%	0%	0%	0%	11%	6%
# Respondents	*17*	*9*	*26*	*9*	*10*	*19*

Perceptions on Market Trends

Contractors were asked to identify trends in the packaged A/C market over the past three years. Their responses were grouped into four broad categories, including technical changes, general comments, availability of high-efficiency units, and prices changes. Contractors in the PG&E territory tended to focus more on technical changes that have occurred in the industry but, in general, there was no real consensus around these trends or obvious differences when compared with the Low-DSM respondents. The most common “technical changes” for PG&E Territory contractors were increases in efficiency and increase in the use and sophistication of controls on packaged A/C systems. The most common “general comments” were about changes in customer demand for value and lack of interest in high efficiency. Technical changes were the most cited trend for the next three years, but again, no strong consensus or differences were clear (see Table 4-15). The most common “technical changes” expected in the future were increases in energy efficiency of units and increases in the sophistication and availability of controls for units (see Table 4-16).

Table 4-15
Contractors: Trends in the Market for Package Units Over the Past Three Years

	PG&E Territory	Low-DSM States
Technical Changes: *Control improvement, refrigerant phase-out,* *Increases in efficiency,* *Incorporation of VSDs,* *Increased complexity,* *Standardization of components, sizes.* *Cheaper parts*	68%	39%
General Comments: *Owners don't care about HE,* *Customers want more value,* *Increased use of packaged units,* *Quality increasing/decreasing,* *Trend towards gas packs* *Improved service from vendors,*	36%	28%
Availability of Units: *Increased Availability of HE units*	5%	0%
Price Changes: *Prices are decreasing,*	*9%*	*11%*
No Trends:,	*5%*	*22%*
# of Respondents	*22*	*18*

Table 4-16
Contractors: Trends in the Market for Package Units in the Next Three Years

	PG&E Territory	Low-DSM States
Technical Changes: *Control improvements, ,* *Increases in efficiency/unit quality,* *More use of evaporative coolers* *Refrigerant phase-out* *Cheaper parts, standardization of components.*	52%	23%
General Comments: *Customers want more value,* *Quality increasing/decreasing,* *Trend towards gas packs and larger units*	22%	8%
Mandated standardization: State or Federal regulations	9%	15%
No Trends:,	*17%*	*54%*
# of Respondents	*23*	*13*

Table 4-17 presents the responses to questions concerning the most important factors considered when choosing packaged A/C equipment for customers. Note that most commonly mentioned by PG&E Territory contractors was reliability and quality of the unit, followed by monetary concerns and issues. Low-DSM States mentioned energy efficiency most often (53%) followed by monetary concerns and issues (47%). Some of the responses that were labeled “other” were as follows: relationship with and service provided by vendor, brand name, needs of the customer, noise concerns, and ease of installation.

Table 4-17
Contractors: Most Important Factors for Installations or Specifications for Customers

	PG&E Territory	Low-DSM States
Quality/reliability	58%	35%
Budget issues/price	54%	47%
Availability of unit/parts	21%	6%
Dimensions/size of unit	25%	12%
Energy efficiency	25%	53%
Other	17%	12%
# of Respondents	*2 4*	*17*

Contractors and distributors were also asked to rate, on a five-point scale, the importance that their customers place on each of five characteristics of packaged units. These results are shown in Table 4-18. For both contractors and distributors in both the PG&E and comparison areas, reliability was rated highest. Price was consistently the second highest rated characteristic. Energy efficiency was the third highest rated characteristic among PG&E contractors and was tied for third (along with brand) among PG&E distributors. Contractors and distributors in the comparison groups both rated energy efficiency below brand and just above or equal to the unit’s dimensions.

Table 4-18
Packaged Unit Characteristics Ratings
(ratings on a 1-5 scale, 1=not important, 5=extremely important)

	Contractors		Distributors	
	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
Price	3.7	4.2	3.8	3.5
Brand	2.6	3.5	3.6	3.5
Dimensions	2.5	2.7	3.1	2.4
Energy Efficiency	3.6	2.9	3.6	2.4
Reliability	4.3	4.5	4.2	4.2
# of Respondents	26	19	10	11

4.4 EFFICIENT-LIGHTING MARKET CHARACTERIZATION

This subsection provides a characterization of the commercial lighting market based on data from surveys with electrical contractors and distributors in Pacific Gas and Electric's service territory and from eleven states with low demand-side management activity. Recent work reported in *PG&E and SDG&E Commercial Lighting Market Effects Study* (XENERGY, 1998) presents a comprehensive characterization of the T8 lamp and electronic ballast market. To complement rather than duplicate this earlier effort, the focus of our primary research for the current Study is on the compact fluorescent market. Complementing this previous research, our surveys were kept broad enough to capture key elements of the entire efficient-lighting market. We were thus able to update a few key market indicators for T8 lamps and electronic ballasts. We also draw on this previous work to supplement our market characterization.

4.4.1 Overview of the Commercial Lighting Market

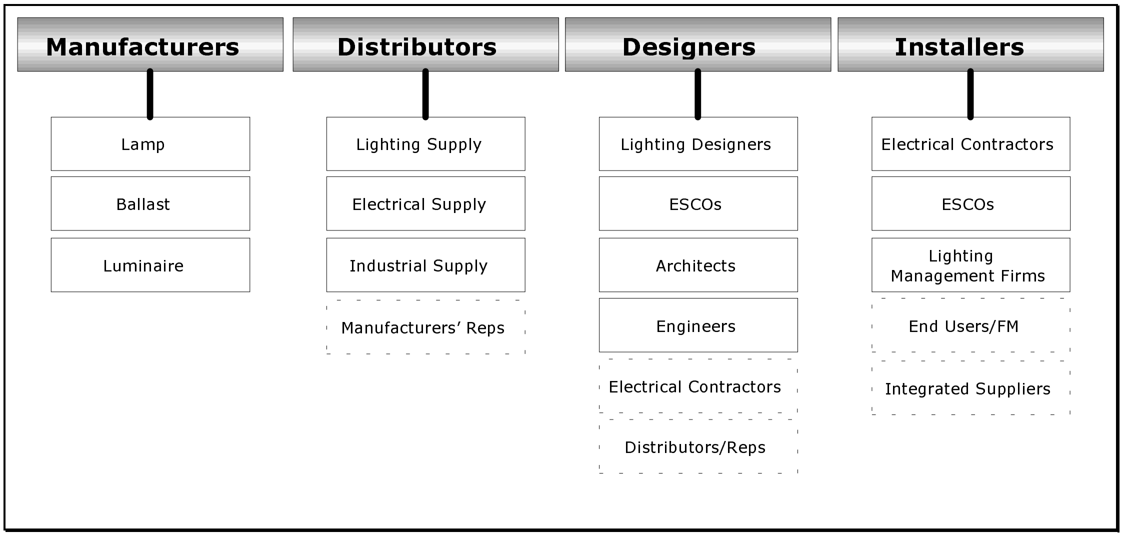
The *PG&E and SDG&E Commercial Lighting Market Effects Study* was much larger in scope than the current Study. As such, this subsection summarizes the market overview developed in this previous study. Readers unfamiliar with the previous work are encouraged to review the market characterization sections of that report as background to the current Study (much more detail is available in this previous report than is included in the summary that follows).

Supply-side Segmentation

The supply side of the commercial lighting market is characterized by a wide range of business models found along the supply chain. Changes both within the industry as well as through external forces have significantly altered the landscape of the commercial lighting market over the past decade, in California as well as the nation. For a variety of reasons, including rapid technological evolution, changes in utility program funding, and increasing pressures to reduce costs, the changing commercial lighting industry has forced businesses to adapt and seek new markets and submarkets. As a result of the market change and the uncertainty that accompanies it, new business models have evolved, some focusing heavily upon energy efficiency as a tool for boosting revenues.

In order to understand the structure of the supply side of the commercial lighting market, it is important to identify and understand the motivations and dispositions of its component parts. The supply-side analysis developed in the previous research (XENERGY, 1998) identified four primary segments, 13 total subsegments and five quasi-segments that did not clearly fall under the primary segments. Figure 4-6 summarizes the segmentation developed previously. Note that the current Study adds primary research on only two of the four primary segments: distributors and installers (contractors).

Figure 4-6
Supply-Side Segmentation Scheme



Source: XENERGY, 1998

The solid boxes in the figure represent discrete subsegments that fall under the primary segment identified in the shaded box above it. The broken boxes represent quasi-segments that do not clearly fall under any one segment. For example, the End User/FM (facilities maintenance) subsegment falls under installers; however, they are not a component of the supply side (nor are they included in the primary research conducted for the current Study). Integrated suppliers span all four segments, but to avoid duplication were grouped under installers. Another quasi-segment is Manufacturers' Reps. These entities have the function of acting as sales conduits for manufacturers, providing design and layout services as a sales tactic. These firms, whether independent or manufacturer-owned, do not definitively fall under any single primary segment as defined; yet they have a significant market presence and therefore merit recognition in the segmentation scheme. Finally, electrical contractors and distributors/reps fall under the designer segment because these are secondary services offered by these groups.

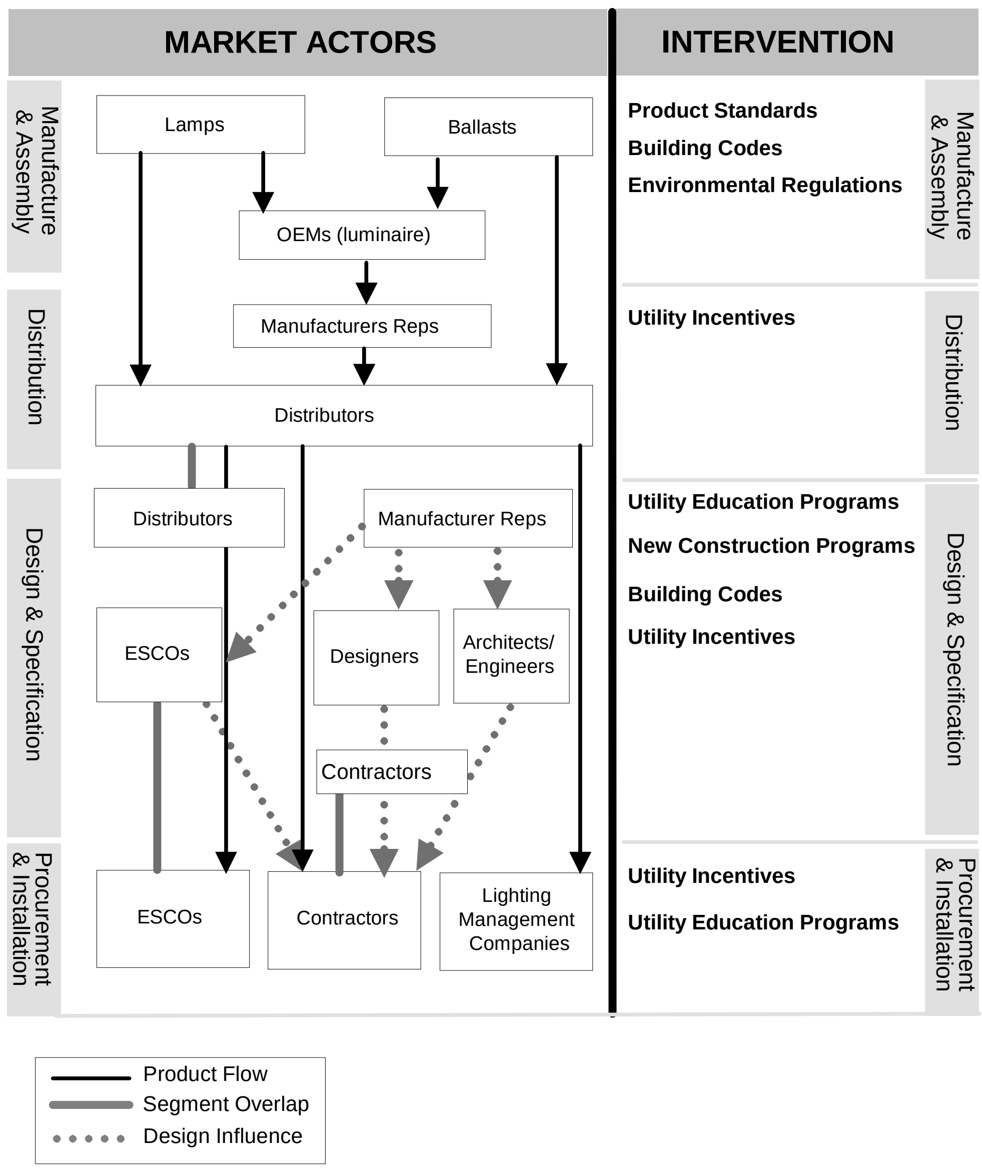
Although this discrete segmentation of the supply-side market is generally appropriate and useful, it is also important to recognize that many supply-side lighting firms engage in multiple levels of the supply chain.

Market Influence

This subsection presents influence diagrams for major sectors of the market (again as developed in XENERGY, 1998). Figure 4-7 below graphically depicts the overall structure of the commercial lighting market and identifies major intervention efforts for each segment. Arrows generally indicate product flows and design influence; boxes represent major segments. Not all possible product flows and influences are shown in the diagram because we prefer to avoid the unnecessary risk of overcomplication. Consequently, the diagram represents the primary market relationships as a simplification, rather than an exhaustive depiction of all relationships we identified in our research.

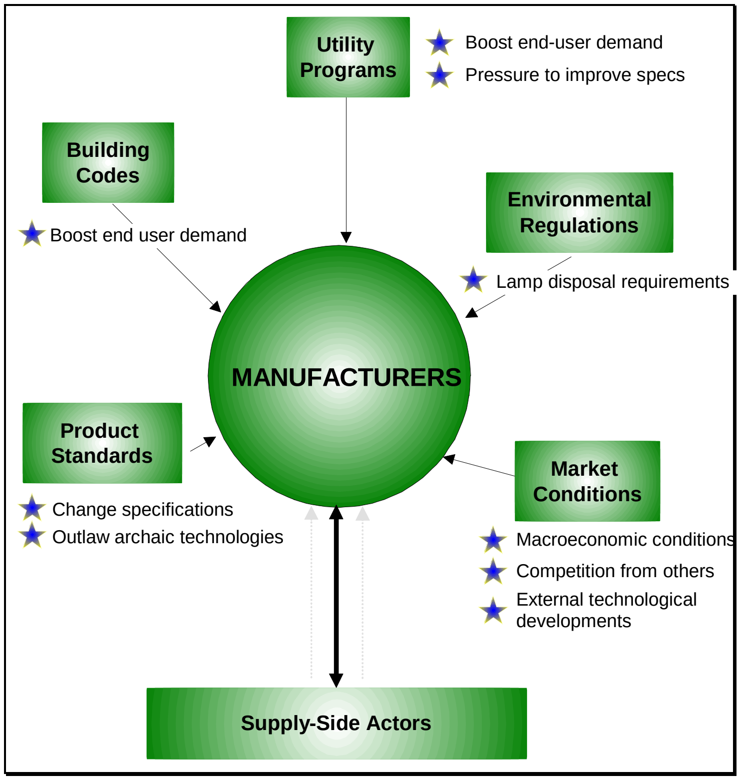
The two subsequent influence diagrams, Figure 4-8 and Figure 4-9, dissect the overall market diagram into a manufacturer and design and specification diagram. These two segments of the market structure, which we deem most important to the adoption of energy-efficient technologies, illustrate the “external” pressures affecting the decision making of both groups.

Figure 4-7
Commercial Lighting Market and Intervention Diagram



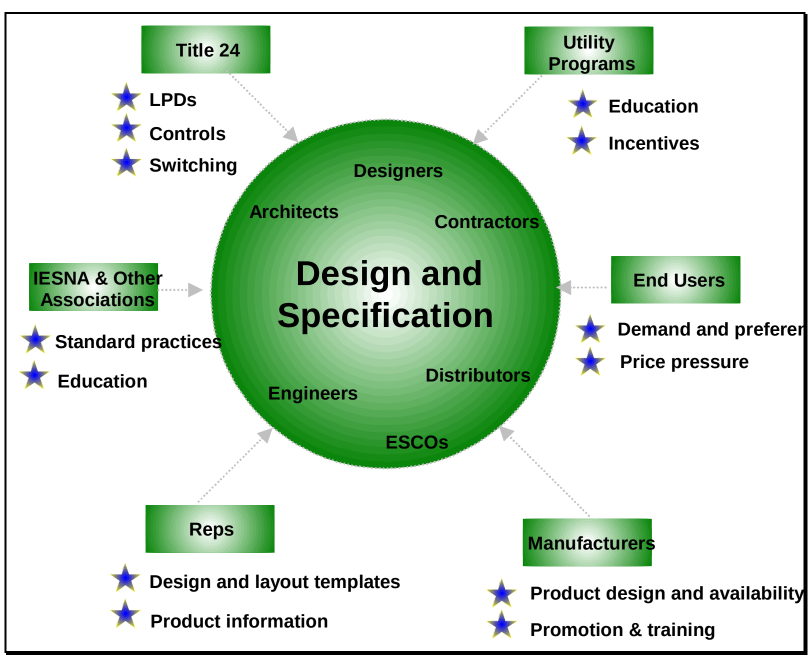
Source: XENERGY, 1998

Figure 4-8
Manufacturer Influence Diagram



Source: XENERGY, 1998

Figure 4-9
Design & Specification Influence Diagram

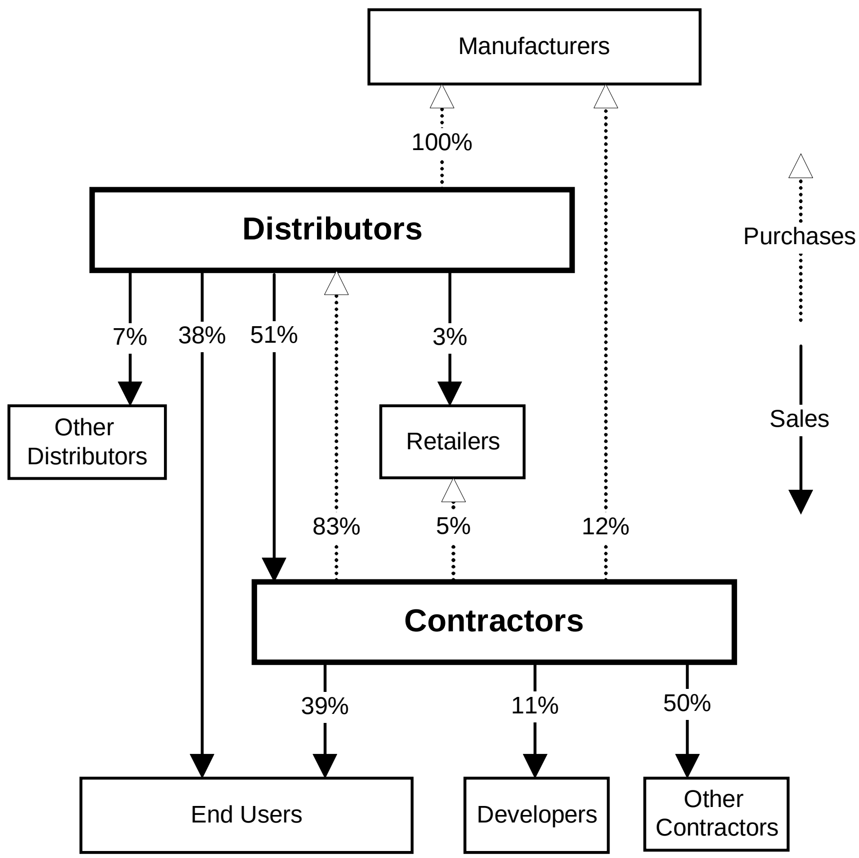


Source: XENERGY, 1998

Product Flows

Within PG&E's service territory, the majority of commercial lighting products flow from manufacturers to distributors, from distributors to contractors and then on to end users. As shown in Figure 4-10, distributors also sell a significant fraction of fluorescent lamps, ballasts, and fixtures directly to end users.

Figure 4-10
Product Flows in the Commercial Lighting Market in PG&E's Service Territory



Source: XENERGY Interviews for the current Study.

4.4.2 Analysis of Primary Interview Results

Analysis of the efficient lighting equipment market information developed from our primary research is presented in the following subsections on market size, interviewee characteristics, and market trends.

Size and Composition

As discussed in Section 9, we stratified our lighting contractor surveys into four size categories based on full-time equivalent employees (FTE). These four strata were aggregated into two groups for the purposes of reporting results. Contractors were broken into two size categories: large and small. We defined large contractors as those having at least 50 employees. Small contractors are defined as those with between two and 49 employees. These size categories are used throughout this report to highlight important differences between contractors. For the population captured by our surveys, small contractors (including those with one or an unknown number of employees) account for approximately 98 percent of the firms but only about 63 percent of commercial lighting revenues throughout PG&E's service territory. Large contractors represent only two percent of the firms but account for over a third of the revenues. The numbers are similar for the nation. Table 4-19 shows the number of lighting contractors and their relative impact in the commercial lighting market as measured by their revenues from commercial lighting work. Note that the estimates in Table 4-19 do not include firms that are misclassified in Dun & Bradstreet under SIC codes other than those we considered.

Table 4-19
Contractors: Description of Population†

	Other‡ *1 or unknown FTE*	Small *2 - 49 FTE*	Large *> 49 FTE*
Lighting			
PG&E territory	958	2,346	58
Low-DSM states	4410	13,286	395
Entire U.S.	18317	57,793	1633
Portion of sample that does not install commercial lighting¥	16%	9%	2%
Adjusted Lighting			
PG&E territory	803	2,133	57
Low-DSM states	3,699	12,082	389
Entire U.S.	15,363	52,554	1,609
Characteristics			
Percent of population	22%	76%	2%
Avg number of employees	1	17	263
Avg total revenues	$159,500	$1,878,600	$54,833,000
Percent commercial lighting	28%	28%	22%
Commercial lighting revenues)	2%	61%	37%

† *As derived from a search of Dun & Bradstreet's database. SIC groups included are listed in Section 9 of this report.*
‡ *This category is almost entirely composed of one-person businesses. Only a few are unknown. Complete interviews were conducted only with contractors in the Small and Large categories.*
¥ These figures are XENERGY estimates based on results from screening calls of potential interviewees.

Characteristics of Interviewees

Of all the contractors interviewed, 95% classified themselves as electrical contractors (Table 4-20). Energy service companies were intentionally avoided for this study, and none were interviewed (a number were interviewed in XENERGY, 1998 and XENERGY, 1999).

Table 4-21 shows the breakdown of distributor self classification. The majority of distributors classified themselves as electrical equipment suppliers (45% PG&E Territory and 80% Low-DSM States). The remaining distributors described themselves variously as manufacturer representatives, catalog companies, general industrial suppliers, and lighting suppliers.

Table 4-20
Contractors: Self-Reported Classification

	PG&E Territory	Low-DSM States
Electrical contractor	95%	95%
Energy service company	0%	0%
Lighting mgmt company	0%	5%
Other	5%	0%
# of Respondents	*21*	*21*

Table 4-21
Distributors: Self-Reported Classification

	PG&E Territory	Low-DSM States
Catalog/mail order firm	9%	10%
General industrial supplier	18%	0%
Electrical equipment supplier	45%	80%
Lighting supplier only	9%	0%
Manufacturer representative	18%	10%
# of Respondents	*11*	*10*

The average, minimum and maximum number of years contractors and distributors have been in business is shown in Table 4-22. The average age of contractors was very similar for both PG&E Territory and Low-DSM States (32 and 34 years, respectively). The distributor averages were 32 years for PG&E Territory and 51 years for those in Low-DSM States.

Table 4-22
Age of Businesses

	Contractors		Distributors	
	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
Average	32	34	32	51
Minimum	2	4	6	19
Maximum	77	93	75	80
# Respondents	*21*	*21*	*11*	*10*

The breakdown of full-time-equivalent (FTE) employees for contractors and distributors is shown in Table 4-23. The average number of employees are shown by the small and large size strata. Respondents' self-report total revenue estimates are shown for contractors in Table 4-24 and for distributors in Table 4-25. Both contractor and distributor revenues are fairly consistent between PG&E Territory and Low-DSM States.

Table 4-23
Number of FTE Employees

	Contractors				Distributors			
	PG&E Territory		Low-DSM States		PG&E Territory		Low-DSM States	
	Small	*Large*	*Small*	*Large*	*Small*	*Large*	*Small*	*Large*
Average	22	202	12	324	11	71	10	41
# of Respondents	*10*	*11*	*9*	*12*	*6*	*5*	*5*	*5*

Table 4-24
Contractors: Total Annual Revenue

	PG&E Territory		Low-DSM States	
	Small	Large	Small	Large
Less than $500,000	30%	0%	33%	0%
$500,000 - $5 Million	50%	9%	67%	0%
Over $5 Million	10%	82%	0%	92%
Don't know/Proprietary	10%	9%	0%	8%
# of Respondents	*10*	*11*	*9*	*12*

Table 4-25
Distributors: Total Annual Revenue

	PG&E Territory		Low-DSM States	
	Small	Large	Small	Large
Less than $1 Million	17%	0%	0%	0%
$1 Million - $10 Million	67%	20%	60%	20%
Over $10 Million	17%	80%	40%	80%
Don't know/Proprietary	0%	0%	0%	0%
# of Respondents	*6*	*5*	*5*	*5*

Contractors and distributors were asked to estimate the percentage of their total sales comprised of commercial lighting products. The results in Table 4-26 show that a majority of sales is equipment other than lighting for both contractors and distributors.

Table 4-26
Commercial Lighting as Percentage of Total Sales

	Contractors		Distributors	
	Low-DSM States	PG&E Territory	Low-DSM States	PG&E Territory
Commercial lighting	31%	19%	33%	47%
Other	69%	81%	67%	53%
# of Respondents	*21*	*21*	*10*	*11*

Contractors were asked to allocate their commercial work between retrofits and new construction. Table 4-27 shows the results to this question. New construction is a larger fraction in PG&E's territory than in the eleven Low-DSM States. Table 4-28 shows the breakdown of lighting contractor business by market sector. The commercial market is largest for all groups.

Table 4-27
Contractors: Breakdown of Lighting Sales

	PG&E Territory		Low-DSM States	
	Small	Large	Small	Large
Retrofits and expansions	35%	20%	43%	35%
New construction	66%	80%	57%	65%
# of Respondents	*10*	*11*	*9*	*12*

Table 4-28
Contractors: Percent of Lighting Business By Market Sector

	PG&E Territory		Low-DSM States	
	Small	Large	Small	Large
Commercial	53%	70%	74%	50%
Residential	23%	12%	19%	4%
Industrial	24%	17%	6%	28%
Other	0%	0%	0%	3%
# of Respondents	*9*	*11*	*9*	*12*

Perceptions on Market Trends

Contractors and distributors were asked to identify trends in the fluorescent lighting market over the past three years. Their responses were grouped into four broad categories, including indirect lighting, energy-efficient lighting equipment, technical improvements to lamps and ballasts, and energy conservation policy. A general difference between the perceptions of in-territory and comparison group responses can be seen in Tables 4-29 and 4-30. Vendors in the Low-DSM states view increased usage of efficient lighting as the dominant trend, while those in the PG&E Territory point much more to technical product improvements. This is consistent with the trend, discussed in Section 6, that the Low-DSM states lagged the high penetrations of efficient lighting equipment that occurred in the PG&E territory between 1992 and 1996. It also shows that the vendors in-territory tend to be focusing on the more subtle, leading edge changes *within* each of the efficient products.

Table 4-29
Contractors: Most Important Trends in the Fluorescent Market Over the Past Three Years

	PG&E Territory	Low-DSM States
Indirect lighting	8%	0%
Increased usage of efficient lighting: *Compact fluorescent lamps,* *T8 lamps,* *Electronic ballasts*	38%	86%
Technical Improvements: *Invention of T5 lamp,* *Improved color rendition,* *Reduced ballast noise,* *Longer lamp life,* *More variety in shape of CFLs,* *Low-mercury lamps*	50%	10%
Energy conservation policy: *EPA* *Title-24* *Other local codes*	4%	4%
# of Respondents	*26*	*21*

Table 4-30
Distributors: Most Important Trends in the Fluorescent Market Over the Past Three Years

	PG&E Territory	Low-DSM States
Indirect lighting	7%	7%
Increased usage of efficient lighting: *Compact fluorescent lamps,* *T8 lamps,* *Electronic ballasts*	29%	53%
Technical Improvements: *Invention of T5 lamp,* *Improved color rendition,* *Reduced ballast noise,* *Longer lamp life,* *More variety in shape of CFLs,* *Low-mercury lamps*	36%	13%
Energy conservation policy: *EPA* *Title-24* *Other local codes*	29%	27%
# of Respondents	*14*	*15*

Respondents were also asked to convey their perceptions of the most important lighting industry trends that they expected to occur over the next three years. These responses are shown in Table 4-31. Increased use of controls, improvements in daylighting/dimmable ballasts, advances in efficiency, and other technical advances are all cited.

Table 4-31
Contractors: Trends in the Fluorescent Market Over the Next Three Years

	PG&E Territory	Low-DSM States
No significant changes	20%	47%
Increase usage of controls: *Occupancy sensors; Low-voltage switching; EMS*	20%	12%
Daylighting & dimming ballasts	10%	6%
Advances in energy efficiency: *Ballasts; Lamps*	35%	12%
Technical advances: *Better indirect lighting, Very bright fluor that compete with HID, Smaller packages such as T5s*	15%	24%
# of Respondents	*20*	*17*

When asked about the importance of offering efficient lighting to their competitive position, contractors in PG&E's territory said that these products were very important in competing for customers (see Table 4-32). Distributors answered differently. Within PG&E's Territory, distributors were less convinced it offers a competitive advantage, while in the low-DSM states, they said it was very important. One possible explanation of this is that virtually all distributors in PG&E Territory now offer efficient lighting, so while an individual distributor must also offer these products to stay competitive, it does not necessarily differentiate his business from his competitors'.

Table 4-32
Competitive Importance of Offering Efficient Lighting Products

	Contractors		Distributors	
Importance Ranking	**PG&E Territory**	**Low-DSM States**	**PG&E Territory**	**Low-DSM States**
Very important	70%	20%	45%	80%
Somewhat important	25%	45%	18%	20%
Not very important	0%	30%	27%	0%
Not at all important	5%	5%	9%	0%
# of Respondents	*20*	*20*	*11*	*10*

5 END USER SURVEY RESULTS

In this section, we present results from interviews conducted with samples of small and medium commercial/industrial customers in three groups: PG&E Express Efficiency Program participants, PG&E territory non-participants, and low-DSM state customers. The purpose of the interviews was to obtain information on topics relating to a variety of establishment and energy efficiency characteristics, behaviors, and attitudes. A large percentage of the questions asked on these surveys were developed based on the hypotheses and indicators discussed in the Program Theory section of this report (Section 3). The objective of this survey was not only to characterize the current market, but also to identify market indicators that could be assessed in the future to determine whether any changes have occurred in the marketplace that might be attributable to the Express Efficiency Program or related programs. The relationship between the results presented in this section and the hypotheses and indicators developed in Section 3 is addressed in Sections 7 and 8, which discuss near-term market effects and related future measurement issues.

This section is organized into the following subsections:

- Survey Statistics and Weighting Approach (Section 5.1)
- Self-Assessment of Equipment Efficiency (Section 5.2)
- Participation Information for Express Efficiency Program (Section 5.3)
- Participation Information for Low-DSM-State Participants in Other Programs (Section 5.4)
- Non-Program Measures Implemented (Section 5.5)
- Experiences with Efficiency Measures/Practices (Section 5.6)
- Effects of Express Efficiency Program (Section 5.7)
- Energy-Efficiency Barriers, Attitudes, Decision-Making and Knowledge (Section 5.8)
- Efficiency-Related Attitudes (Section 5.9)
- Facility Characteristics (Section 5.10)

The customer survey instruments are provided in Appendix C.

5.1 SURVEY STATISTICS AND WEIGHTING APPROACH

Table 5-1 presents the number of respondents interviewed in each group by segment and size. A total of 707 interviews were completed and are distributed as follows: 186 1998 Program participants, 299 PG&E territory non-participants, and 222 low-DSM state customers.

Table 5-1
Number of Survey Interviews

Segment	Size	Participants	PG&E Territory	Low-DSM States
Office	<20 kW	23	25	11
	20-99 kW	10	27	15
	100-499 kW	10	25	23
	Sub total	43	77	49
Retail	<20 kW	12	25	14
	20-99 kW	15	25	25
	100-499 kW	2	25	14
	Sub total	29	75	53
Institution	<20 kW	12	26	21
	20-99 kW	11	25	20
	100-499 kW	19	25	18
	Sub total	42	76	59
Other	<20 kW	26	21	19
	20-99 kW	26	25	23
	100-499 kW	20	25	19
	Sub total	72	71	61
Total	Total	186	299	222

To help minimize the effects of differences in the proportion of customer types represented in each sample, we chose to weight all the survey results in a uniform way. Each respondent within the three groups was weighted to represent the PG&E population of commercial/industrial customers with less than 500 kW demand. We weighted the participant and low-DSM state strata cells the same way as the PG&E territory cells so that comparisons could be made across the three markets without the need to adjust for differences in the distribution of business types and size strata between the three groups. Energy weights were used based on dividing the total energy consumption for each cell by the number of sample points in that cell.

5.2 SELF-ASSESSMENT OF EQUIPMENT EFFICIENCY

This subsection reports results from questions regarding respondents' self-assessment of the efficiency of their equipment.

Table 5-2 shows that slightly over half of the Program participants categorized their lighting as "High-efficiency." Slightly less than 20% of both the out-of-state customers and PG&E-area non-participants stated that their lighting was "High efficiency."

Table 5-2
Self-Report Efficiency of Customer's Lighting Equipment

Efficiency	Participants	PG&E Territory	Low-DSM States
High efficiency	50.8%	19.6%	19.2%
Standard efficiency	16.7%	47.2%	46.1%
Mix of high and standard efficiency	32.5%	33.2%	34.7%
# Respondents	183	297	221

We collected similar information for air-conditioning installations. The first question asked whether the customer had installed a new air-conditioner since 1996. As seen in Table 5-3, 42% of the Program participants had installed new A/Cs since January 1996, compared with about 20% of the PG&E-area non-participants. For customers in low-DSM states, 32% stated that they had installed new A/Cs during that period. Of those customers who had installed new units, we asked whether they had installed high-efficiency or standard-efficiency units. Sixty-three percent of the Program participants said that their units were high efficiency (note that another question addressed whether the equipment was installed under the Program). The shares that reported they installed high-efficiency units were identical for the two non-participant groups, 54%, and somewhat less than the share of participants. All of these reports must be treated with caution, however, because there was no uniform way to define what was meant by "high efficiency" to the customers.[1]

Table 5-3
Installed New A/C Since January 1996

Response	Participants	PG&E Territory	Low-DSM States
Yes	41.9%	19.8%	37.2%
(Self-reported high efficiency)	(63%)	(54%)	(54%)
No	58.1%	80.2%	62.8%
# Respondents	184	295	220

5.3 Participation Information for Express Efficiency Program

The following tables present participation information for the Express Efficiency Program.

[1] Our survey question addressed the issue of possible overreporting by asking the customer "did you pay more for high-efficiency air-conditioning equipment" to minimize the tendency to assume that all equipment would be high efficiency.

Participants and non-participants in the PG&E territory were asked if their business had participated in a PG&E-sponsored energy audit (BEMS) since January 1996. Express Efficiency Program participants (29%) were three times as likely to say that they had participated in the audit as non-participants (10%) as shown in Table 5-4.

Table 5-4
Participated in a PG&E Energy Audit

Response	Participants	PG&E Territory
Yes	28.6%	10.1%
No	63.0%	82.9%
Don't Know	8.4%	7.0%
# Respondents	186	299

Although our participant sample was based on Program data indicating that the respondents had participated in the 1998 Program, only 44% of those interviewed actually reported that they had participated in 1998. About a fifth reported participation in 1997, and about 8% reported participation in 1996. Forty-two percent (42%) indicated that they had never participated in the Program. These data are shown in Table 5-5.

Table 5-5
Participation in PG&E Retrofit/Express Efficiency Program Since January 1996

Participation year	Percent
Yes, 1996	8%
Yes, 1997	21%
Yes, 1998	44%
None Reported	42%
# Respondents	186

*Percentages add to more than 100% because multiple year responses were allowed.

It was unclear why a significant number of the respondents did not recall participating. The survey instrument specifically targeted the person most likely to be knowledgeable at each site, but it was possible that some of the interviewees might not have been involved directly in Program participation. It also was likely that in some cases the measure installation and Program paperwork were handled by a contractor and, therefore, the customer had little direct involvement. In these cases, the customer probably had too little knowledge of the Program to remember their participation. Some respondents probably misreported the year they had participated, but even combining responses for all three years only about 60% reported that they had participated over the longer period. Some respondents probably simply did not remember correctly that they had participated. A small number (2) of respondents who said they did not participate in the Program indicated that they had implemented Program measures, but said they had done so under the BEMS Program. Many (18) of those who said they had not participated in the Program did state that they had installed Program measures, but without being in any program. While the survey data did not provide clear insights into why some respondents did not remember their participation, these data did suggest that this was an issue that should be recognized and addressed in the future.

Table 5-6 shows that about a third of participants reported that they installed T-8 lamps under the Program. About 5% of the participants reported the installation of reflectors, CFLs, or high-efficiency central air conditioners under the Program.

Table 5-6
Measures Installed Under Program

Measures Installed	Percentage	Average # of units (# of respondents)
T8	34.22%	356 (64)
Reflectors	4.22%	138 (8)
CFL	5.38%	147 (10)
CAC	6.33%	15 (17)
Setback Thermostat	1.04%	not asked
VSD	0.22%	3 (1)
Occupancy Sensors	2.27%	547 (4)
# Respondents	186	varies per measure

Participants were asked if they would have installed each efficient measure without the Program. As shown in Table 5-7, one quarter reported that they wouldn't have made the change to the higher efficiency measure without the Program. Half said they would have made the change anyway, while a quarter said they would have made the change, but later.

Table 5-7
Without Rebate When/If Change Would Be Made

Behavior	Participants	
	Mean % across all measures	Std Error of the mean %
Would have made the change anyway	52%	5.4%
Would have made the change, but later	23%	4.5%
Would not have made the change	25%	4.7%
# Respondents	81	

5.4 PARTICIPATION INFORMATION FOR LOW-DSM STATE PARTICIPANTS IN OTHER PROGRAMS

The low-DSM state group was asked a series of questions regarding their participation in energy-efficiency programs. This subsection presents the results of this line of questioning.

Low-DSM state respondents were asked whether they had participated in an energy-efficiency audit program since January 1996. Table 5-8 shows that only about 14% of the total 213 respondents said that they had.

Table 5-8
Participated in an Energy Audit

Response	Percent
Yes	13.7%
No	86.3%
# Respondents	213

Low-DSM state respondents also were asked if they had participated in a utility-sponsored program that paid customers rebates for installing energy efficient measures and, if so, in what year. About 91% of respondents had never participated. About 5% had participated in 1998, about 3% had in 1997, and just under 2% had in 1996 as seen in Table 5-9.

Table 5-9
Participated in a Utility Energy Efficient Rebate Program

Participation year	Percent
Yes, 1996	1.8%
Yes, 1997	2.8%
Yes, 1998	4.5%
No	91.4%
# Respondents	212

*Percentages may add to more than 100% because multiple year responses were allowed.

Low-DSM state respondents were asked what measures they had installed as a result of participating in a utility-sponsored rebate program. The results are shown in Table 5-10 based on all low-DSM state respondents. T-8 lamps were the most common measure installed with 0.43% of all respondents in this group reporting adoption of this measure.

Table 5-10
What Program Measures Were Installed/When

Measures Installed	Percentage	Average # of units (# of respondents)
T-8	0.43%	17 (4)
Reflectors	0.40%	2 (1)
CFL	0.37%	NA (0)
CAC	0	NA
Setback Thermostat	0.37%	not asked
VSD	0	NA
Occupancy Sensors	0	NA
# Respondents	222	varies per question

When asked whether they would have made the measure changes without the rebate, the answers from the three responding customers were split equally into the three categories—would have made the change anyway, would have made the change later, and would not have made the change.

5.5 NON-PROGRAM MEASURES IMPLEMENTED

All groups were queried about energy-efficient measures installed outside utility programs. The following tables provide information regarding non-program measure implementation.

Respondents were asked what energy-efficiency measures they had installed outside of the Express Efficiency Program (or other utility program if relevant). As shown in Table 5-11, for six of the eight measures considered, the Program participants were more likely to have installed them than the respondents in either of the non-participant groups. Setback thermostats were the measure installed most frequently across all three groups. The least common measure installed, ranging between 5% and 7% for all three groups , was variable speed drive controllers on HVAC fans or air handlers.

Table 5-12 provides the average number of units for four measures installed outside of a program. For the participants, the installation of these measures outside of the Program represented a spillover effect and, even though the quantities were less in some cases than reported by the non-participant groups, they should be considered in conjunction with what the participants also did under the Program.

Table 5-11
Proportion of Respondents Who Implemented Measures Outside of Program

Measures Installed	Participants	PG&E Territory	Low-DSM States
T-8	22.4%	20.0%	21.3%
Reflector	22.0%	4.8%	6.6%
CFL	21.1%	11.1%	14.3%
CAC	19.4%	8.4%	22.9%
Setback	43.2%	25.5%	27.4%
VSD Control	4.9%	5.1%	6.7%
Sensor	19.1%	5.7%	6.1%
# Respondents	186	299	222

*Percentages may not add to 100% as multiple mentions were allowed.

Table 5-12
Average Number of Units Installed Outside of Program

Measures	Average # of Units (# of respondents)		
	Participants	PG&E Territory	Low-DSM States
T-8	162 (32)	98 (57)	172 (45)
Reflectors	162 (29)	295 (17)	231 (15)
CFL	78 (34)	152 (33)	77 (30)
CAC	8 (39)	26 (28)	7 (47)
# Respondents	134	135	137

5.6 EXPERIENCES WITH EFFICIENCY MEASURES/PRACTICES

Respondents were asked about their experiences with energy-efficient measures. This subsection reports these results.

Respondents were asked whether their confidence in the economics of energy efficiency had changed as a result of their experiences with energy-efficient measures. Table 5-13 shows that three-quarters of participants indicated that their confidence had increased, while less than half of non-participants said that their confidence had increased. Overall, a large majority of all respondents reported that either their confidence increased or remained the same.

Table 5-13
Resulting Confidence that Energy-Efficiency Measures Will Reduce Bills

Confidence Level	Participants		PG&E Territory		Low-DSM States	
	Mean %	Std Error of the mean %	Mean %	Std Error of the mean %	Mean %	Std Error of the mean %
Increased confidence	75%	3%	48%	4%	48%	4%
Decreased confidence	2%	1%	12%	3%	12%	2%
No change in confidence	23%	3%	40%	4%	40%	4%
# Respondents	145		139		115	

Note: Responses are averaged over all measures installed

Respondents were asked to rank their satisfaction with the energy savings and general performance for each measure installed. Eight measures, including T8s, reflectors, CFLs, energy-efficient central air conditioning (A/C), setback thermostats, variable speed drives (VSDs), and occupancy sensors, were ranked on a 1 to 10 scale, where 1 meant very dissatisfied and 10 meant completely satisfied.

The results are shown in Tables 5-14 through 5-20. Participants registered higher average satisfaction with all but one measure (energy-efficient A/C) than did non-participants.

Table 5-14
Satisfaction with Energy Savings-T8

Satisfaction	Participants	PG&E Territory	Low-DSM States
1 - 3:Dissatisfied	2.3%	1.9%	4.7%
4 - 7: Neutral	24.0%	48.5%	37.3%
8 - 10: Satisfied	73.6%	49.6%	58.0%
Average rating	8.0	7.4	7.4
# Respondents	102	68	51

Table 5-15
Satisfaction with Energy Savings-Reflectors

Satisfaction	Participants	PG&E Territory	Low-DSM States
1 - 3:Dissatisfied	0%	0%	0%
4 - 7: Neutral	41.7%	51.4%	46.8%
8 - 10: Satisfied	58.3%	48.6%	53.2%
Average rating	7.8	7.5	7.3
# Respondents	40	19	16

Table 5-16
Satisfaction with Energy Savings-CFL

Satisfaction	Participants	PG&E Territory	Low-DSM States
1 - 3:Dissatisfied	7.6%	7.4%	0.0%
4 - 7: Neutral	18.1%	36.4%	41.4%
8 - 10: Satisfied	74.4%	56.2%	58.6%
Average rating	8.0	7.3	7.4
# Respondents	46	37	30

Table 5-17
Satisfaction with Energy Savings-Energy Efficient A/C

Satisfaction	Participants	PG&E Territory	Low-DSM States
1 - 3:Dissatisfied	0.0%	5.9%	0.0%
4 - 7: Neutral	41.2%	40.0%	34.6%
8 - 10: Satisfied	58.8%	54.1%	65.4%
Average rating	7.9	6.9	8.0
# Respondents	55	27	52

Table 5-18
Satisfaction with Energy Savings-Set-Back Thermostat

Satisfaction	Participants	PG&E Territory	Low-DSM States
1 - 3:Dissatisfied	3.7%	4.8%	7.1%
4 - 7: Neutral	35.1%	56.3%	42.7%
8 - 10: Satisfied	61.3%	38.9%	50.1%
Average rating	7.8	6.9	7.0
# Respondents	74	87	65

Table 5-19
Satisfaction with Energy Savings-VSD Controller

Satisfaction	Participants	PG&E Territory	Low-DSM States
1 - 3:Dissatisfied	0.0%	5.5%	14.0%
4 - 7: Neutral	11.6%	51.6%	29.0%
8 - 10: Satisfied	88.4%	42.9%	57.0%
Average rating	8.5	7.0	7.2
# Respondents	10	14	15

Table 5-20
Satisfaction with Energy Savings-Sensors

Satisfaction	Participants	PG&E Territory	Low-DSM States
1 - 3:Dissatisfied	5.2%	12.9%	10.1%
4 - 7: Neutral	20.3%	27.4%	44.6%
8 - 10: Satisfied	74.5%	59.7%	45.3%
Average rating	8.0	7.3	6.7
# Respondents	34	22	20

Respondents were asked, based on their experiences with energy-efficient investments, how likely they were to select energy-efficient options in the future. Table 5-21 shows that nearly two-thirds of the participants and one-half of the PG&E territory non-participants reported that they would be much more likely to choose energy efficient investments in the future; only about 40% of low-DSM state customers said they were much more likely.

Table 5-21
Energy Efficiency Experience Impact on Choosing Energy Efficient Investments

Likelihood	Participants	PG&E Territory	Low-DSM States
Much less likely	1.1%	2.6%	2.6%
Somewhat less likely	1.3%	3.3%	5.4%
About as likely	10.3%	11.7%	13.8%
Somewhat more likely	22.9%	31.8%	37.7%
Much more likely	64.4%	50.6%	40.5%
# Respondents	169	211	174

5.7 EFFECTS OF EXPRESS EFFICIENCY PROGRAM

This section reports on data from Program participants who were asked to evaluate the influence the Program had on their behavior.

Respondents were first asked to assess the influence of the Program on the likelihood of selecting energy-efficient options. Almost three-quarters of participants said that the Program had a significant positive influence on their likelihood of selecting energy-efficiency measures in the future as shown in Table 5-22.

Table 5-22
Influence of Program on Selecting Energy-Efficiency Measures

Influence	Percentage
1 - 3: No Positive Influence	1.8%
4 - 7: Some Positive Influence	27.3%
8 - 10: Significant Positive Influence	70.9%
Average rating	8.3
# Respondents	106

When asked what influence the Program had on overcoming initial cost barriers, almost two-thirds said that it had been a significant influence. The results are summarized in Table 5-23.

Table 5-23
Importance of Rebate for Reducing Initial Cost Barriers

Influence	Frequency
1 - 3: No Influence	13.4%
4 - 7: Some Influence	24.0%
8 - 10: Significant Influence	62.6%
Average rating	7.6
# Respondents	106

When asked how influential the Program rebate was in convincing customers that the installed high-efficiency measures would perform as described, the majority of participants said that it was a significant influence. Results are shown in Table 5-24.

Table 5-24
Importance of Program in Assuring Measure Performance

Influence	Frequency
1 - 3: No Influence	16.8%
4 - 7: Some Influence	28.7%
8 - 10: Significant Influence	54.6%
Average rating	6.8
# Respondents	106

5.8 ENERGY-EFFICIENCY BARRIERS, ATTITUDES, DECISION-MAKING AND KNOWLEDGE

Through ranking a series of statements, respondents were asked to convey their beliefs about energy-efficient investments and practices. Respondents rated their agreement level on a 1 to 10 scale, where 1 meant complete disagreement and 10 meant complete agreement, for eleven statements related to energy-efficiency barriers, attitudes and knowledge about energy efficiency, and decision-making methods.

A large proportion of both participants and non-participants expressed concern that the actual bill savings might be less than what was estimated. The average rating was about the same for all groups; surprisingly there was no difference in the results for participants as shown in Table 5-25.

Table 5-25
Bill Savings Might Be Less

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	13.2%	15.3%	8.7%
4 - 7: Neutral	44.4%	43.2%	54.6%
8 - 10: Agree	42.4%	41.4%	36.7%
Average rating	6.6	6.5	6.6
# Respondents	182	292	219

Almost half of the participants disagreed that it takes too much time and hassle to get enough information to make an informed decision about energy-efficient investments. Only about a third of PG&E area non-participants and only 29% of the low-DSM state respondents disagreed. As shown in Table 5-26, the average level of agreement was lowest for Program participants.

Table 5-26
Too Much Time/Hassle to Get Information

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	44.5%	33.2%	28.9%
4 - 7: Neutral	33.8%	40.4%	49.1%
8 - 10: Agree	21.7%	26.4%	22.0%
Average rating	4.6	5.1	5.1
# Respondents	185	297	219

For Program participants, 43% disagreed with the statement that it takes too much time to pick an energy efficient contractor. About one third of the PG&E area non-participants and about 30% of low-DSM state respondents disagreed with this statement. The average rating for agreement with the statement was lowest for participants as shown in Table 5-27.

Table 5-27
Too Much Time/Hassle to Pick
Energy-Efficiency Contractor

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	43.2%	32.5%	30.6%
4 - 7: Neutral	35.3%	43.5%	42.8%
8 - 10: Agree	21.5%	24.0%	26.6%
Average rating	4.5	5.2	5.2
# Respondents	179	292	213

Responses across the three groups were fairly consistent with regard to how much respondents felt that non-utility information about energy efficiency was unreliable. Table 5-28 shows that most respondents neither agreed nor disagreed with the statement.

Table 5-28
Non-Utility Information Not Reliable

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	21.0%	16.6%	22.7%
4 - 7: Neutral	53.3%	48.2%	49.3%
8 - 10: Agree	25.6%	35.2%	28.0%
Average rating	5.7	6.2	5.6
# Respondents	179	290	210

Respondents were asked how much they agreed that the information they received from sources they trust was not very helpful in assisting them in making energy-efficiency decisions. The largest share of respondents in each group had neutral responses. Compared with the two non-participant groups (slightly less than 30% of each group), a much larger share (41%) of participants disagreed that the information was not very useful as shown in Table 5-29.

Table 5-29
Information Not Helpful

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	40.9%	27.1%	29.6%
4 - 7: Neutral	42.9%	53.8%	54.7%
8 - 10: Agree	16.2%	19.1%	15.7%
Average rating	4.5	5.2	4.8
# Respondents	176	281	211

When asked whether the lack of financing was a barrier to making energy-efficiency investments, responses were similar across all three groups. The share of participants (40%), however, who disagreed that this was a barrier was higher than the shares for the two non-participant groups (32%) as seen in Table 5-30.

Table 5-30
Lack of Financing Is a Barrier

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	39.8%	31.7%	31.5%
4 - 7: Neutral	27.8%	33.7%	38.5%
8 - 10: Agree	32.4%	34.6%	30.0%
Average rating	5.1	5.6	5.4
# Respondents	184	293	209

Slightly over half of the participants disagreed with the statement that energy-efficient investments were not available from suppliers. About 40% of the respondents in the two non-participant groups disagreed, but the share was slightly higher in the PG&E territory. PG&E-area non-participants were twice as likely (19%) as participants to agree strongly that such investments were not available. The average agreement rating was lowest for participants as shown in Table 5-31.

Table 5-31
Energy-Efficiency Investments Not Available From Supplier

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	51.6%	40.4%	36.3%
4 - 7: Neutral	38.0%	40.4%	47.7%
8 - 10: Agree	10.3%	19.2%	16.0%
Average rating	3.8	4.5	4.5
# Respondents	174	281	203

We asked all customers to rate their agreement with the statement that there were energy-efficiency investments that they were interested in making but that they always seemed to fall below other priorities. Participants were less likely to agree with this statement than non-participants. PG&E-area non-participating customers were more likely to agree than out-of-state customers as shown in Table 5-32.

Table 5-32
Energy Efficiency Falls Below Other Priorities

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	26.1%	22.1%	22.5%
4 - 7: Neutral	48.0%	39.7%	49.9%
8 - 10: Agree	26.0%	38.2%	27.5%
Average rating	5.4	6.1	5.6
# Respondents	178	290	214

Agreement with the statement that energy-efficiency investments were something that all businesses should consider was high across all groups. Less than 5% of all groups disagreed strongly. Agreement was highest among participants and lowest among low-DSM state customers as shown in Table 5-33.

Table 5-33
Businesses Should Consider
Energy-Efficiency Investments

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	1.3%	2.5%	4.6%
4 - 7: Neutral	15.3%	17.4%	20.6%
8 - 10: Agree	83.5%	80.1%	74.8%
Average rating	9.0	8.7	8.2
# Respondents	185	299	220

Respondents were asked if they agreed that in general energy-efficiency investments would significantly reduce their energy bill. The patterns were very similar to those for the preceding question. Participants were most likely to agree and the smallest proportion that agreed was among the out-of-state customers. The average agreement rating was highest for participants and lowest for low-DSM state respondents as seen in Table 5-34.

Table 5-34
Energy Efficient Products Will Significantly Reduce My Bill

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	4.1%	5.0%	4.7%
4 - 7: Neutral	20.9%	28.1%	32.0%
8 - 10: Agree	75.0%	66.9%	63.2%
Average rating	8.3	7.9	7.8
# Respondents	184	296	221

When asked whether they agreed with the statement that they intended to actively pursue energy-efficient investments in the future, about 66% of the participants said they agreed strongly. Slightly under half of the respondents in the two non-participant groups said that they agreed strongly. Table 5-35 shows that the average rating was considerably higher for the participants, and slightly higher for PG&E-area non-participants than low-DSM state customers.

Table 5-35
I Will Pursue Energy Efficient Investments

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	4.8%	10.7%	13.2%
4 - 7: Neutral	29.4%	40.6%	40.1%
8 - 10: Agree	65.8%	48.8%	46.7%
Average rating	8.0	7.1	6.8
# Respondents	184	294	219

Respondents who had not installed high-efficiency lighting equipment in the last few years were asked what the main reason was for not doing so. The primary (and secondary ,if given) reason was recorded. Ten possible answers were given, and are summarized in Table 5-36. Of these, the most common response for all respondent groups was that there was no need because they were satisfied with the lighting they had. The next most common answer was that it was too expensive compared to other equipment. The third most common answer for all respondent groups was that it would have taken too much time and/or work to install the higher efficiency lighting.

Table 5-36
Why Firm Did Not Install Energy Efficient Lighting

Reason	Primary			Secondary		
	Participants	PG&E Territory	Low-DSM States	Participants	PG&E Territory	Low-DSM States
No need/satisfied with current lighting	25.8%	26.8%	47.3%	0.8%	4.0%	7.6%
Too expensive compared to other equipment	20.7%	20.3%	12.6%	1.2%	2.6%	3.9%
It would have taken too much time/work	12.6%	6.1%	2.3%	0.5%	1.3%	0.5%
Energy savings not adequate to justify cost	1.9%	4.1%	2.3%	0.0%	1.1%	0.3%
Didn't make a formal comparison	2.5%	1.0%	4.3%	0.0%	0.3%	0.0%
Rest of facility(ies) use(s) standard efficiency	3.8%	0.4%	0.9%	0.0%	0.2%	0.0%
We lease the space; not worth extra expense	1.3%	5.9%	5.4%	0.0%	1.8%	1.1%
Other	3.8%	4.5%	2.9%	0.0%	1.5%	0.9%
None	1.3%	0.4%	3.5%	0.9%	1.5%	0.0%
# Respondents	67	207	147	66	206	147

Respondents who had not installed an energy-efficient central air-conditioning system in the last few years were asked what the main reason was for not doing so. The most common response for all respondent groups was that there was no need because they were satisfied with A/C they had. The next most common answer was that it was too expensive compared to other equipment. The third most common answer for all respondent groups was that they leased the space and it was not worth the extra expense. Results are summarized in Table 5-37.

Respondents were asked how important the decision-makers at their business generally found energy efficiency to be. The most frequent response of all of the groups was that the decision-makers generally found energy efficiency somewhat important. Participants were more likely to state that their decision-makers found energy efficiency to be very important as shown in Table 5-38.

Table 5-37
Why Firm Did Not Install Energy Efficient A/C

Reason	Primary			Secondary		
	Participants	PG&E Territory	Low-DSM States	Participants	PG&E Territory	Low-DSM States
No need/satisfied with current CAC/not broken	61.3%	40.1%	52.8%	2.5%	3.7%	5.7%
Too expensive compared to other equipment	34.3%	15.8%	11.2%	3.3%	1.7%	2.7%
It would take too much time/work to change	3.9%	0.6%	2.7%	0.0%	0.5%	0.0%
We lease the space; not worth the extra expense	9.1%	6.5%	7.5%	0.5%	1.5%	0.9%
Other	3.0%	4.5%	6.2%	0.5%	1.2%	1.5%
None/No more	0.9%	1.8%	1.4%	22.0%	26.0%	18.1%
# Respondents	130	269	166	128	264	166

Table 5-38
Importance of Energy Efficiency to Decision-Makers

Importance	Participants	PG&E Territory	Low-DSM States
Very important	44.7%	37.9%	34.1%
Somewhat important	48.5%	46.9%	49.8%
Not very important	5.1%	12.1%	12.4%
Not at all important	1.7%	3.2%	3.7%
# Respondents	185	296	219

Respondents were asked whether their organizations had developed a policy for the selection of energy-efficiency equipment. Over three-quarters of customers in both non-participant groups said that they had not developed such a policy. Slightly over 70% of the participants said that they had not as seen in Table 5-39.

Table 5-39
Firm Had Developed Policy for
Selecting Energy-Efficient Equipment

Response	Participants	PG&E Territory	Low-DSM States
Yes	28.1%	22.3%	19.0%
No	71.9%	77.7%	81.0%
# Respondents	176	286	205

When asked whether each respondent's organization routinely applied long-term investment analysis to energy equipment selection, about half the participants and PG&E territory non-participants said that they did. Only about one third of respondents in low-DSM states, however, said that they did as shown in Table 5-40.

Table 5-40
Firm Applies Long-Term Investment Analysis for Energy Equipment

Response	Participants	PG&E Territory	Low-DSM States
Yes	49.4%	46.8%	35.0%
No	50.6%	53.2%	65.0%
# Respondents	178	277	199

For those respondents who did routinely apply a long-term investment analysis, the most widely used mechanism was a payback period: about half of those respondents in each group who applied long-term analyses used payback period as their primary criterion. Both life cycle costing analysis and internal rate of return were stated as the primary criterion by roughly 25% of each group of respondents as shown in Table 5-41.

Table 5-41
Primary Investment Criterion

Criterion	Participants	PG&E Territory	Low-DSM States
Payback period	55.0%	50.1%	48.4%
Life cycle costing analysis	21.4%	27.9%	25.2%
Internal rate of return	23.5%	22.0%	26.4%
# Respondents	66	89	49

Respondents, who used a payback period as their energy-efficiency investment criterion, were asked what the longest acceptable payback could be. The average was between 3.5 and 4.4 years, with the shortest average period reported by the participants as shown in Table 5-42.

Using a 1 to 10 scale where 1 meant having no knowledge and 10 meant fully knowledgeable, respondents were asked to rate their knowledge about what energy-efficiency products were available and how they would perform. The results are shown in Table 5-43. Most respondents indicated that they were somewhat knowledgeable. Participants were the most likely to state that they were very knowledgeable. Low-DSM state respondents were twice as likely as participants to state that they were not very knowledgeable. The average rating was highest for participants and lowest for respondents in low-DSM states.

Table 5-42
Longest Acceptable Payback
Period for Energy-Efficiency Investment

Payback length	Participants	PG&E Territory	Low-DSM States
<= 2 years	9.5%	9.9%	5.0%
3-4 years	20.8%	13.0%	4.9%
5-6 years	7.8%	9.9%	8.0%
7-8 years	2.5%	4.7%	1.1%
8-10 years	0.0%	2.5%	0.4%
Average # of years	3.5	4.4	4.3
# Respondents	29	41	17

Table 5-43
Knowledge of Energy Efficient Products
Availability and Performance

Knowledge	Participants	PG&E Territory	Low-DSM States
1 - 3: Are not knowledgeable	16.0%	22.3%	31.6%
4 - 7: Somewhat knowledgeable	58.6%	55.9%	49.0%
8 - 10: Fully knowledgeable	25.4%	21.8%	19.4%
Average rating	5.8	5.4	4.9
# Respondents	185	261	222

Respondents were asked to estimate by what percentage they thought their business could reduce its electricity bill if it implemented all of the cost-effective energy-efficient products and practices that were currently available. The responses were very similar across all groups, with the average savings estimated to be about 25% across all three groups as seen in Table 5-44.

Using a 1 to 10 scale where 1 meant no impact from the Program and 10 meant a significant impact, participants were asked to rate the effect of the Program on their long-term investment analysis of energy-efficient equipment. Almost half of participants said that the Program had a significant impact as shown in Table 5-45.

Table 5-44
Amount that Implementing Cost-Effective Energy Efficiency Would Reduce Bill

Bill Reduction	Participants	PG&E Territory	Low-DSM States
0%	0.3%	1.3%	0.9%
1-9%	11.7%	11.2%	13.2%
10-19%	21.7%	27.8%	19.3%
20-39%	52.2%	39.1%	49.4%
40-59%	9.3%	14.2%	10.1%
60-99%	4.7%	5.5%	6.1%
100% or more	0%	1%	1%
Average reduction	23.4%	24.3%	26.6%
# Respondents	160	221	189

Table 5-45
Program Impact on Long-Term Investment Analysis

Impact	Frequency
1 - 3: No Impact	15.6%
4 - 7: Some Impact	39.5%
8 - 10: Significant Impact	44.9%
Average rating	6.5
# Respondents	102

5.9 EFFICIENCY-RELATED ATTITUDES

Respondents were queried about their attitudes toward energy efficiency. These questions focused on general attitudes and beliefs. The following tables present the results of these attitudinal questions.

Customers were asked to rate their agreement with the statement that saving money on energy was important for their business. Table 5-46 presents responses about whether saving money on energy was considered to be important for the respondents' businesses.. The average rating was highest for participants and lowest for low-DSM state respondents: 86% of participants agreed with this statement, while less than three quarters of non-participants agreed.

Table 5-46
Saving Money on Energy Is Important for Firm

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	2.6%	4.2%	7.3%
4 - 7: Neutral	11.4%	22.3%	24.7%
8 - 10: Agree	86.0%	73.5%	68.0%
Average rating	8.9	8.4	8.0
# Respondents	186	299	222

When asked to indicate their agreement with the statement that saving energy was an important part of being a good corporate citizen, all groups agreed strongly. Table 5-47 presents the results. Based on a scale from 1 to 10, the highest average for all respondent groups was 9.1 for participants, followed by 8.9 for PG&E-area non-participants, and 8.4 for low-DSM state respondents.

Table 5-47
Saving Energy Is Part of Being a Good Corporate Citizen

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	1.7%	1.4%	3.9%
4 - 7: Neutral	9.0%	14.9%	23.2%
8 - 10: Agree	89.3%	83.7%	72.9%
Average rating	9.1	8.9	8.4
# Respondents	186	299	222

Respondents were asked how much they agreed with the statement that energy-efficient investments and practices provided as good or better comfort, quality, and reliability as standard investments and practices. The majority of each group of respondents agreed with the statement. The highest average was for participants (8.4), followed by PG&E-area non-participants (7.7), and low-DSM state respondents (7.6) as shown in Table 5-48.

Table 5-48
Energy Efficient Investments/Practices Perform As Well As/Better Than Standard

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	1.6%	2.8%	3.3%
4 - 7: Neutral	27.3%	37.7%	35.2%
8 - 10: Agree	71.1%	59.5%	61.5%
Average rating	8.4	7.7	7.6
# Respondents	184	290	216

The majority of each respondent group agreed that there were important practical benefits that came with energy-efficient investments apart from saving money. Table 5-49 shows that agreement was highest among participants (68%), while agreement was about equal across the other two groups (55%). The share of each group that disagreed was very low and was highest for the low-DSM state respondents.

Table 5-49
Energy Efficiency Has Important Non-Monetary Benefits

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	1.8%	4.4%	5.3%
4 - 7: Neutral	30.1%	40.4%	39.9%
8 - 10: Agree	68.1%	55.2%	54.9%
Average rating	8.1	7.6	7.4
# Respondents	182	296	218

A much larger share of the participants agreed that energy-efficient investments were easy to use and understand than the shares of the other two groups. Participants were nearly twice as likely to agree than the low-DSM state respondents. The average rating was highest for participants and lowest for the low-DSM state customers. The share who disagreed strongly was slightly higher for the low-DSM state group than either PG&E-area group. The results are summarized in Table 5-50.

Table 5-50
Energy Efficient Equipment Is Easy to Use/Understand

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	12.1%	11.7%	15.3%
4 - 7: Neutral	40.9%	53.1%	58.5%
8 - 10: Agree	46.9%	35.2%	26.1%
Average rating	6.8	6.5	5.8
# Respondents	183	291	216

Respondents were asked how much they agreed with the statement that they actively advocated energy efficiency to others. Participants were nearly twice as likely to agree with this statement than low-DSM state respondents. Nearly one third of the respondents in the latter group disagreed strongly with this statement as seen in Table 5-51.

Table 5-51
I Actively Advocate Energy Efficiency to Others

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	19.0%	19.0%	32.1%
4 - 7: Neutral	29.3%	39.3%	38.6%
8 - 10: Agree	51.7%	41.7%	29.3%
Average rating	6.9	6.3	5.4
# Respondents	186	295	221

When asked how much they agreed with the statement that they regularly heard about energy-efficiency investments from business/professional contacts, only about one fifth of the respondents in each group agreed strongly. The share was higher among the participants than in either of the non-participant groups. The average rating was highest for participants and lowest for low-DSM state respondents. Table 5-52 presents the results.

Table 5-52
I Regularly Hear about Energy Efficiency

Agreement	Participants	PG&E Territory	Low-DSM States
1 - 3: Disagree	36.3%	41.0%	48.2%
4 - 7: Neutral	42.1%	40.2%	34.2%
8 - 10: Agree	21.6%	18.8%	17.6%
Average rating	5.0	4.6	4.2
# Respondents	186	298	221

5.10 FACILITY CHARACTERISTICS

This subsection presents facility characteristics data for each of the respondent groups. It includes information on the facility size, ownership, and responsibility for energy.

Table 5-53 displays the distribution of the number of full-time employees for each of the groups. The participant group had a larger share in the 100+ employees category than the other two groups. The non-participant groups had a larger share in the smallest number of employees (1 to 5) category than the participant group.

Table 5-53
Number of Employees

Number	Participants	PG&E Territory	Low-DSM States
1 to 5	21.2%	30.1%	32.3%
6 to 10	14.8%	17.8%	16.9%
11 to 20	13.3%	13.4%	14.3%
21 to 50	15.4%	19.5%	15.8%
51 to 100	12.9%	8.8%	11.9%
Over 100	22.6%	10.5%	8.9%
# Respondents	186	298	222

The statistics for the total square footage of respondents' facilities are shown in Table 5-54. Generally, the pattern was similar to that for the number of employees shown in the previous table; however, the low-DSM state respondents' facilities were much more likely than the participants' facilities to be in the largest floor area category (more than one million square feet).

Table 5-54
Total Square Footage of Facility

Square footage	Participants	PG&E Territory	Low-DSM States
Less than 5,000 square feet	23.3%	31.6%	42.3%
5,000 but less than 10,000 square feet	14.0%	24.1%	20.5%
10,000 but less than 20,000 square feet	14.1%	14.9%	14.9%
20,000 but less than 50,000 square feet	26.3%	15.2%	7.2%
50,000 but less than 100,000 square feet	10.6%	7.6%	4.9%
100,000 but less than 1 million square feet	11.1%	5.4%	6.8%
Over 1 million square feet	0.7%	1.3%	3.3%
# Respondents	177	288	206

Respondents were asked if their businesses had assigned a specific person to be responsible for controlling and monitoring energy usage. Table 5-55 shows that only about one third of the two non-participant group businesses had such a person, whereas almost half of participants did.

Table 5-55
Specific Person Monitors Energy Use

Response	Participants	PG&E Territory	Low-DSM States
Yes	47.0%	32.8%	28.5%
No	49.7%	66.0%	68.1%
Don't know	3.3%	1.2%	3.3%
# Respondents	186	299	222

The majority of participants, 69%, and low-DSM state respondents, 61%, stated that they owned their own facility. Only about half of the PG&E-area non-participants, on the other hand, indicated that they owned their facility as shown in Table 5-56.

Table 5-56
Is Facility Owned or Leased

Ownership status	Participants	PG&E Territory	Low-DSM States
Own	68.6%	48.2%	61.0%
Lease/rent	30.9%	49.3%	37.1%
Don't know	0.5%	2.1%	1.9%
Refused	0.0%	0.3%	0.0%
# Respondents	186	299	222

Almost all participants and PG&E-area non-participants who leased their space reported that they directly paid all of their utility bills as shown in Table 5-57. On the other hand, just less than two thirds of low-DSM state respondents who leased their space said that they paid all of their utility bills separately from their lease payment.

Table 5-57
Share Firm Pays of Utility Bill If Space Is Leased

Bill Payment Status	Participants	PG&E Territory	Low-DSM States
Pay ALL of bill - NO electric utilities in lease	94.9%	90.5%	61.8%
Pay some portion of electric utility bills	0.0%	6.6%	15.1%
Pay NONE of bill - ALL electric utilities in lease	5.1%	3.0%	23.1%
# Respondents	52	143	78

Respondents who leased their facility also were asked how active a role their businesses have taken in making lighting and climate control equipment purchases decisions. Table 5-58 shows that the majority of participants stated that they were very active, while a third of PG&E-area respondents and only a fifth of low-DSM state respondents reported they were very active in this area.

Table 5-58
How Active Firm Is in Equipment Purchase If Space Is Leased

Level of Activity	Participants	PG&E Territory	Low-DSM States
Very active - involved in all phases w/ veto power	58.0%	34.5%	20.3%
Somewhat active - approve decisions	16.5%	27.5%	27.4%
Slightly active - we have a voice but not dominant	11.3%	17.3%	13.5%
Not active at all - we're part of a larger firm	6.2%	7.7%	16.3%
Not active at all - not involved in HE issues	7.9%	13.0%	22.5%
# Respondents	53	145	77

The majority of all respondent groups said they had not remodeled business space since January 1996. However, the proportion of participants who said that they had remodeled their space was substantially higher than it was for the other two respondent groups as shown in Table 5-59.

Table 5-59
Remodeled Space Since January 1996

Response	Participants	PG&E Territory	Low-DSM States
Yes	44.8%	27.0%	35.5%
No	55.2%	73.0%	64.5%
# Respondents	186	299	221

6 EFFICIENCY-RELATED SUPPLY-SIDE RESULTS

6.1 INTRODUCTION

In this section we present the results from primary surveys on market effects, market barriers, utility program awareness and usage, and general impressions of the markets for efficient commercial lighting and packaged HVAC units. This section is organized as follows:

- Packaged HVAC Results
- Efficient Lighting Results
- VSD and Setback Thermostats (limited results)

6.2 PACKAGED HVAC RESULTS

This subsection provides a summary of the data collected through interviews conducted with contractors and distributors in the commercial HVAC industry and is organized into the following topics:

- Promotion, Stocking, and Prices of High-Efficiency Units
- Market Penetration of High-Efficiency Units
- Barriers to High-Efficiency Units
- Program-Related Information

Interviews were conducted with 45 contractors (26 in PG&E Territory and 19 in Low-DSM States) and 21 distributors (10 in PG&E Territory and 11 in Low-DSM States) involved in the HVAC market.

6.2.1 Promoting, Recommending, Stocking, and Pricing High-Efficiency Packaged Units

Contractors and distributors were asked a number of questions about the extent to which they promote and recommend high-efficiency packaged units, their stocking levels of these units, and their estimates of the incremental costs associated with high-efficiency units.

Promoting and Recommending

For the contractors, we began the interview process by asking respondents whether they were aware that high-efficiency units were available at the qualifying efficiency levels (required by the

PG&E Express Program) prior to the interview itself. As shown in Table 6-1, virtually all of the respondents stated that they were already aware that these high-efficiency units were available.

Table 6-1
Contractor Awareness of Package Units at High Efficiency Levels

Currently Aware?	PG&E Territory	Low-DSM States
Yes	100%	95%
No	0%	5%
# Respondents	*26*	*19*

We then asked contractors and distributors whether they actively promote or market high-efficiency units. A summary of responses is presented in Table 6-2 below. For both contractors and distributors, a larger percentage of PG&E territory than comparison area respondents indicate that they do promote high-efficiency units. Similarly, as shown in Table 6-3, contractors in the PG&E territory report offering high-efficiency units as an alternative to standard units 63 percent of the time, versus 39 percent among the comparison area respondents. Program area distributors also state that they offer high-efficiency alternatives more than their counterparts in the comparison area (81 percent of the time on average versus 41 percent). Despite the small samples sizes, the differences are so large that the contractor results in both Table 6-2 and 6-3 are statistically significant at the 90 percent confidence level.

Table 6-2
Promote High Efficiency HVAC Package Units

	Contractors		Distributors	
Promote HE Units?	PG&E Territory	Low-DSM States	PG&E Territory*	Low-DSM States
Yes	77%	47%	100%	45%
No	23%	53%	0%	55%
# Respondents	*26*	*19*	*10*	*11*

*Recall that these are all Program participants

Table 6-3
Contractors: High Efficiency Recommendations as Option to Standard Equipment

	Contractors		Distributors	
	PG&E Territory	Low-DSM States	PG&E Territory*	Low-DSM States
Average	63%	39%	81%	41%
Minimum	0%	0%	50%	0%
Maximum	100%	100%	100%	100%
# Respondents	26	19	*9*	*11*

*Recall that these are all Program participants

When probed as to why they promoted or did not promote high-efficiency units, several comments were made:

Contractors

Contractors who responded "yes" typically said they did so because the H.E. units were better products, the margins were better, energy efficiency is "the right thing" to promote, or they have a procedure to provide H.E. quotes in a bid along with standard equipment. Those who said "no" commented that the demand for such products in their area was low, that customers considered the paybacks too long, or that although they did not promote to commercial customers, they did promote to residential customers.

Distributors

Distributors who responded "yes" typically said they did so because there is a demand for H.E. equipment, there are higher profit margins, and like contractors they believe it is the correct thing to do (energy conservation). Several Low-DSM State distributors also commented that the quality and number of available features of the H.E. units was higher than standard units. Note that there were zero "no" responses from PG&E Territory respondents.

When asked whether they were recommending high-efficiency units more or less today than three years ago, contractors and comparison area distributors were evenly split between those saying "more" and those indicating "about the same." Seven of 9 participating dealers indicating they were recommending these units more than three years ago. Thus, there appears to be a fairly strong trend toward recommending high-efficiency units both in-territory and elsewhere in the country.

Table 6-4
Trend in High Efficiency Recommendations Over Last Three Years

	Contractors		Distributors	
Trend	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
More today than three years ago	45%	43%	78%	45%
Less today than three years ago	9%	7%	0%	9%
About the same	45%	50%	22%	45%
# Respondents	*22*	*14*	*9*	*11*

When probed as to why they were or were not recommending high-efficiency over standard units, the following responses were obtained:

Contractors

Contractors that said they are recommending high-efficiency units "more" gave several reasons. They stated that they are recommending more often because energy rates are higher and less stable than in past years, high-efficiency units are more available and cost effective, and contractors themselves are now more knowledgeable about these units.

Those contractors that said they were recommending “less” often said they were doing so because of the reduction in or elimination of rebate programs.

Distributors

Distributors that said they are recommending “more” high-efficiency units now than three years ago stated that they are doing so because the rebates have made the cost difference between high-efficiency and standard units negligible, engineers and contractors are demanding them more these days, and mostly because the manufacturers they represent now offer these high-efficiency models. One distributor that said they are recommending “about the same” said that the rebate programs had been around for awhile (thus showing negligible incremental effects across the past three years).

When asked whether they believed that selling high-efficiency packaged units was more difficult or less difficult than selling standard-efficiency units, no strong difference emerged between the in-territory and comparison groups. As shown in Table 6-5, 70 to 80 percent of each group stated it was either “somewhat” or “much more” difficult to sell high-efficiency units.

Table 6-5
Difficulty of Selling High Efficiency Package HVAC Units

	Contractors		Distributors	
Relative Difficulty	**PG&E Territory**	**Low-DSM States**	**PG&E Territory**	**Low-DSM States**
Much more difficult	16%	25%	0%	30%
Somewhat more difficult	60%	56%	70%	40%
About the same	20%	6%	30%	30%
Somewhat less difficult	4%	6%	0%	0%
Much less difficult	0%	6%	0%	0%
# Respondents	*25*	*16*	*10*	*10*

Responses to our probe on the difficulty of selling efficient units were as follows:

Contractors

Contractors that felt it was “much more difficult” to sell a high-efficiency unit than a standard unit all said price difference was responsible for this difficulty. The majority of contractors felt that selling high-efficiency units is “somewhat more difficult.” These contractors also mentioned initial price difference (both in lack of willingness to spend the extra money and lack of available funds) as well as lack of demand in particular geographic areas, and comments concerning customers’ general lack of interest in high-efficiency. A few contractors felt that it was “somewhat less difficult” to sell high-efficiency units - saying that it was easier if “you know what you’re talking about” and show customers what they will save in the long-run. Low-DSM State contractors had similar answers to PG&E Territory contractors; however, there was one Low-DSM State contractor that said it was “much less difficult” to sell high-efficiency units, stating that rebates make it easy.

Distributors

Most PG&E Territory distributors said it was "somewhat more difficult" to sell high efficiency units. Cost difference was the primary reason cited for this difficulty. One distributor cited the fact that they had to sell these efficient units outright and could not sell them through the bidding process. The distributors that felt it was "about the same" said that this was so because engineers are interested in high efficiency and that rebates have closed the price gap.

As shown in Table 6-6, 71 percent of in-territory contractors reported that offering high-efficiency units was either "somewhat" or "very" important versus only 37 percent of contractors in the comparison area. The difference is significant at the 90 percent confidence level.

Table 6-6
Contractors: Importance of Offering High Efficiency HVAC Equipment to Firm's Competitive Position

Importance	PG&E Territory	Low-DSM States
Very important	29%	11%
Somewhat important	42%	26%
Not very important	13%	16%
Not at all important	17%	47%
# Respondents	*24*	*19*

Stocking Practices

In this subsection, we present the results of our inquiries to distributors about their stocking levels of high-efficiency packaged units. Distributors were first asked whether they stock units with efficiencies high enough to meet the Express Program qualifications (expressed to interviewees in terms of SEER or EER levels by size category). As shown in Table 6-7, a significantly higher percentage of participant distributors reported stocking qualifying units than distributors in the comparison area. The differences in stocking practices between the two groups were large for every size category. Participant distributors' stocking levels of high-efficiency units decreased with unit size, dropping from 100 to 90 percent for the smallest units to 50 and 30 percent for units 13 to 20 tons and larger than 20 tons, respectively.

Table 6-7
Distributors: Stocking High Efficiency Package Units in Quantity

Unit	PG&E Territory Participants	Low-DSM States
<5 ton with 11.0 SEER or higher	100%	27%
6 -12 ton with 10.3 EER or higher	90%	18%
13 - 20 ton with 9.7 EER or higher	50%	9%
>20 ton with 9.5 EER or higher	30%	9%
# Respondents	*10*	*11*

Distributors that do not stock particular units, generally the larger units, had several reasons for not doing so. These units were generally only a week or two from delivery coming from the manufacturer or distributor's parent warehouse. Also, these units are so large that space and warehouse equipment requirements must be altered (one distributor said that they would have to purchase a crane and a flatbed truck). Another reason for not stocking was that the larger units were often custom ordered because of the variety of options available.

For those in-territory distributors that stocked high-efficiency units, we also asked in what year they began stocking these units; results are shown in Table 6-8.

Table 6-8
Year in Which Participant Dealers began Stocking High-Efficiency Units

Respondent	<5 ton with 11.0 SEER or higher	6 -12 ton with 10.3 EER or higher	13 - 20 ton with 9.7 EER or higher	>20 ton with 9.5 EER or higher
1	1989	Don't stock	Don't stock	Don't stock
2	1993	1993	Don't stock	Don't stock
3	1993	1993	1993	Don't stock
4	1994	1994	Don't stock	Don't stock
5	1994	1994	Don't stock	Don't stock
6	1994	1994	Don't stock	Don't stock
7	1995	1995	1995	1995
8	1997	1997	1997	1997
9	1997	1997	1997	1997
10	1999	1999	1999	Don't stock
Total Stocking	10	9	5	3

In Table 6-9 we present distributors self-reported indication of the extent to which their stocking patterns of high efficiency package units has changed over the past three years. All of the PG&E Territory respondents said that they are stocking either "significantly" or "somewhat" more high efficiency units than three years ago, whereas only two of the 11 comparison area distributors reported increases in stocking.

Table 6-9
Distributor: Changes in Stocking Patterns of High-Efficiency Package Units Over the Past Three Years

Trend	PG&E Territory	Low-DSM States
Significantly increased	50%	9%
Somewhat increased	50%	9%
Stayed about the same	0%	82%*
Somewhat decreased	0%	0%
Significantly decreased	0%	0%
# of Respondents	*10*	*11*

**Includes the 7 distributors that did not stock previously and do not stock today*

Prices

Contractors and distributors were asked about the prices of high-efficiency units over the last several years. In Tables 6-10 and 6-11, we present the self-reported estimates of the per-ton price differences between standard and high-efficiency packaged units for 15-ton and 5-ton units. A few things are noteworthy about these tables. First, a number of respondents were not able to provide any estimate of the incremental costs. This is, in itself, an indicator that some vendors are not knowledgeable about a key characteristic of the units (even though almost all vendors state that they are aware that such units exist). As shown in Table 6-12, there is no consensus around whether the incremental prices of high-efficiency units have changed over the last three years. Most respondents indicated that they believe the incremental prices have remained about the same over this period.

Table 6-10
Cost Difference Between 15-Ton Standard and High-Efficiency Package Units ($/ton)

	Contractors			Distributors		
	PG&E Territory	Low-DSM States	Total	PG&E Territory	Low-DSM States*	Total
Average	$161	$126	$148	$85	$200	$123
Minimum	$46	$0	$0	$60	$0	$0
Maximum	$500	$300	$500	$133	$350	$350
# Respondents	*14*	*8*	*22*	8	4	12

**Data considered unreliable.*

Table 6-11
Cost Difference Between 5-Ton Standard and High-Efficiency Package Units ($/ton)

	Contractors			Distributors		
	PG&E Territory	Low-DSM States	Total	PG&E Territory	Low-DSM States	Total
Average	$126	$106	$122	$67	n/a	$67
Minimum	$50	$0	$0	$35	n/a	$35
Maximum	$250	$200	$250	$140	n/a	$140
# Respondents	*15*	*3*	*18*	*7*	*n/a*	*7*

Table 6-12
Price Trends Between Standard and High-Efficiency Units Over Past Three Years

	Contractors			Distributors		
	PG&E Territory	Low-DSM States	Total	PG&E Territory	Low-DSM States	Total
Increased	14%	16%	15%	20%	0%	16%
Stayed about the same	64%	47%	56%	40%	89%	63%
Decreased	23%	26%	24%	40%	11%	21%
Don't know	0%	11%	5%	0%	0%	0%
# Respondents	*22*	*19*	*41*	*10*	*9*	*19*

Responses to our probe in Table 6-12 on the price trends between standard and high-eficiency package HVAC units over the last three years were as follows:

Contractors

Contractors that felt that the price difference had decreased attributed the change a tool-up of manufacturing facilities as a result of the increased demand of high-efficiency units (spawned by rebate programs in part). This increase in manufacturer production capability led to a decline in costs for these units.

Distributors

The distributors that thought the price difference had decreased attributed this to efficiencies gained by the manufacturers due to the increased volume of units. The only comment received from a distributor who thought the price difference had increased attributed this increase to the natural inflation on parts and labor for the manufacturer.

PG&E Territory distributors reported a higher incidence of high-efficiency packaged units producing higher profit margins than standard units (60% of PG&E Territory distributors versus 33% of Low-DSM State distributors). Nearly half (44%) of Low-DSM State distributors reported that the margins were the same for high-efficiency units.

Table 6-13
Distributors: Differences in Margins Between High and Standard-Efficiency Package Units

	PG&E Territory	Low-DSM States
Higher	60%	33%
Lower	10%	22%
Same	30%	44%
# Respondents	*10*	*9*

6.2.2 Market Penetration

The penetration of high-efficiency packaged HVAC units in the market is shown in Tables 6-14 and 6-15. Table 6-14 shows that for units greater than five tons, there has been an increase in high-efficiency unit installations for contractors from 1996 to 1998 in both PG&E Territory and Low-DSM States. Also, PG&E Territory contractors have a higher rate of high-efficiency unit installations than Low-DSM State contractors for both 1996 and 1998. This percentage difference between PG&E Territory and Low-DSM States has actually increased since 1996 from a four percent difference to an eight percent difference.

Table 6-14
Contractors: Package Units Installed That Were High-Efficiency

	1998		1996	
	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
>5 ton units	35%	27%	25%	21%
# of Respondents	*22*	*16*	*20*	*15*

Distributors were also asked about the percentage of their packaged HVAC sales that were high efficiency. Table 6-15 shows the breakdown of the percentage of units that were high efficiency versus standard for four size/efficiency categories. Similar to numbers in Table 6-14 for contractors, there has been an increase in HVAC units that are high efficiency since 1996 in all size categories for both PG&E Territory and Low-DSM States. The difference between PG&E Territory and Low-DSM States in 1998 is somewhat less straight forward than it was for contractors. Distributors in Low-DSM States reported selling a higher percentage of high-efficiency units for the smallest and largest size categories (<5-ton and >20-tons, respectively). PG&E Territory distributors, however, reported selling considerably higher percentages of high-efficiency units for the 6 to 12 and 13 to 20-ton categories.

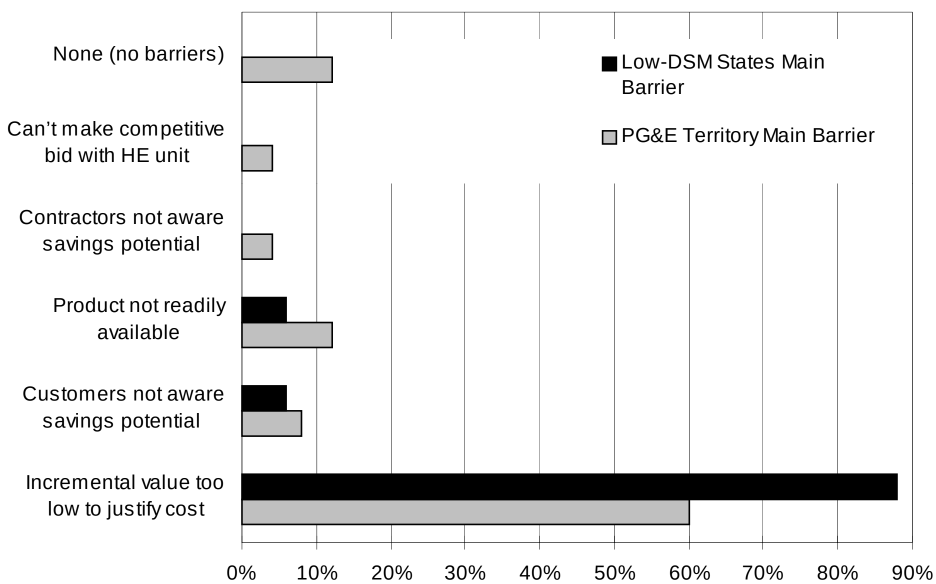
Table 6-15
Distributors: Package Units Sold That Were High-Efficiency

	1998		1996	
	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
<5 ton with 11.0 SEER or higher	31%	33% *(8)*	24%	11%
6 -12 ton with 10.3 EER or higher	37%	4% *(6)*	22%	3%
13 - 20 ton with 9.7 EER or higher	33%	5% *(4)*	18%	2%
>20 ton with 9.5 EER or higher	37%	50% *(4)*	17%	11%
# of Respondents	*10*	*4 to 8*	*9*	*8*

6.2.3 Barriers to Efficiency

Figure 6-1 summarizes the survey responses to our open-ended question asking them to specify the *main* obstacle to specifying high-efficiency packaged systems. The contractor responses identified too little incremental value for the added cost[1] and lack of customer awareness as the main barriers to selling high-efficiency air conditioners (A/Cs). We believe that underlying these obstacles are organizational practices and bounded rationality barriers.

Figure 6-1
Contractors: Self-Reported Primary Barrier to Increased Usage of High Efficiency Packaged HVAC Units



[1] We recognize that "first cost" is not an agreed upon market barrier and, in particular, is not included as a barrier in Eto, et al., 1996. We do believe, however, that it is important to report respondents' assessments of market barriers in their own terms.

6.2.4 Express Efficiency Program

In-territory contractors and distributors were asked a series of questions concerning the 1998 Express Efficiency Program. Table 6-16 points out the low level of awareness contractors have about the 1998 Program; only a third of small contractors and a quarter of large contractors were familiar with the program. All of the distributors surveyed were aware of the program as they were participants. Table 6-17 shows the breakdown of first sources of program-related information. PG&E representatives were responsible for the majority of first source program contact for both contractors and distributors (50% and 70%, respectively). Mail advertisements were also popular sources for information, especially for the remaining 30% of distributors.

Table 6-16
Contractors (PG&E Territory): Familiarity with the packaged unit component of the 1998 PG&E Express Efficiency Program

	Small	Large	Total
Yes	31%	22%	28%
No	69%	78%	72%
# of Respondents	*16*	*9*	*25*

Table 6-17
First Source of Information About PG&E's Express Efficiency Program (Aware Respondents Only)

	Contractors	Distributors
PG&E representative	50%	70%
Mail advertisement	17%	30%
Other	33%	0%
# of Respondents	*6*	*10*

Distributors were asked why they chose to participate in the new program. More than half of the distributors stated that they chose to participate because they believed the Program would benefit their business financially. Several other distributors felt that the Program goals were well aligned with their company's goals - that goal being to promote and sell high-efficiency units. One distributor said that they began participating because of contractor interest.

Table 6-18 presents the percentages of units that distributors reported received a rebate in 1998. Contractors were asked this question but only three out of the seven contractors that knew about the program were able to produce useful and valuable data. Distributor data, however, is presented in this table. Distributors indicated that an average of 52 percent of the high-efficiency units they sold in 1998 received a rebate. Large distributors had twice as many rebated units as small distributors in 1998.

Table 6-18
Distributors: Percent of High-Efficiency Units that Received a Rebate in 1998

	Small	Large	Total
Average	32%	65%	52%
Minimum	2%	5%	2%
Maximum	80%	100%	100%
# of Respondents	*4*	*6*	*10*

Contractors and distributors were asked to rate the effectiveness of the new program structure - going to a distributor-based incentive rather than the previous end-user incentive. The responses were, not surprisingly, very different between the two groups. In general, contractors felt the new program was less effective while distributors felt the opposite to be true. Although 60 percent of distributors favored the distributor-based program, 30 percent agreed with the majority of contractors that said the new program is less effective

Table 6-19
Perceived Effectiveness of Distributor-Based Rebate Program

	Contractors PG&E Territory	Distributors PG&E Territory
More effective	14%	60%
Less effective	57%	30%
About the same	14%	10%
Don't know	14%	0%
# of Respondents	*7*	*10*

HVAC contractors and distributors were asked for their opinions on the effectiveness of changing the rebate program so that the rebates are paid to distributors. Their responses are as follows:

Contractors

The contractor that felt that the distributor-based program was more effective in promoting high-efficiency HVAC units said that the savings are instant (discount given in the price to the end user). Nearly all of the contractors that felt the original end-user based program was more effective had similar comments regarding the issue. The general consensus from this group was that the end user is more willing to go with high-efficiency if they receive and can see the incentive for themselves, and that the distributors are merely taking the money for themselves and not passing the discount through to the end user.

Distributors

Distributors generally agreed that the new distributor-based program is more effective than past end-user programs. Evidence given included increased awareness and enthusiasm on the part of the distributors' sales staff, more flexibility in the way distributors can promote the high-efficiency units, and less hassle for end users as they are not required to fill out forms like in the previous program. A couple of distributors stated that this new program was less effective than previous programs. They cited paperwork hassles, corporate uncertainty over how to handle the new program, and the fact that contractors were difficult to work with since they knew the $/ton incentive rates and expected a pass through to them.

Presented in Table 6-20 are ratings given by contractors on the effects of the 1998 Express Efficiency Program on several energy-efficiency related categories. It can be seen that contractors rated all categories on the low end with the exception of "reduced the wholesale cost of high efficiency A/C" which was rated a three out of five.

Table 6-20
Contractors (Program Territory): Ratings of the Effects of Express Efficiency Program

Extent to Which Program Has:	Rating (1 = little effect at all, 5 = major effect)
Increased your awareness about energy-efficient A/C	2.2
Improved access to information on efficient A/C	1.6
Improved your opinion of quality & performance of efficient A/C	1.4
Reduced the wholesale cost of high efficiency A/C	3.0
# of Respondents	*7*

As shown in Table 6-21, contractors and distributors were in general agreement with respect to potential changes in sales in the absence of rebate programs. The majority of contractors (71 percent) and distributors (80 percent) said that HVAC sales would decrease if rebate programs went away. All of the large distributors said sales would decrease and none of the contractors and distributors said sales would increase.

Table 6-21
Potential Packaged HVAC Sales Changes in the Absence of Rebate Programs

Change Expected without Rebate	Contractors (Specifications and Installations)	Distributors (Sales)
Decrease	71%	80%
Stay about the same	29%	20%
Increase	0%	0%
# of Respondents	*7*	*10*

Finally, contractors and distributors were asked what they thought it would take to maintain demand for high-efficiency packaged units in the absence of utility or other energy-efficiency programs. The results are shown in Table 6-22. Contractors were fairly evenly spread between the variety of answers given with the two responses related to cost (price difference between HE and standard and a rate hike for electricity) being slightly more common than other responses.

An increase in utility rates was the most common answer for distributors, followed by increased education and awareness.

Table 6-22
Needed to Maintain Demand for High Efficiency in Absence of Rebate Programs

	Contractors	Distributors
Decrease in price difference between high and standard efficiency	22%	14%
Increase in electricity rates	22%	43%
Minimum efficiency standards imposed	17%	0%
Increase in the quality, efficiency and availability of units	17%	0%
Increase in education/awareness	17%	29%
Increase in marketing and sales effort	17%	0%
Other	6%	14%
# of Respondents	*18*	*7*

6.3 Efficient Lighting Results

This subsection provides a summary of results from our interviews conducted with contractors and distributors in the commercial lighting industry. This subsection is organized into the following subsections:

- Promotion of High-Efficiency Lighting
- Market Penetration of High-Efficiency Lighting (CFLs)
- Barriers to High-Efficiency Lighting
- Program-Related Information

Interviews were conducted with contractors and distributors in the commercial lighting market. A total of 42 contractors (21 in PG&E Territory and 21 in Low-DSM States) and 20 distributors (10 in PG&E Territory and 10 in Low-DSM States) were surveyed.

6.3.1 Promotion of High-Efficiency Lighting

Contractors and distributors were asked if they were "active promoters" of T8 lamps, electronic ballasts, or compact-fluorescents lamps. A "yes" answer to any of these technologies was recorded as a "yes" answer to the question. As shown in Table 6-23, approximately two-thirds of contractors and 80 to 90 percent of distributors stated that they actively promote one or more of the efficient technologies. No strong differences emerged between the two comparison areas.

Table 6-23
Promotion of T8 Lamps, Electronic Ballasts, and CFLs

	Contractors		Distributors	
	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
Yes, actively promote	62%	70%	91%	80%
No, do not promote	38%	30%	9%	20%
# of Respondents	*21*	*20*	*11*	*10*

The verbatim responses on promotion are summarized below.

Contractors

Contractors who said "yes" typically said they did so because the price of efficient lighting equipment is now competitive, energy efficiency is significantly better, new ballasts and lamps offer better color rendition and less flicker, and codes like Title-24 require efficient lighting in some cases. Nearly all of those who said "no" explained that it was because they do not usually have a role in specifying equipment.

Distributors

Distributors who said "yes" typically said they did so because high-efficiency lighting products are more profitable to sell, light quality is better with T8 lamps and new CFLs, maintenance is easier, and EPAC disposal requirements make the older technologies more expensive. The few who said "no" explained that customers will ask if they want high-efficiency lighting, making it unnecessary to advertise.

When asked what types of lamps and ballasts contractors typically specify or install for four-foot fluorescent fixtures, almost all in both the PG&E and comparison group stated they typically specified T8s and electronic ballasts. When asked, however, in what percent of cases they recommend or specify T8 lamps *instead of or as an option to* T12 lamps, differences emerged between the two groups indicating in-territory vendors recommended T8s and electronic ballasts for a higher percentage of projects, as shown in Table 6-24. A similar pattern, with even larger differences between the in-territory and comparison groups, emerged when vendors were asked the percentage of jobs on which they recommend CFLs as an alternative to incandescents (as shown in Table 6-25).

Table 6-24
Percent of Projects on Which Vendor Recommends T8 Lamps as an Option to T12 Lamps

	Contractors		Distributors	
T8s Recommended as Option to T12s	PG&E Territory	Low-DSM States	PG&E Territory	Low-DSM States
Average	89%	69%	87%	66%
# of Respondents	*19*	*18*	*10*	*10*

Table 6-25
Percent of Projects on Which Vendor Recommends CFLs as an Option to Incandescents

CFLs as Option to Incandescents	Contractors PG&E Territory	Contractors Low-DSM States	Distributors PG&E Territory	Distributors Low-DSM States
Average	68%	25%	74%	47%
# of Respondents	*19*	*18*	*10*	*10*

We also asked contractors and distributors whether they recommended compact fluorescent lamps more now as compared with three years ago. As shown in Table 6-26, across all categories, more than 80% responded that they are recommending the lamps more now.

Table 6-26
Three-Year Trend in Recommending CFLs

CFL recommendations versus 3 years ago	Contractors PG&E Territory	Contractors Low-DSM States	Distributors PG&E Territory	Distributors Low-DSM States
Recommend more	82%	83%	90%	80%
Recommend less	0%	0%	0%	0%
About the same	18%	17%	10%	20%
# of Respondents	*17*	*12*	*10*	*10*

Verbatim responses to a probe on the three-year trend are summarized below.

Contractors

Most contractors said they recommend CFLs more than three years ago because a recent increase in the variety of fixtures specifically designed for use with CFLs enabled them to use the efficient lamps in a much broader range of applications. These contractors also mentioned that costs have gone down, problems with buzzing and flicker have largely been solved, and that customers are becoming more receptive to energy efficiency. The few who said that they are recommending CFLs about the same as they were three years ago said that it was because the technology and market have not changed much over that time period, pointing out that the big surge in CFLs happened earlier (in the PG&E territory). No contractors said that they recommend CFLs less than they did three years ago.

Distributors

Most distributors said they recommend CFLs more than three years ago for much of the same reasons as contractors. In addition to the general increase in product availability and improvements in technology mentioned by contractors, the advent of the high-wattage “twisty” CFL was cited as a recent major breakthrough. Also, distributors said that general customer knowledge about lighting has increased, making them better decision makers and less fearful of CFL technology. The few who said they recommend CFLs about the same as they did three years ago simply said that not much has changed over that period. No distributors said that they recommend CFLs less than they did three years ago.

The year in which lighting equipment distributors first started stocking T8 and T5 lamps, electronic ballasts, and CFLs are shown in Table 6-27. The results indicate that these technologies were available in PG&E's territory about two years before they became available in the low-DSM states. This difference is consistent with that observed from similar distributor self-reports obtained in the PG&E/SDG&E Commercial Lighting Market Effects Study (XENERGY, 1998).

Table 6-27
Average Year Distributors Started Stocking Efficient Lighting Equipment

	Average Year Began Stocking	
	PG&E Territory	Low-DSM States
T8 lamps	1992	1994
T5 lamps	1995	1997
Electronic ballasts	1992	1994
Compact fluorescent lamps	1990	1991
# of Respondents	*11*	*10*

6.3.2 Market Penetration

The next series of tables and figures present the difference in self-reported sales of CFLs, T8 lamps, and electronic ballasts between 1996 and 1998. The trend in these data are of increased usage over time, and also of a catching-up by low-DSM areas to the level of usage found in PG&E's territory. These results are also consistent with those observed in the PG&E/SDG&E Commercial Lighting Market Effects Study (XENERGY, 1998). The latest trends extend the previously collected data and indicate both that the previously observed market effects are sustaining and that these effects have spilled over rapidly to the low-DSM states.

Table 6-28
Percent of Downlight or Sconce Sales With Compact Fluorescent Lamps

	Contractors		Distributors	
	1996	1998	1996	1998
Low-DSM States	19% *(n=20)*	56% *(n=20)*	25% *(n=9)*	45% *(n=9)*
In-Territory	43% *(n=14)*	63% *(n=18)*	31% *(n=9)*	42% *(n=9)*

Figure 6-2
Percent of Downlight and Sconce Sales With Compact Fluorescent Lamps

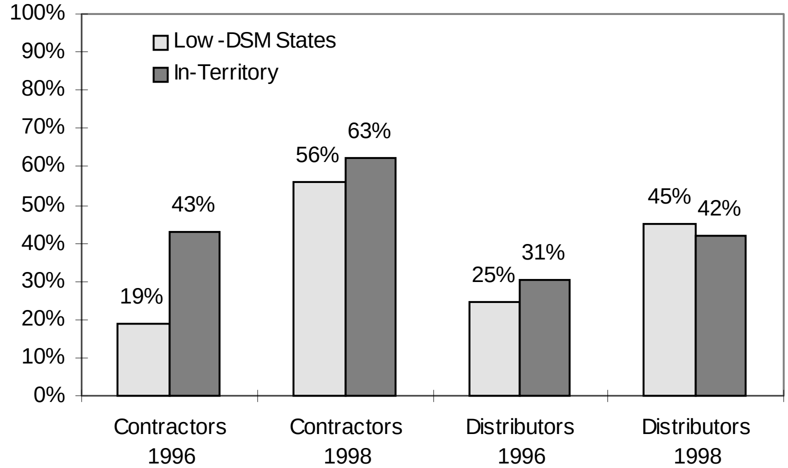


Table 6-29
Percent of Linear Fluorescent Lamp Sales That Were T8 Lamps

	Contractors		Distributors	
	1996	**1998**	**1996**	**1998**
Low-DSM States	27% *(n=21)*	65% *(n=19)*	25% *(n=10)*	56% *(n=10)*
In-Territory	46% *(n=21)*	72% *(n=20)*	44% *(n=9)*	61% *(n=9)*

Figure 6-3
T8 Lamps As Percent of 4-foot Linear Fluorescent Sales

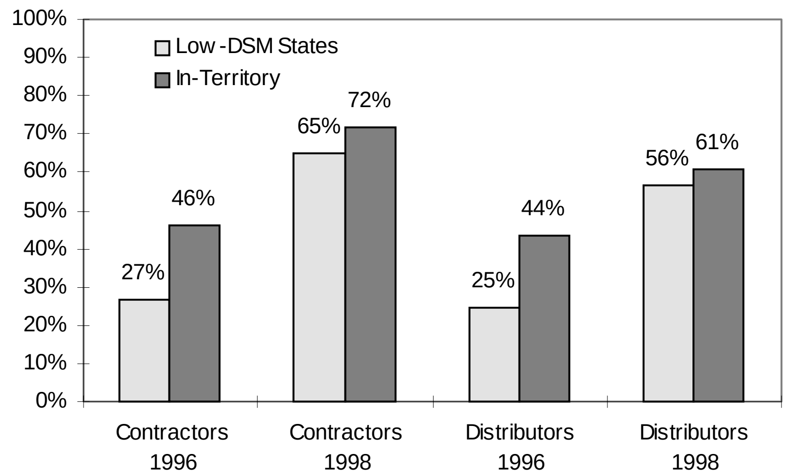
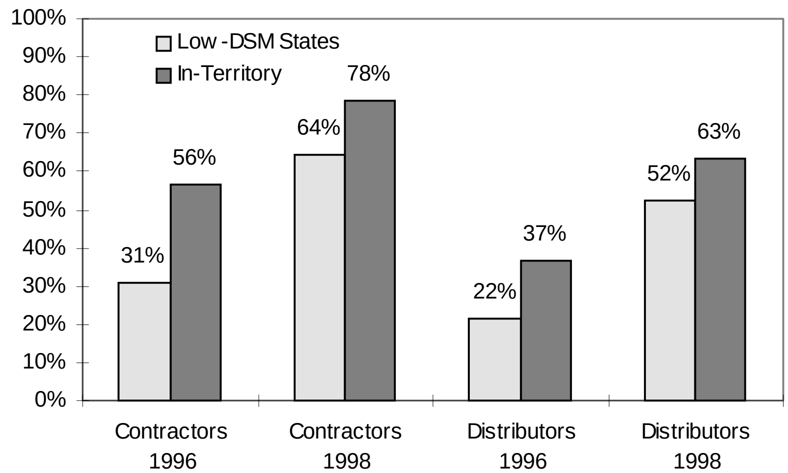


Table 6-30
Percent of Linear Fluorescent Ballast Sales That Were Electronic

	Contractors		Distributors	
	1996	**1998**	**1996**	**1998**
Low-DSM States	31% *(n=20)*	64% *(n=20)*	22% *(n=10)*	52% *(n=10)*
In-Territory	56% *(n=14)*	78% *(n=20)*	37% *(n=9)*	63% *(n=10)*

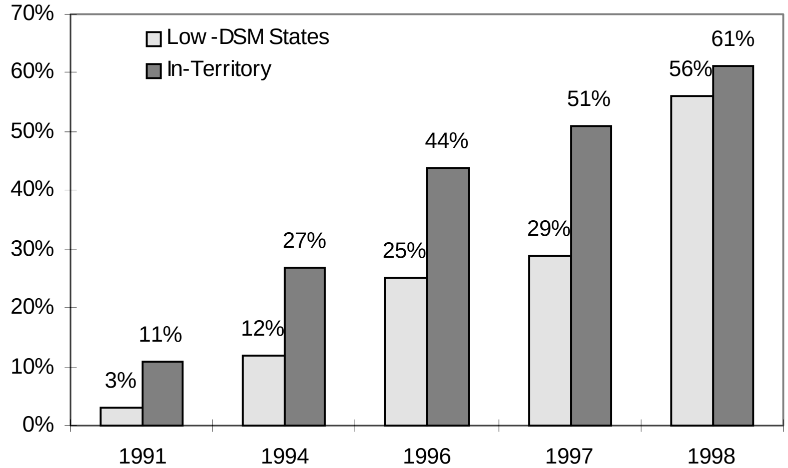
Figure 6-4
Electronic Ballasts As Percent of All Linear Fluorescent Ballast Sales



In Figures 6-5 and 6-6 we have combined the results of our PG&E/SDG&E Commercial Lighting Market Effects Study and the current Study, to produce a consistent picture of the long-term penetration trends for T8 lamps and electronic ballasts in the PG&E territory and comparison area. The trends for both areas follow classic diffusion S-shaped diffusion curves, with the in-territory curves reflecting an acceleration largely attributable to program activities carried from 1990 to 1996, while the comparison area trend reflects a lag followed by recent "catching up" that fits the hypothesis that these areas are undergoing rapid spillover from parts of the country that heavily promoted these technologies earlier in the decade. We were particularly impressed with the consistency of the self-reported data that we received from the two studies, given the small sample sizes for the current study[2] and the fact that the respondents were chosen randomly in both cases (i.e., the respondents were not part of a longitudinal panel).

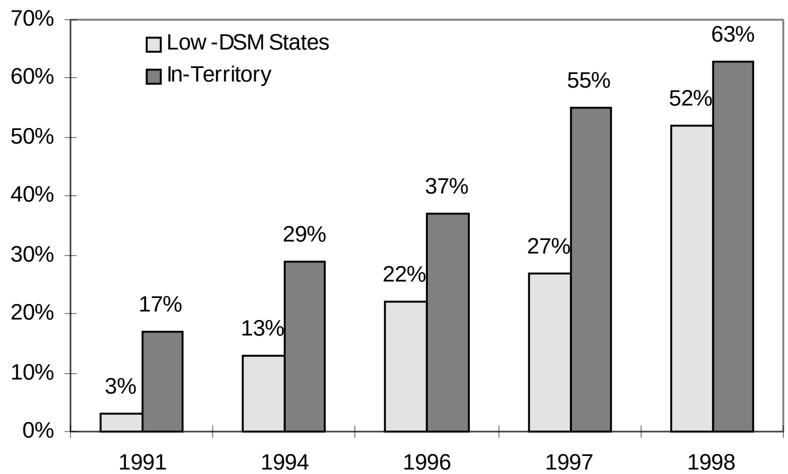
[2] Distributor sample sizes were much larger in the PG&E/SDG&E Commercial Lighting Market Effects Study consisting of 109 in-territory and 30 comparison areas surveys.

Figure 6-5
Long-Term Trend of T8 Lamps As Percent of 4-foot Linear Fluorescent Sales
(Based on Distributor Self-Reports from Two Studies, see footnote)



Sources: For 1991, 1994, and 1997; XENERGY, 1998. For 1996 and 1998, the current Study.

Figure 6-6
Long-Term Trend of Electronic Ballast As Percent of 4-foot Ballast Sales
(Based on Distributor Self-Reports from Two Studies, see footnote)



Sources: For 1991, 1994, and 1997; XENERGY, 1998. For 1996 and 1998, the current Study.

6.3.3 Barriers to CFLs

Contractors and distributors were asked to think back to 1996 to recall the barriers to increased usage of compact fluorescent lamps at that time. Figure 6-7 shows the primary barriers cited by supply-side actors in PG&E's territory. Following the figure, Tables 6-31 and 6-32 show the seven main categories of barriers cited as well as the secondary barriers.

Figure 6-7
Self-Reported Primary Barrier to Increased Usage of CFLs

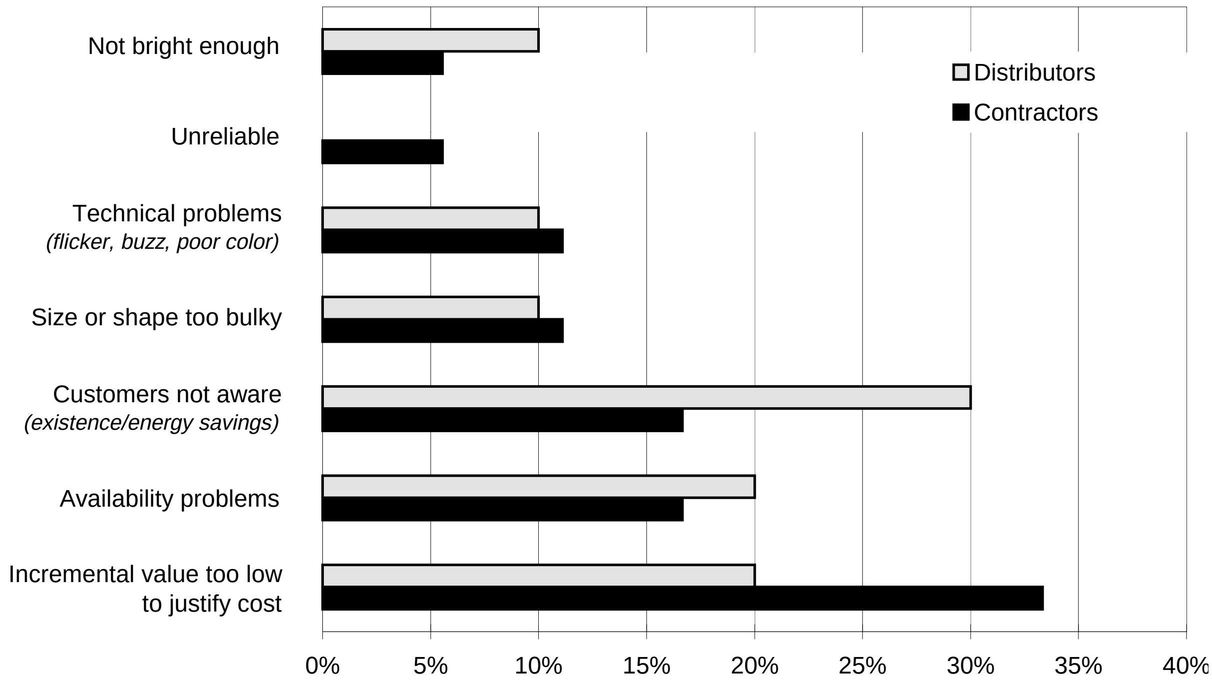


Table 6-31
Contractors Report on Barriers to Usage of CFLs in 1996

	PG&E Territory		Low-DSM States	
	Main	**Secondary**	**Main**	**Secondary**
Reliability (esp. early failures)	6%	0%	0%	0%
Availability	17%	17%	6%	56%
Physical size/shape *Doesn't fit in existing fixtures* *Poor aesthetic*	11%	33%	6%	0%
Technical problems: *Color rendition, flicker, buzzing*	11%	25%	13%	33%
Not bright enough	6%	0%	0%	0%
Customers not aware *Savings potential* *Availability of CFLs*	17%	8%	25%	0%
Incr value too low to justify cost	33%	17%	44%	11%
None (no barriers)	0%	0%	6%	0%
# of Respondents	*18*	*12*	*16*	*9*

Table 6-32
Distributors Report on Barriers to Usage of CFLs in 1996

	PG&E Territory		Low-DSM States	
	Main	**Secondary**	**Main**	**Secondary**
Reliability (esp. early failures)	0%	0%	0%	14%
Availability	20%	0%	10%	0%
Physical size/shape *Doesn't fit in existing fixtures* *Poor aesthetic*	10%	57%	30%	14%
Technical problems: *Color rendition, flicker, buzzing*	10%	14%	10%	29%
Not bright enough	10%	0%	0%	0%
Customers not aware *Savings potential* *Availability of CFLs*	30%	14%	30%	14%
Incremental value too low to justify cost	20%	14%	20%	29%
# of Respondents	*10*	*7*	*10*	*7*

When asked whether the utility program contributed to reducing barriers to CFLs, 71 percent of in-territory and 44 percent of Low-DSM State contractors indicated that they had. In-territory contractors stated that the rebates contributed to increased awareness, reduced the risk of trying a new technology, and generally jump-started the market. Comparison-area contractors also cited utility programs, though many noted there were none in their territories, but also tended to cite energy standards as playing an important role in increased acceptance of CFLs.

Table 6-33
Did Utility Energy Efficiency Programs Contribute to Reducing Barriers to CFLs?

Response	PG&E Territory	Low-DSM States
Yes	71%	44%
No	18%	50%
Don't Know	12%	6%
# of Respondents	*17*	*18*

When asked what the most important remaining barriers are, contractor responses ranged widely from comments on how utility education programs could be improved to unresolved technology issues. The most common technological barrier mentioned is the problem of brightness and package size. For bright fixtures, CFL lamps and ballasts are much larger than the incandescent lamps they replace. Contractors also pointed out that a good fraction of their customers still don't know about the secondary benefits of CFLs like lower cooling loads and reduced maintenance. In addition to teaching about energy savings, future education efforts should focus on these secondary benefits as well. A few contractors said that there are no more barriers to CFL usage in the commercial market.

Nearly all the distributors focused on the high initial cost of CFLs. They say that customers remain blind to rational choices about payback when they compare first costs between incandescent and fluorescent options. Addressing this sticker shock is partly the purview of education programs, they say, however a number of distributors also expressed concern that some customers may never choose CFLs unless prices drop further.

Our previous research (XENERGY, 1998) asserted that market transformation was occurring for the T8 lamp and electronic ballast technologies among certain segments, mainly, institutional, chain retail, and leased office end users. We observed, however, that high-efficiency technologies were not the dominant choice among smaller commercial customers. To followup on this observation, we asked contractors if they thought smaller commercial customers lag behind larger ones in adopting T8 lamps and electronic ballasts and, if so, why. Responses are presented in Table 6-34. The overwhelming majority of contractors in both areas indicated that they believed smaller customers do lag significantly with respect to the penetration of high-efficiency lighting. A larger percentage of contractors in the PG&E territory, however, indicated that they thought smaller customers did not lag larger customers in this respect.

Table 6-34
Contractors: Do Smaller Customers Lag Behind in Adopting T8 Lamps and Electronic Ballasts?

Response	PG&E Territory	Low-DSM States
Smaller customers lag	67%	90%
No lag	24%	10%
Don't know	10%	0%
# of Respondents	*21*	*21*

Verbatim responses to this inquiry are summarized below.

Contractors

Contractors who agreed that smaller commercial customers lag significantly behind larger commercial customers in their adoption of T8 lamps and electronic ballasts were largely in agreement as to the reasons. Unlike small companies, larger ones have personnel dedicated to energy procurement and efficiency. First cost, and the financing necessary to purchase more expensive lighting equipment were cited as a combined barrier that is higher for small companies because of their more limited access to capital. It is also interesting to note that a quarter of the contractors within PG&E's service territory did not think that smaller customers are lagging. Those with this opinion said that smaller customers used to lag behind, but are now fully caught up with the larger commercial companies.

6.3.4 Express Efficiency Program

Many lighting contractors felt that PG&E reduced its advertising of the lighting programs in 1998. Frequently, surveyors got surprised responses indicating respondents did not know the Program was "still around." Many of these same contractors said they had participated in the program several years ago. This reaction indicates that the diminishing spending (as shown in Section 1 of this report) has had a corresponding impact on program participation and awareness.

One contractor in three is aware of PG&E's current lighting Express rebate program. When questioned about this, all but two replied that they were aware of previous PG&E lighting programs, but were unaware of any current activity. Interestingly, for distributors awareness is much higher with two out of every three aware of the current lighting program.

Table 6-35
Familiarity with PG&E's Express Efficiency Program

	Contractors	Distributors
Familiar	33%	64%
Not familiar	67%	36%
# of Respondents	*21*	*11*

Mail advertisements informed the majority of contractors and distributors about the rebate program, with utility representatives playing an important role as well. The large response in the "Other" column probably indicates that the respondent couldn't remember. When pressed about from what "other" source they learned about the program, those contractors said it was too long ago to recall.

Table 6-36
Source of First Contact with Express Efficiency Program

Source	Contractors	Distributors
Trade Organization	0%	0%
Business colleague	0%	17%
PG&E Representative	14%	17%
Mail advertisement	57%	67%
Lighting Equipment Distributor	0%	0%
Other	29%	0%
# of Respondents	*7*	*6*

Respondents were asked to report whether or not they would change their specification practice if rebates were to disappear today. Their responses indicate a fairly strong commitment to continue using compact fluorescent lamps. Table 6-37 shows the close-ended responses and is followed by a summary of the verbatim responses.

Table 6-37
Specification Practices of CFLs in Absence of Utility Rebate Programs (In-territory Only)

	Contractors	Distributors
Would change	15%	13%
Would *not* change	75%	75%
Don't know	10%	13%
# of Respondents	*20*	*8*

Contractors and distributors were probed on whether they would change their specification practices of compact fluorescent lamps if utility rebate programs ended today. Their responses are summarized below.

Contractors

Three-quarters of the surveyed contractors said they would not change their specification of CFLs if no rebates were available. The reason, they say, is that Title-24 requires the use of these technologies in many instances anyway, and that the energy savings have convinced most customers that CFLs are the right choice whether or not rebates are available.

Distributors

Like contractors, three-quarters of the lighting distributors in PG&E's service territory say they would not change their specification practice of CFLs in the absence of any rebates. Their efforts have been on cultivating customer interest in high-efficiency lighting products over the past several years, and while rebates may help sell some projects, they do not shape the underlying choices of equipment in the long run.

6.4 PICK-UP TECHNOLOGIES

In this section, a brief report is made of the state of variable-speed drive controllers in HVAC applications and of programmable thermostats. Organization of Section 6.4 is as follows:

- Variable Speed Drive Controllers
- Programmable Thermostats

Table 6-38 shows that most contractors and distributors at least occasionally work with these technologies. Work with water-cooled or evaporative air conditioners and heat pumps is also shown in Table 6-38.

Table 6-38
Percent of Vendors Indicating They Install or Specify High Efficiency HVAC Equipment

	Contractors (installation/specification)		Distributors (sales only)	
Measure/Technology	**PG&E Territory**	**Low-DSM States**	**PG&E Territory**	**Low-DSM States**
Water-cooled or evaporative air conditioners	92%	78%	60%	82%
Heat pumps	100%	100%	100%	91%
VSDs (variable-speed-drive controllers)	84%	50%	90%	91%
Programmable thermostats	100%	100%	90%	91%
Other	0%	83%	80%	0%
# of Respondents	*25*	*18*	*10*	*11*

6.4.1 Variable-Speed Drive Controllers

Contractors were asked how familiar they were with variable speed drives (VSDs). Nearly all (91%) of the PG&E Territory contractors and three-quarters of the Low-DSM States contractors were either “very” or “somewhat familiar” with VSD applications (see Table 6-39). The average number of VSDs installed, for those that were able to estimate a figure, is shown in Table 6-40. The trend with respect to changes in penetration of VSDs between 1996 and 1998 is shown in Table 6-41. The majority of contractors in both areas report an increase in VSD installations.

Table 6-39
Contractors: Familiarity with Variable Speed Drives

	PG&E Territory	**Low-DSM States**
Very familiar	55%	33%
Somewhat familiar	36%	42%
Somewhat unfamiliar	9%	8%
Very unfamiliar	0%	17%
# of Respondents	*11*	*12*

Table 6-40
Contractors: Variable Speed Drives Installed Over Past Three Years and Percentage Receiving Rebates

	PG&E Territory	**Low-DSM States**
Average	53	30
Percent receiving rebates	13%	n/a
# of Respondents	*9*	*8*

Table 6-41
Contractors: VSD Installation Changes Over the Last Three Years

	PG&E Territory	Low-DSM States
Increased	60%	50%
Stayed about the same	30%	40%
Decreased	10%	10%
# of Respondents	*10*	*10*

Contractors were asked to characterize the market for VSDs in existing commercial buildings. Responses ranged from little to no potential for savings to "great opportunity for savings," with most comments leaning towards the latter. Other comments included notes that VSDs were cost effective only on large air-handling units or units that run constantly. Contractors were also asked about barriers to greater implementation of VSDs on existing commercial buildings. High initial costs and repair costs, limited knowledge of contractors about VSD opportunities, and difficulties associated with installing this equipment into existing units were all cited as potential down-sides to the potential growth of the market for VSDs on commercial buildings.

6.4.2 Programmable Thermostats

Finally, HVAC contractors were asked to estimate the effect of utility rebate and audit programs on the market for setback/programmable thermostats. Attribution of program effects was negligible. These results are presented in Table 6-42.

Table 6-42
Contractors: Ratings of the Effect of Utility Rebate or Audit Programs on the Market for Setback Thermostats

Response	PG&E Territory	Low-DSM States
Significant effect	9%	11%
Modest effect	9%	11%
No effect	36%	6%
Don't know	45%	72%
# of Respondents	*11*	*18*

7 MARKET EFFECTS

In this section, we provide our analysis of the evidence for market effects of the Express Efficiency Program based on the research conducted to date. We revisit several of the hypotheses developed in the Program Theory section of this report to assess the extent to which hypothesized changes in the market are or are not occurring as a result of the Program. The section concludes with a brief discussion of initial modeling we conducted to provide additional evidence with which to examine our hypotheses.

7.1 INTRODUCTION

7.1.1 Background Issues

Analyzing and interpreting the data were complicated by several significant, related factors:

1. Because this study was designed and conducted after the first year of the Program had elapsed, no baseline data were collected on conditions prior to the Program. Consequently, since the Program was offered to all small and medium C&I customers, no pure control group was available in the PG&E area for comparison with the participants.
2. We analyzed results based primarily on data for the 1998 Program. Consequently, we investigated end-user market effects that reflected only a single operating year for the Program overall and the effects were likely to be limited to the 1998 participants and only *indicative* of the potential for market transformation.
3. The Express Efficiency Program was preceded for several years by the Retrofit Express Program, which addressed most of the same efficiency products and measures, but did not include the new upstream activities incorporated in the 1998 Express Efficiency Program. Because of the long-term existence of the downstream (i.e., customer-focused Retrofit Express) portion of the Program, there were likely to be market effects observable in 1998 that resulted from the preceding Retrofit Express Program.
4. Related to Item 3 above, the level of Program-related activity has decreased significantly since 1994, both overall and specifically for the measures in the scope of this Study (e.g., for customers with demands less than 500 kW the total dollars rebated for the 8 measures included in our study scope were $17 million in 1994 and only $2.3 million in 1998).

We recognized these issues at the outset of the study and prior to analyzing the data. To address the first issue, we took several complementary steps. We identified both a PG&E non-participant customer sample and a low-DSM state customer sample for comparison with the participant customer sample. As one way to reduce differences in the results that might be attributable to characteristics of self-selected Program participants, we weighted the observations to make them consistent with regard to customer size and segment. We also closely examined results for different groups depending on characteristics that appeared to be over- or under-represented in the participant group. When possible, these compositional differences across the groups were controlled for statistically.

Regarding the second issue, it was clear that the first year of a program was unlikely to transform this market to a significant degree. To take this into account, we used our program theories to distinguish market cause-effect relationships expected in the near-term from those expected over the long-term. Our hypotheses and associated market effects also reflected this chronological split. Fundamentally, we were looking less for indisputable proof of lasting, program-induced changes in the marketplace (which rarely occur so quickly from any new program intervention) and more for whether there were any early indications that the hypothesized sequences of events had begun to manifest themselves. This perspective was consistent with the theory-based evaluation approach introduced earlier. In our analysis and results, we made the distinction between the near- and long-term effects, and emphasized assessing the expected near-term market effects.

To address the third issue—the influence of previous years of the Retrofit Express Program—we also took several steps. For one, we selected participating customers based on participation data for 1998. In our customer interviews, we asked about participation in prior years since some 1998 participants also participated in previous years. The survey included questions about when the customer participated and which measures were installed when. Ultimately, however, it was not possible to eliminate totally the influence from previous years of the Program. Of course, participation in prior years among the PG&E-area customers who did not participate in the 1998 Program might have produced some measurable market effects. Such effects might be captured by comparing results for these in-state 1998 non-participants to the out-of-state comparison group.

7.1.2 Overview of Results Presentation

The hypotheses and indicators developed for this evaluation are summarized in Table 7-1 and Table 7-2. In addition to presenting some information presented earlier, these tables identify the hypotheses that we tested and are discussed in later subsections. The findings are summarized in Section 7.2 and each of the hypotheses that we tested are discussed in subsequent subsections.

Table 7-1
Downstream Program Hypotheses, Indicators, Data Availability

Hypotheses	Indicators	Data Availability
Supply-Side Actors		
H1. Program promotion to suppliers increases supplier awareness/ knowledge of energy efficiency	• Increased awareness of efficiency products	• Contractor/distributor interview questions about awareness/knowledge data (for lighting measures and VSDs primarily) • Contractor/distributor interview questions about Program awareness
H2. H1 leads to increased supplier marketing of energy efficiency H11. H10 leads to increased supplier marketing of efficiency measures	• Increased marketing and promotion of efficient products	• Contractor/distributor interview questions about promotion and specifications for high-efficiency lighting
H13. H11 leads to vendors/ contractors benefiting from sales and installation of efficiency measures.	• Increased profits • Improved customer relations	• Contractor/distributor interview questions about competitive importance of offering efficient lighting products
H17. H13 and H14 lead to increased supply and lower costs of efficiency measures	• Increased availability of efficient products • Reduced prices of efficient products	• Contractor/distributor interview questions about sales of efficient lighting products
Customers		
H3. H2 leads to increased customer awareness/knowledge and lower information costs for efficient measures H4. Program promotion/ marketing to customers increases awareness/ knowledge of energy efficiency and lowers information costs for efficient measures	• Increased availability of efficiency information from suppliers • Decreased effort required to obtain efficiency information and select contractors • Increased understanding of potential energy/utility bill savings	• Customer survey: frequency of hearing about energy-efficient investments [Q131(7)]; how knowledgeable about energy-efficient products [Q108]; estimates of potential cost-effective energy savings [Q109]; self-reported lighting efficiency [Q008] and lighting measures installed [Q021, Q029, Q044, Q050, Q061]; time/hassle to get information [Q092(2)]; time/ hassle to select contractor [Q092(3)]
H5. Program promotion/ marketing to customers increase customer use of long-term investment analysis or criteria for efficiency measures	• Increased use of long-term investment analyses/criteria	• Customer survey: use of long-term investment analyses/criteria [Q105, Q106]; effect of Program [Q110]
H6. Program promotion/ marketing to customers provides customers with independent, objective measure information	• Confidence in available measure information • Knowledge/awareness and ease of understanding efficiency information	• Customer survey: knowledge of efficiency measures and performance [Q108]; ease of understanding energy-efficiency measures [Q131(5)]

Table 7-1 continued.

Hypotheses	Indicators	Data Availability
H7. Program rebates increase customer confidence in measure performance	• Effect of rebate on confidence in measure performance	• Customer survey: rebate effect on confidence in performance [Q080]
H8. Program rebates reduce need-for-financing barrier	• Reduced effect of first-cost barrier • Significance of lack-of-financing barrier	• Customer survey: importance of rebate in overcoming initial cost barriers [Q079] significance of lack-of-financing barrier [Q092(6)]
H9. Program rebates reduce cost barrier for lessees	• Reduced effect of measure cost on lessee efficiency investments	• Customer survey: comparison of [Q079] and [Q092(6)] responses for lessees and owners
H10. H4-H9 lead to increased customer efficiency measure adoption in short term	• Increased adoption of single and multiple efficiency measures in short term	• Customer survey: number of different measure types and counts for each measure installed [Q021, Q029, Q044, Q050, Q061] • Contractor/distributor interview questions about sales/installations of efficient products
H12. H10 leads to customers having positive experiences with the efficiency measures they implement	• Increased satisfaction with performance of efficient measures • Increased other benefits of efficiency measures	• Customer survey: satisfaction with energy savings and general performance [Q073]; whether adopted measures had increased customer's confidence efficiency investments would reduce energy bills [Q071]; general belief that efficiency investments would significantly reduce energy bills [Q092(10)]; comparisons of adopters to non-adopters
H14. H12 leads to customers who adopt efficiency measures communicating benefits to others H15. H14 leads to customers communicating to suppliers about interest in efficiency measures (H1)	• Increased communication to peers and suppliers about positive aspects of efficiency measures	• Customer survey: advocacy of efficiency measures to others by adopters [Q131(6)]
H16. H12 and H14 lead to increased customer long-term demand for measures	• Increased and sustained long-term demand for efficiency measures	• Customer survey: likelihood of selecting efficiency measures in the future as a result of experiences with efficiency [Q075]; general intentions to pursue efficiency investments [Q092(11)] • This is a long-term effect that can't be tested adequately in time-frame
Customers & Supply-Side Actors		
H18. H16 and H17 lead to increased market for efficiency measures	• Established market for increased sales of efficient products	• Contractor/distributor interview questions about expectation if Program ended • This is a long-term effect that can't be tested in time-frame
Note: Numbers in brackets indicate relevant question numbers from customer survey instrument.		

Table 7-2
Upstream Program Hypotheses, Indicators, Data Availability

Hypotheses	Indicators	Data Availability
Supply-Side Actors		
H1. Program promotion/marketing to suppliers increases supplier awareness/knowledge of energy efficiency and lowers cost of getting information H2. Program promotion/ marketing to supply-side actors reduces uncertainty about product performance	• Familiarity with the Program • Increased awareness of efficiency products • Reduced costs of getting information on efficiency products • Increased confidence in efficiency product performance	• Contractor/distributor interview questions about Program awareness, efficient A/C awareness/knowledge, Program effects
H3. Rebate reduces supplier costs	• Reduced costs of efficient products throughout supply chain	• Contractor/distributor interview questions about Program effects, barriers
H4. H1, H2, and H3 lead to increased stocking of efficient units	• Increased distributor stocking of efficient products • Increased vendor/contractor stocking of efficient products	• Distributor interview questions about stocking and trends for high-efficiency A/Cs
H5. H1-H4 and H9 lead to increased vendor/contractor short-term demand	• Increased vendor/contractor demand for efficient products	• Distributor interview questions about sales, difficulty of selling, and trends for high-efficiency A/Cs
H6. H1-H3 and H5 lead to vendors/ contractors promoting high efficiency units	• Increased marketing and promotion of efficient products to customers	• Contractor/distributor interview questions about promotion and recommendations of high-efficiency A/Cs
H7. H5 leads to increased near-term installations of high-efficiency units	• Increased installations of high-efficiency products	• Contractor interview questions about sales, difficulty of selling, and trends for high-efficiency A/Cs
H10. H7 leads to vendor/contractor/ distributor satisfaction with sales and installation of high-efficiency products	• Increased profits • Improved customer relations	• Contractor interview questions about importance of offering high-efficiency A/Cs • Distributor interview questions about margins on high-efficiency A/Cs
H11. H10 and H13 lead to positive communications to vendors/ contractors/distributors about performance, sales, and installation of efficiency measures.	• Increased supply-side actor communications to other supply-side actors about benefits of high-efficiency products	• No data obtained
H12. H10 and H11 lead to increased supply and lower prices for efficiency products	• Increased availability of efficient products • Reduced prices of efficient products	• Contractor/distributor interview questions about stocking, barriers, and price trends

Table 7-2 continued.

Hypotheses	Indicators	Data Availability
Customers		
H8. Promotion to customers increases customer awareness/knowledge of efficient measures	• Increased customer awareness of efficient products • Increased customer understanding of potential energy/utility bill savings	• No direct information available on high-efficiency A/Cs; customer survey data available on general awareness
H9. H8 and H6 lead to increased customer demand for efficient measures	• Increased customer demand for efficient products	• Customer survey: customer self-reports of installation of high-efficiency A/Cs [Q021, Q029, Q044, Q050, Q061]; customer definitions of high-efficiency probably differed and customers were probably not aware of all 1998 Program installations
H13. H7 leads to customer satisfaction with high-efficiency products	• Increased satisfaction with performance of efficient measures • Increased other benefits of efficiency measures	• Customer survey: satisfaction with high-efficiency A/Cs installed [Q073]
H14. H10 and H13 lead to positive communications to customers about efficiency measures	• Increased communication to other customers about positive aspects of efficiency measures	• Customer survey: general advocacy of energy-efficiency measures for those who adopt them but nothing specific on A/Cs [Q131(6)]
H15. H13 and H14 lead to increased customer long-term and aggregate demand for efficiency measures	• Increased demand by participating customers for other efficiency measures • Increased demand by other customers for efficiency measures	• No reliable data were available for customers who adopted high-efficiency packaged A/Cs
Customers & Supply-Side Actors		
H16. H12 and H15 lead to increased market for efficiency measures	• Established market for increased sales of efficient products	• This is a long-term effect that can't be tested adequately in this time-frame

Note: Numbers in brackets indicate relevant question numbers from customer survey instrument.

7.2 SUMMARY OF FINDINGS

In this section we provide a brief discussion of the findings from our assessment of the extent to which the 1998 Express Efficiency Program engendered market effects. Findings on the downstream Program are presented first, followed by findings on the upstream Program.

7.2.1 Downstream Program Findings

Table 7-3 presents a summary of our assessment for each of the research hypotheses applying to the downstream component of the Program. As shown at the bottom of Table 7-3, our overall assessment of the downstream component of the 1998 Express Program is that it appeared to have resulted in *moderate effects among end-user participants.* The majority of the hypotheses for which evidence of effects exists are associated with end users; conversely, there are few effects of the downstream portion of the Program that can be observed on the supply-side.

Although we observed a number of differences among our end-user comparison groups[1] that point to program-induced effects, there are two caveats to this finding. First, because we had no opportunity to observe the characteristics of end-user participants before they entered the 1998 Program, we cannot be sure that the differences in the indicators of interest are attributable exclusively to the Program and not the fact that participants self-selected into the Program because they already possessed the desired characteristics. Second, the absolute participation level for the 1998 Program was low enough to beg the question as to whether any program-induced effects could have spread among the overall population of targeted customers. Participants in the 1998 Express Efficiency Program represented only 0.5 percent of the PG&E small/medium customer population and 1.9 percent of the PG&E small/medium energy usage. This level represented a significant drop in participation compared with the Retrofit Express Program: In 1994, the number of unique sites participating was 5,670 and between 1995 and 1997 the number fluctuated between about 3,800 and 4,500; in 1998, however, the number of unique sites participating dropped to less than 1,400. In contrast, it was estimated that a cumulative total of about 27,000 establishments representing approximately 64 percent of PG&E-territory floorspace participated in all of PG&E's C&I rebate programs between 1992 and 1996.[2] At the 1998 participant levels, it is unlikely that significant spillover leading to broad-based market effects would be generated.

The lack of observed near-term effects from the downstream Program among supply-side actors is likely attributable to the fact that the Program was very small in 1998, particularly in comparison to previous years. For example, two-thirds of lighting contractors interviewed stated they were unfamiliar with the current program, even though many indicated they participated (indirectly since rebates went to end users) in previous years. Thus, it is difficult to make a case that the 1998 Program itself is having a strong direct influence on contractors. On the other hand, the supply-side actors interviewed continue to report that they promote efficient lighting products routinely and would continue to do so without rebates. This aspect of our findings confirmed the results of the PG&E/SDG&E Commercial Lighting Market Effects Study, which indicated that the 1992 to 1996 rebate programs had an important impact on supply-side actors, and indicated that the effects might be sustainable (that is, for larger customers). The downstream component of the 1998 Express Program appeared to have *few*, if any, *incremental effects*[3] *on contractors and distributors* but continued to influence participating end users.

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[1] The comparison groups are: end user participants, in-territory non-participants, and end users in states with low historic levels of DSM or market transformation program.

[2] Source: *PG&E/SDG&E Commercial Lighting Market Effects Study*. Note that the figures quoted are for the entire commercial population, i.e., including customers above 500 kW.

[3] That is, incremental to those effects previous documented in the study cited above.

Table 7-3
Summary of Market Effects Assessment of the Downstream Express Efficiency Program

Hypotheses	Extent of Evidence	Strength of Evidence
Supply-Side Actors		
H1. Program promotion to suppliers increases supplier awareness/knowledge of energy efficiency	Limited	Moderate
H2. H1 leads to increased supplier marketing of energy efficiency	Limited	Weak
H11. H10 leads to increased supplier marketing of efficiency measures	Limited	Weak*
H13. H11 leads to vendors/ contractors benefiting from sales and installation of efficiency measures.	Limited	Weak*
H17. H13 and H14 lead to increased supply and lower costs of measures	Moderate	Moderate
Customers		
H3. H2 leads to increased customer awareness/knowledge and lower information costs for efficient measures	Moderate	Strong
H4. Program promotion/ marketing to customers increases awareness/knowledge of energy efficiency and lowers information costs for efficient measures	Moderate	Strong
H5. Program promotion/ marketing to customers increase customer use of long-term investment analysis or criteria for efficiency measures	Moderate	Limited
H6. Program promotion/ marketing to customers provides customers with independent, objective measure information	Limited	Moderate
H7. Program rebates increase customer confidence in performance	Limited	Moderate
H8. Program rebates reduce need-for-financing barrier	Moderate	Weak
H9. Program rebates reduce cost barrier for lessees	Moderate	Weak
H10. H4-H9 lead to increased customer measure adoption in short term	Extensive	Moderate
H12. H10 leads to customers having positive experiences with the efficiency measures they implement	Extensive	Strong
H14. H12 leads customers who adopt to communicate benefits to others	Moderate	Moderate
H15. H14 leads to customers communicating to suppliers about interest in efficiency measures (H1)	Moderate	Moderate
H16. H12 and H14 lead to increased customer long-term demand	Limited	Limited
Customers & Supply-Side Actors		
H18. H16 and H17 lead to increased market for efficiency measures	Moderate	Moderate
OVERALL FOR DOWNSTREAM PROGRAM	**Moderate**	**Moderate**

**Although the evidence associating these hypothesized effects directly to the 1998 Express Efficiency Program was judged to be weak, the preceding years of the Retrofit Express Programs had relatively strong effects. Thus, it would be difficult for the 1998 to generate effects incremental to the previous supply-side effects, particularly given the small size of the Program in 1998.*

7.2.2 Upstream Program Findings

Table 7-4 presents a summary of our assessment for each of the research hypotheses applying to the upstream component of the Program. As shown at the bottom of Table 7-4, we broke our overall assessment of the upstream component of the 1998 Express Efficiency Program into two parts. For the near term, it appeared that the data supported the conclusion that the Program had resulted in *moderate effects*. In terms of long-term effects, we have concluded the extent and strength of the evidence indicated that the Program has had *limited effects*.

The contractor and distributor interviews suggested the Program-related awareness and behavior differed between the two supply-side actor groups. Most PG&E-area contractors were not aware of the 1998 Program, while most distributors were. This was not surprising given that the upstream Program targeted HVAC distributors. Because awareness and knowledge of energy efficiency were high in both the PG&E and comparison areas and there was limited Program awareness, we concluded that the Program had not increased awareness and knowledge significantly. Similar results applied to product performance uncertainty. Although the rebate reduced distributor costs, the evidence was limited that these savings were passed along through the supply chain. On the other hand, there was evidence suggesting that the Program had resulted in increased stocking of high-efficiency units and that contractor demand, installations, and promotion of high-efficiency A/Cs was higher in the PG&E area. Similarly, overall satisfaction with sales and installation of high-efficiency units was higher in the PG&E area. We had no information from the interviews about whether the Program had led to increased positive communications by suppliers about high-efficiency units.

Overall, the information from customers on the upstream Program effects was limited. Because the Program targeted distributors, there was little reason to expect significant market effects on the customer side unless the effects carried through the supply chain. As observed above for the supply side, however, the energy-efficiency message promoted by the upstream Program did not appear to extend much beyond the distributors. The customer survey data did not contradict the supply-side findings. Generally, the evidence of Program effects on customers was quite limited. Evidence of effects was highest for customer satisfaction with high-efficiency A/Cs and positive communications about energy-efficient measures and this was consistent with results for the downstream Program.

The effects for which the extent and the strength of the evidence were most significant involved near-term changes in the market. As noted earlier, because our data applied to the first year of the upstream Program it was unlikely that significant long-term market effects would be observed and this was borne out by the data. The information did suggest near-term effects that could lead to long-term market changes were observable. It also identified some links in the causal change that would need to be strengthened to increase the likelihood of fundamental market changes.

Table 7-4
Summary of Market Effects Assessment of the Upstream HVAC Express Program

Hypotheses	Extent of Evidence	Strength of Evidence
Supply-Side Actors		
H1. Program promotion/marketing to suppliers increases supplier awareness/knowledge of energy efficiency and lowers cost of getting information	Limited	Limited for Distributors/ Weak for Contractors
H2. Program promotion/marketing to supply-side actors reduces uncertainty about product performance	Limited	Limited for Distributors/ Weak for Contractors
H3. Rebate reduces supplier costs	Limited	Limited
H4. H1, H2, and H3 lead to increased stocking of efficient units	Moderate	Moderate
H5. H1-H4 and H9 lead to increased vendor/contractor short-term demand	Moderate	Strong
H6. H1-H3 and H5 lead to vendors/ contractors promoting high efficiency units	Extensive	Strong
H7. H5 leads to increased near-term installations of high-efficiency units	Moderate	Strong
H10. H7 leads to vendor/ contractor/distributor satisfaction with sales and installation of high-efficiency products	Moderate	Moderate
H11. H10 and H13 lead to positive communications to vendors/ contractors/distributors about performance, sales, and installation of efficiency measures.	None	Undetermined
H12. H10 and H11 lead to increased supply and lower prices for efficiency products	Very Limited	Limited
Customers		
H8. Promotion to customers increases customer awareness/knowledge of efficient measures	Very Limited	Undetermined
H9. H8 and H6 lead to increased customer demand for measures	Limited	Weak
H13. H7 leads to customer satisfaction with high-efficiency products	Limited	Moderate
H14. H10 and H13 lead to positive communications to customers about efficiency measures	Limited	Moderate
H15. H13 and H14 lead to increased customer long-term and aggregate demand for efficiency measures	Very Limited	Weak
Customers & Supply-Side Actors		
H16. H12 and H15 lead to increased market for efficiency measures	Very Limited	Limited
OVERALL FOR UPSTREAM HVAC PROGRAM	**Moderate for Near-Term Effects** **Limited for Long-Term Effects**	**Moderate for Near-Term Effects** **Limited for Long-Term Effects**

7.3 DOWNSTREAM PROGRAM

This subsection presents detailed findings about the downstream portion of the Express Efficiency Program. It discusses findings regarding each of the hypotheses developed as part of the Program theory presented in Section 3.

7.3.1 Program Promotion to Suppliers Increases Supplier Awareness/Knowledge of Energy Efficiency (H1)

Promotion to supply-side actors is a limited element of the downstream portion of the Program. However, the Retrofit Express Program, which had a downstream focus, operated for several years prior to the Express Efficiency Program so it was likely to have had cumulative effects on supply-side actor awareness/knowledge. Previous research concluded that the 1992 to 1996 PG&E rebate programs had positive effects on supply-side actor promotion of (and, concomitantly, awareness and knowledge of) high-efficiency lighting (see the PG&E/SDG&E Commercial Lighting Market Effects Study).

To assess awareness/knowledge related to the 1998 Program, we used information primarily from the lighting contractor and distributor interviews. We supplemented it with information from the HVAC contractor interviews related to measures covered by the downstream component of the Program.

One indirect indicator of Program effects on energy-efficiency awareness/knowledge is familiarity with the Program. We found that less than one third of the HVAC contractors and about one third of the lighting contractors were aware of the Express Efficiency Program. About two thirds of the lighting distributors, however, were aware of the Program. On the other hand, all the PG&E area contractors and distributors we interviewed were aware of the preceding Retrofit Express Program and much of their energy-efficiency awareness/knowledge was probably attributable to the earlier program.

Virtually all in-territory and low-DSM state suppliers were aware of and carried the high efficiency lighting products included in the Program so there was little direct evidence we could use to compare awareness/knowledge across these groups. However, the trends identified by both contractors and distributors suggested that in-territory suppliers had a more informed knowledge and awareness of the products than the suppliers in the comparison area. We drew this conclusion based on the fact that data from the suppliers suggested that the efficient lighting market had existed longer in the PG&E area than in our comparison area, and that in-territory suppliers felt that the most significant lighting trends were technological improvements, rather than simply market growth.

The contractor data on VSDs also suggested that awareness/knowledge was considerably higher in the PG&E area. Almost 20% of Low-DSM States contractors were very unfamiliar with VSDs, whereas 91% of the in-territory contractors we interviewed were at least somewhat familiar with these products.

A summary of how the results of this evaluation bear on the first downstream Program hypothesis is provided in Table 7-5.

Table 7-5
Summary of Findings Associated with Downstream Program Hypothesis H1

Element	Description
Hypothesis	Program Promotion to Suppliers Increases Supplier Awareness/Knowledge of Energy Efficiency (H1)
Indicators	• Increased awareness/knowledge of efficiency products
Key Sources	• Lighting contractor and distributor interviews • HVAC contractor interviews
Extent of Evidence	**Limited** Contractor and distributor awareness/knowledge data were available in Program and non-Program areas, particularly for lighting products. Less information was available for other products.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** Suppliers were aware of efficient lighting products in both areas, but PG&E-area supply-side actors had a more informed awareness. Data for VSDs showed a significantly higher awareness/knowledge in the PG&E area.
Related Issues	Much of the observed effect, particularly for lighting, was probably due to the Retrofit Express Program. Awareness/knowledge of efficient lighting products was high outside the state also.

7.3.2 Increased Supplier Awareness/Knowledge (H1) and Increased Customer Demand (H10) Lead to Increased Supplier Efficiency Marketing (H2, H11)

The supply-side actor interviews provided limited information on how extensively suppliers were promoting the efficiency products covered by the downstream Program. We found, in fact, that when they were asked about whether they actively promoted selected products there was little difference between the responses of PG&E territory and low-DSM state respondents.

Comments about CFLs by in-territory contractors gave considerable credit to the Program for increasing customer demand. This might partly explain why there was little difference between responses in the two regions about the extent of marketing. Specifically, the in-territory contractors generally observed that the Program had significantly increased customer awareness/knowledge and reduced the barriers faced by customers. It was likely that, as a result of the Program, contractors had less need to market CFLs. The information available did not allow us to disentangle this effect from the effect of increased contractor awareness/knowledge. Consequently, we were unable to draw any substantial conclusions about the relationship among supplier marketing, supplier awareness/knowledge, and customer demand.

Our observations are summarized in Table 7-6.

Table 7-6
Summary of Findings Associated with Downstream Program Hypotheses H2 and H11

Element	Description
Hypothesis	Program Leads Directly and Indirectly to Increased Supplier Efficiency Marketing (H2, H11)
Indicators	• Increased marketing and promotion of efficient products
Key Sources	• Lighting contractor and distributor interviews
Extent of Evidence	**Limited** There was little information available from the interviews about promotion of the downstream Program products and it was not possible to ascertain what factors contributed to increased marketing.
Overall Strength of Evidence in Supporting Hypothesis	**Weak** There were only minor differences between the promotion of efficient products that contractors said they did in the PG&E and Low DSM areas so there was little direct evidence that the downstream Program had led to increased marketing.
Related Issues	The Program effects on consumer awareness/knowledge and demand may have alleviated much of the need for supply-side actor marketing, at least for efficient lighting products. The Retrofit Express Program probably led to significant effects in prior years.

7.3.3 Increased Short-Term Customer Demand (H10) Leads to Increased Benefits for Supply-Side Actors (H13)

For an efficiency market to grow and become self-sustaining, the supply-side actors must derive some benefits. We relied on the supply-side actor interviews to examine the hypothesis that these actors were benefiting from increased customer demand for efficient products. The data, however, were very limited, largely because businesses are usually unwilling to provide information on details that affect their competitive advantage.

One useful source was contractor and distributor responses when we asked about the competitive importance of offering efficient lighting products. In the PG&E territory, the contractors were almost four times more likely than their out-of-territory counterparts to say that this was very important competitively. This suggested that one consequence of the Program was that contractors have derived benefits from offering efficient lighting equipment, but we did not assess the details of the benefits (e.g., whether they were increased unit profits, sales, customer relations, etc.).

The distributor responses, however, were the opposite. Low-DSM States distributors were nearly twice as likely to state that offering efficient lighting products was very important competitively.

Although the distributor responses could be interpreted to suggest that the Program had not led to advantages for distributors offering efficient products, it was likely that both contractor and distributor responses in the PG&E area were affected by the prior existence of the Retrofit Express Program. In fact, nearly all PG&E-area contractors and distributors that we contacted indicated that they did offer efficient lighting products. Because of this market situation, it could be argued that not offering efficient lighting products was not a realistic possibility in PG&E's area. Consequently, suppliers could not distinguish themselves any longer by offering these products. The difference between the responses of contractors and distributors might be due to the fact that contractors could specialize in serving certain types of customers, some of which might be less willing to invest in more expensive high efficiency lighting equipment. These contractors could believe that to be competitive across the full spectrum of customers they needed to offer high efficiency products as well.

An alternative explanation was suggested by information on the customers served by contractors and distributors and their views on barriers to selling efficient products. The supplier interviews showed that distributors provided products to a wider range of customer types (e.g., end-users, other distributors, and contractors) so their customer base could include customers that were not seeking efficient products. The data on market barriers showed that distributors viewed lack of customer awareness/knowledge as a larger barrier than did contractors, thus supporting this hypothesis. Consequently, looking just at the results for the PG&E area, it was possible that the fact that distributors attached a lower importance than contractors did to offering efficient products might be due to differences in the customers served. However, this pattern was not confirmed by the contractor and distributor data from the low-DSM states.

Overall, we had to conclude that our results were mixed for the hypothesis that offering efficient products had significant benefits for supply-side actors. The issue appeared to be more complicated and we were unable to resolve it satisfactorily with our interviews. Our summary results are presented in Table 7-7.

Table 7-7
Summary of Findings Associated with Downstream Program Hypothesis H13

Element	Description
Hypothesis	Benefits for Supply-Side Actors Increase (H13)
Indicators	• Increased profits • Improved customer relations
Key Sources	• Lighting contractor and distributor interviews
Extent of Evidence	**Limited** There was little information available from the interviews about benefits to supply-side actors from increased customer demand (and sales) of efficient products. Some information was available on the competitive advantages of offering efficient lighting products. We had little information on the downstream Program products to identify specific types of benefits.
Overall Strength of Evidence in Supporting Hypothesis	**Weak** The contractor interviews suggested that PG&E area contractors believed there were significant competitive reasons to offer high-efficiency lighting equipment, compared with Low-DSM contractors. The results for distributors were the opposite, however, making the overall effects fairly inconclusive.
Related Issues	The evidence appeared to be contradictory and difficult to explain. In addition, the Retrofit Express Program and established market changes reduced the potential effects of the Express Efficiency Program alone and probably achieved several of these effects.

7.3.4 Supply-Side Actors Increase Supply and Lower Costs of Efficient Products (H17)

This hypothesis addressed longer-term effects of the Program and data from a single program year were inadequate to test it. On the other hand, the Retrofit Express Program had been in place for several years and its effects were likely to be observable.

The supplier interview data showed that in almost all cases efficient lighting products represented a larger share of sales of each product type in the PG&E area than in the low-DSM states area. The differences were more pronounced in 1996 than in 1998. These data suggested that prior years of the Retrofit Express Program had affected efficient lighting product sales significantly. This conclusion was supported by the fact that distributors in the PG&E area indicated that they had started stocking efficient lighting products about two years sooner than their counterparts in the low-DSM states.

The narrowing of the differences between sales in the PG&E and Low-DSM areas in 1998 were not fully explained. Possible explanations included the following:

- Sales of efficient lighting products could be reaching a stable saturation level. For three products we considered, efficient types represented about 70% of sales of that product.

- The significant reductions in the Program scope in 1998 could be reducing the incremental effect of the Program. PG&E contractor and distributor comments supported this conjecture.
- There may be more programs underway outside of California to promote sales of efficient lighting products and the PG&E (and other California) programs could be having spillover effects outside the region.

As noted, we were unable to identify the effect of each of these possible causes. Nevertheless, the evidence supported the hypothesis that the Express Efficiency Program, *in combination with the Retrofit Express Program*, had increased the supply and sales of efficient lighting products.

We had no cost data that would have allowed us to test whether efficient lighting product prices had declined as an indirect effect of the Program.

Data for VSDs tended to confirm that the supply and sales were higher in the PG&E area than in the low-DSM states. The average number of VSDs installed by PG&E-area contractors was small, but it was 25 times larger than in the comparison area.

Our findings are summarized in Table 7-8.

Table 7-8
Summary of Findings Associated with Downstream Program Hypothesis H17

Element	**Description**
Hypothesis	Supply-Side Actors Increase Supply and Lower Costs of Efficient Products (H17)
Indicators	• Increased availability of efficient products • Reduced prices of efficient products
Key Sources	• Lighting contractor and distributor interviews • HVAC contractor and distributor interviews
Extent of Evidence	**Moderate** The interviews provided data on the availability and supply of some of the efficient products covered by the downstream Program and trends. There was no information available on the prices of the products..
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** Sales and installations of efficient lighting and VSDs reported by suppliers in the PG&E area were substantially higher than in the low-DSM states area. The difference was especially significant for VSDs.
Related Issues	The observed differences for lighting products were probably due in part to the Retrofit Express Program. For lighting products, the differences between the PG&E and Low-DSM areas appeared to be lessening and this could be attributable to several possible reasons, including the scaling back of the Program in 1998.

7.3.5 Supplier (H2) and Program Marketing Increase Customer Awareness/Knowledge and Lower Information Costs (H3, H4)

To assess this hypothesis, we examined responses to several of the customer survey questions.

First, we considered whether Program customers were receiving more information on efficient products. On a 10-point scale, we asked respondents to rate how frequently they heard about energy-efficiency investments from professionals. The average was higher for Program participants than PG&E non-participants, and this value was higher than for low-DSM state customers. This was consistent with the hypothesis that participants were receiving more information from suppliers than were non-participants. In addition, the results suggested that efficiency information was being provided to PG&E area non-participating customers more often than it was to customers outside the region.[4]

Second, we examined how knowledgeable customers felt they were about what efficiency products were available and how they performed. On a 10-point scale, the average score for participants was a full point higher than for low-DSM state respondents and a half point higher than for PG&E non-participants. The differences between the groups were all statistically significant.[5] This was consistent with the hypothesis that the Program had increased customer awareness/knowledge and it suggested that the Program and the preceding Retrofit Express Program had improved the awareness/knowledge of even non-participating customers.

A related conjecture was that more knowledgeable customers would have higher estimates of how much electricity bill savings they could achieve cost-effectively by making efficiency improvements. We compared the responses to a survey question about this topic and found, however, that there was essentially no difference across the three customer groups. The average response for each group was about 25% and the differences were not statistically significant.

Another test of how knowledgeable *and realistic* customer views on energy efficiency were was based on their self-reported lighting equipment efficiency compared with the equipment that they said they had installed recently. We compared customers' assessment of the efficiency of their lighting with their responses indicating whether they had installed T8 lamps. Of those who considered their lighting to be high efficiency, nearly three fourths of the participants had installed T8 lamps, but only about one third of the customers had in the other two groups. In other words, non-participants appeared to be overstating the efficiency of their lighting.

To examine information costs directly, we compared customer responses to a question about the time and hassle required to get information about efficiency measures. On a 10-point scale the differential between participants and non-participants was about 0.5 points. This difference was

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[4] The difference between the ratings for participants and low-DSM state customers was statistically significant ($p<0.01$ with a one-tailed test). The differences between PG&E non-participants and low-DSM states respondents and between participants and PG&E non-participants were marginally statistically significant ($p<0.07$).

[5] The differences were significant at the 0.025 level and lower.

statistically significant ($p<0.04$). The averages for PG&E non-participants and low-DSM state respondents were essentially the same, suggesting that the Program impacted the information costs for participants but had little effect on PG&E non-participants. The results for a question about the time and hassle involved to select a qualified energy-efficiency contractor were very similar. The difference between the average score for participants and all non-participants was 0.7 points and the differences were statistically significant ($p<0.007$). The results for PG&E non-participants and low-DSM state respondents were essentially the same.

Another important issue was the effectiveness of the Program for increasing the awareness/knowledge of smaller customers. The lighting contractor interviews provided useful, tangential information that the Program had been effective with smaller customers. Contractors indicated that smaller customers lagged behind less in adopting T8s and CFLs in the PG&E territory. Overall, 24% of contractors in the PG&E area felt that smaller customers did not lag behind in their adoption of these measures compared with only 10% of the Low-DSM contractors. Although these data were more directly related to adoption rates, they suggested that smaller customers in the PG&E area were probably more aware of the efficiency measures as well.

We were not able to differentiate the effects of information communicated by suppliers and peers from effects of information provided directly by the Program. Table 7-9 summarizes our findings.

Table 7-9
Summary of Findings Associated with Downstream Program Hypotheses H3 and H4

Element	Description
Hypothesis	Program Has Led to Increased Customer Awareness/Knowledge and Lower Information Costs (H3, H4)
Indicators	• Increased availability of efficiency information from suppliers • Increased confidence in supplier efficiency information • Increased knowledge and awareness/knowledge of efficiency measures • Increased understanding of potential energy/utility bill savings • Reduced information barriers • Increased realism of assessment of energy efficiency and potential for improvements
Key Sources	• Customer surveys
Extent of Evidence	**Moderate** Several customer survey questions addressed related issues and provided reliable data.
Overall Strength of Evidence in Supporting Hypothesis	**Strong** Program participants were significantly more likely to have received information about efficient products than non-participants. Participants indicated that they were significantly more knowledgeable about what efficient products were available and how they performed. Participants appeared to be considerably more realistic than non-participants in their assessment of how efficient their lighting was; non-participants appeared to overstate the efficiency of their equipment substantially. On the other hand, both participants and non-participants had similar estimates of the potential savings that could be achieved with cost-effective efficiency improvements. The Program appeared to reduce the effort and costs required to obtain efficiency information by a significant amount. We were not able to differentiate the effects of information communicated by suppliers and peers from effects of information provided directly by the Program.
Related Issues	There appeared to be some increase of information available to PG&E non-participants and a higher level of knowledge, possibly as a result of the Program. Some of the observed effects were probably due to the Retrofit Express Program.

7.3.6 Program Increases Customer Use of Long-Term Investment Analyses or Criteria (H5)

To assess how much effect the Program had on the use of long-term investment analyses and criteria, we asked participants to rate the effect of the Program on their long-term investment analysis for efficiency measures. The average response was 6.5 on a 10-point scale, indicating that the Program on the average had had some effect on the use of long-term analyses.

When respondents were asked whether they routinely applied long-term investment analysis to energy equipment, the results were consistent. Nearly 50% of the participants said that they did, while only 35% Low-DSM respondents responded affirmatively. Within the PG&E area, the difference was less pronounced: only about three percentage points fewer non-participating

PG&E customers used such analyses. Consequently, it appeared that PG&E customers were generally more likely to use such analyses, but the Program increased the usage a small amount. The cumulative effects of the Retrofit Express Program could have been responsible for some of the differential between Low-DSM respondents and PG&E customers who had not participated in the Express Efficiency Program.

Table 7-10 summarizes the results.

Table 7-10
Summary of Findings Associated with Downstream Program Hypothesis H5

Element	Description
Hypothesis	Program Increased Customer Use of Long-Term Investment Analyses or Criteria (H5)
Indicators	• Increased use of long-term investment analyses/criteria
Key Sources	• Customer surveys
Extent of Evidence	**Moderate** All respondents were asked about their use of long-term analyses/criteria. Program participants were asked specifically about the effect of the Program.
Overall Strength of Evidence in Supporting Hypothesis	**Limited** PG&E area customers were much more likely to use long-term analyses than low-DSM state customers, but the difference between PG&E participants and non-participants was small. Participants rated the effect of the Program on their use of such techniques as moderate.
Related Issues	The Retrofit Express Program probably contributed to the wider reported usage of long-term analyses/criteria in the PG&E area.

7.3.7 Participants View Program Promotion/Marketing as Objective (H6)

We did not ask customers to rate the trustworthiness of the information provided by the Program. We assessed this hypothesis indirectly by considering other indicators.

As noted earlier, participants rated their knowledge of efficiency measures and their performance considerably higher than non-participants. This suggested that the information provided by the Program was felt to be reliable. This was reinforced by the results when we asked respondents about the ease of understanding energy-efficiency measures. On a 10-point scale, the difference between the average rating for participants and Low-DSM respondents was a full point. The difference was statistically significant ($p<<0.005$). Although there was a 0.3 point difference between PG&E participants and non-participants, this difference was not statistically significant. The difference between PG&E-area non-participants and Low-DSM customers was less than between participants and Low-DSM customers but was statistically significant, suggesting that the Program had indirect effects on non-participating customers.

Table 7-11 summarizes our findings.

Table 7-11
Summary of Findings Associated with Downstream Program Hypothesis H6

Element	**Description**
Hypothesis	Participants View Program Promotion/Marketing as Objective (H6)
Indicators	• Customers consider Program information to be trustworthy • Program information provides increased confidence in performance of efficiency measures
Key Sources	• Customer surveys
Extent of Evidence	**Limited** We did not obtain information specifically on how objective or trustworthy customers felt the Program information was. Customer ratings of the ease of understanding efficiency measures and their knowledge provided indirect measures.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** Participants rated the ease of understanding efficiency measures and their knowledge of such measures significantly higher than did out-of state customers. PG&E participants, however, provided ratings only marginally higher than PG&E non-participants.
Related Issues	The Retrofit Express Program probably accounted for much of the observed difference.

7.3.8 Rebates Increase Customer Confidence in Measures (H7)

A rebate can be perceived as a “stamp of approval” that a measure will perform as expected. We examined whether the Program rebate increased participants’ confidence in measures through a specific survey question.

When asked directly how important the rebate was in convincing participants that the measures would perform as described, participants gave an average rating of 6.83 on a 10-point scale. About half the participants gave ratings between 8 and 10. Consequently, it appeared that the rebate was perceived generally as an important indicator that the measure would perform as anticipated.

Our findings are summarized in Table 7-12.

Table 7-12
Summary of Findings Associated with Downstream Program Hypothesis H7

Element	Description
Hypothesis	Rebates Increase Customer Confidence in Measures (H7)
Indicators	• Availability of rebate provides increased confidence in measure performance
Key Sources	• Customer surveys, Program participants
Extent of Evidence	**Limited** A single survey question provided a rating of the role of rebates.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** The average response of participants indicated that rebates played a moderate role in convincing customers that measures would perform as desired. About half of the respondents rated the role of rebates as high.
Related Issues	None

7.3.9 Rebates Reduce Need for Financing (H8) and Cost Barrier for Lessees (H9)

A rebate obviously lowers the first cost of a measure, but if the measure is cost-effective from a life-cycle perspective then lack of information, a longer term financial perspective, and financing would be the critical barriers. In our assessment of this hypothesis, we investigated the effect of the rebate on financing and the special needs of customers who leased their space.

When asked how important the Program rebate was in helping customers overcome any initial cost barriers, the average rating by participants was 7.6 on a 10-point scale. Sixty-three percent of participants gave it a rating of 8 or higher. Clearly, the rebate played a significant role in reducing first-cost barriers.

To assess the effect of the Program rebate on the lack-of-financing barrier, we compared responses to a question about how significant lack of financing was as a barrier to energy-efficiency investments. Program participants did give it a lower rating on a 10-point scale, indicating that they felt it was a less significant barrier. The differences among the customer groups were relatively small, however, and none were statistically significant.

We anticipated that first cost and lack of financing were more significant barriers for customers who leased their space than those who owned it because lessees would be less likely to reap the benefits in the long term. However, when we compared the responses of these two customer groups we found little supporting evidence for this hypothesis. There was not a statistically significant difference between the importance that participating owners and lessees attributed to the rebate in terms of overcoming initial cost barriers.

Table 7-13 summarizes the findings for these hypotheses.

Table 7-13
Summary of Findings Associated with Downstream Program Hypotheses H8 and H9

Element	Description
Hypothesis	Rebates Reduce Need for Financing (H8) and Cost Barrier for Lessees (H9)
Indicators	• Reduced effect of first-cost barrier • Increased availability of funding for efficiency measures • Reduced effect of measure cost on lessee efficiency investments
Key Sources	• Customer surveys
Extent of Evidence	**Moderate** The survey obtained specific information about financing barriers and the results could be examined for participants/non-participants and lessees/owners separately. Self-reported barriers focused on first cost more than related issues.
Overall Strength of Evidence in Supporting Hypothesis	**Weak** There was little evidence that the rebates changed perceptions about financing as a barrier. There was no significant evidence that lessees found the rebate more useful than owners.
Related Issues	None

7.3.10 Program Effects Lead to Increased Short-Term Measure Adoption (H10)

For the participants, an outcome obviously expected from the Program was increased adoption of efficiency measures in the short term. We investigated several pieces of information to assess the effect of the Program on measure adoption.

We compiled the count of distinct measure types that each respondent said they had installed either under an efficiency program or on their own. Seven measure types, such as T8 lamps, CFLs, or VSDs, were included. Overall, the average number of different types of measures installed by respondents in both the PG&E-area and low-DSM states was just below one. On the other hand, Program participants installed an average of 2.1 of the 7 types of measures considered.

In addition to a larger number of measure types, Program participants installed a larger number of units of each type. For example, Program participants installed T8 lamps in an average of 356 fixtures under the Program. In addition, those who installed T8s outside of the Program installed T8s in an average of 162 additional fixtures. PG&E area non-participants that installed T8 lamps installed them in 98 fixtures on the average. Outside the territory, those customers who installed T8s said that they installed them in 172 fixtures on the average.

The supply-side interviews reinforced these observations. When asked what share of their downlight or sconce units sold had CFLs in 1998, 63% of contractors in the PG&E area said they did, compared with only 56% for Low-DSM contractors. Similarly, 60% of the PG&E area contractors indicated that installations of VSDs had increased in the past three years, whereas 50% of the low-DSM state contractors said that installations had increased. The most significant difference was observed for the use of electronic ballasts in fluorescent light fixtures: PG&E-area contractors said that on the average 78% of their linear fluorescent ballast sales were electronic units compared with only 64% outside the territory.

Although there was strong evidence that the Program induced significant increases in the number and types of measures implemented by participants, other results suggested that the Program was responsible only partially for the higher rate of adoptions. We asked participants if they would have made the changes *without* the Program and slightly over half the participants said that they would have.[6] One fourth of the respondents said that they would have made the changes, but at a later date. Only one fourth said that they would not have made the changes without the Program.

Another important issue was whether the Program had been effective at increasing demand for smaller customers. As noted earlier, the lighting contractor interviews suggested that smaller customers lagged behind less in adopting T8 and CFLs in the PG&E territory (67%) than in the Low-DSM region (90%). These results were consistent with the conjecture that the Program had increased smaller customer demand, although once again some of the effect was probably attributable to the Retrofit Express Program.

In addition, most of the supplier data showed that the differences between sales percentages of efficient equipment in the PG&E and Low-DSM areas were larger in 1996 than in 1998. These results suggested that the Retrofit Express Program had achieved significant effects in prior years, and that the market shares of efficient products covered by the downstream Program had increased in general.

We present a summary of the findings in Table 7-14.

[6] These results were based on a composite of the responses across all measures installed so they represented an average value across all the measures.

Table 7-14
Summary of Findings Associated with Downstream Program Hypothesis H10

Element	Description
Hypothesis	Program Effects Lead to Increased Short-Term Measure Adoption (H10)
Indicators	• Increased adoption of single and multiple efficiency measures in short term
Key Sources	• Customer surveys • HVAC contractor interviews
Extent of Evidence	**Extensive** Both customer surveys and supplier interviews provided data on the adoption of measures under the downstream Program.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** The customer surveys showed that participants adopted more different types of measures and implemented more installations of individual measures than PG&E non-participants and Low-DSM customers. The HVAC contractor interviews confirmed that electronic ballasts, CFLs, and VSDs were installed more frequently in the PG&E area than outside it. Lighting contractor data suggested that adoption of efficient lighting equipment by smaller customers was higher in the Program area than the Low-DSM area. Participant customer responses about whether they would have installed the measures without the Program, however, suggested that most would have and the general market trend was toward increased sales of efficient products.
Related Issues	This was an overall outcome expected from the Program. We were unable, however, to differentiate the direct and indirect (through the postulated cause-effect relationships) effects of the Program in increasing measure penetration. The Retrofit Express Program may have influenced these results, although the participant/non-participant comparison suggested that installations were considerably higher for participants and probably attributable to the Express Efficiency Program. The contractor observations suggested that the Program had produced positive effects for smaller customers.

7.3.11 Customers Have Positive Experiences with Adopted Measures (H12)

A hypothesis that would link near-term Program effects to long-term market changes was that customers would experience the expected benefits of the efficiency measures that they installed. We relied on several customer survey responses to address this hypothesis.

We asked all respondents who had installed efficiency measures to rate their satisfaction with the energy savings and general performance. For all three groups, the average rating over all the measures implemented was greater than 7 on a 10-point scale, indicating a high level of satisfaction. Interestingly, the satisfaction rating for Program participants was nearly a full point higher than for non-participants and the difference was statistically significant ($p<0.005$). This suggested that some characteristics of the Program added to the satisfaction of the measure adopters.

We also asked whether the adopted measures had increased the customer's confidence that efficiency investments would reduce energy bills. Overall, installing efficiency measures either increased or had no effect on most customers' confidence in their energy savings effects. Forty-eight percent of both the PG&E-area non-participants and Low-DSM respondents said that the measures had increased their confidence. Only 12% said that they had decreased their confidence. For Program participants, the share that said the measures increased their confidence was much higher—75%. Consistent with the satisfaction results, these data suggested that the Program had additional positive effects on customers' perceptions about the benefits of efficiency measures.

Another source of data was responses to the question about whether customers believed in general that efficiency investments would significantly reduce energy bills. This question aimed at a more general and fundamental belief in the effects of efficiency measures. Not surprisingly, the differences between customer groups were less, but they followed the same pattern. On a 10-point scale, the average ratings all exceeded 7.7. The average response of participants indicated a higher level of agreement with the proposition. The average participant response was higher than the average for the other two groups at a statistically significant level; the average responses for PG&E-area and low-DSM state customers were essentially the same.

To try to separate the Program effects from the effects due to just implementing the measures, we looked closer at the responses to the question discussed above. For respondents outside of California we found a significant difference in these ratings for adopters and non-adopters: implementing measures increased the overall score by 0.8 points and the difference was statistically significant ($p<0.005$). The difference between non-participating PG&E adopters and non-adopters, however, was not statistically significant.

Our findings are summarized in Table 7-15.

Table 7-15
Summary of Findings Associated with Downstream Program Hypothesis H12

Element	Description
Hypothesis	Customers Have Positive Experiences with Adopted Measures (H12)
Indicators	• Increased satisfaction with performance of efficient measures • Increased other benefits of efficiency measures
Key Sources	• Customer surveys
Extent of Evidence	**Extensive** Several survey questions addressed related issues. Responses for adopters and non-adopters also allowed examining the effects of the measures separately from the Program effects.
Overall Strength of Evidence in Supporting Hypothesis	**Strong** On the average, measure adopters were very satisfied with the performance of the measures overall. Experience with efficiency measures generally increased customer confidence in the performance of the measures. In all cases, Program participation appeared to increase positive perceptions beyond those due to just having experience with the measures.
Related Issues	Although Low-DSM adopters rated their belief that efficiency measures would produce significant energy savings higher than Low-DSM non-adopters, there was not a similar difference between the two groups of PG&E-area non-participants.

7.3.12 Customers Communicate to Peers (H14) and Suppliers (H15) About Efficiency Measures

We had limited information to assess whether customers who adopted efficiency measures informed others about the measures. We examined the responses to a customer survey question about whether the customers actively advocated energy-efficiency investments to others.

We examined the results for only respondents who indicated that they had adopted one or more of the measures targeted in the survey. On a 10-point scale, the average rating for Program participants was 7.0, which indicated that participating customers generally communicated to others about the benefits of efficiency measures. The average for out-of-territory customers who had adopted measures was 5.9, which indicated that on the average they advocated the measures to others, but to a lesser degree than the Program participants. The two values differed at a statistically significant level. We also compared these values with those for PG&E-area non-participants. The area non-participants' average rating was 6.9, only 0.1 points less than the Program participants. This suggested that they also advocated efficiency measures to others and to a degree similar to that for the participants.

These results supported the hypothesis and also suggested that customers in the PG&E area were more likely to communicate to others about efficiency measures. Some of the difference appeared to be attributable to the Express Efficiency Program, but it was likely that much of the difference was due to the preceding program and possibly other prior activities in the PG&E territory.

The findings are summarized in Table 7-16.

Table 7-16
Summary of Findings Associated with Downstream Program Hypotheses H14 and H15

Element	Description
Hypothesis	Customers Communicate to Peers (H14) and Suppliers (H15) about Efficiency Measures
Indicators	• Increased communication to peers about positive aspects of efficiency measures • Increased customer feedback to suppliers about interest in efficiency measures
Key Sources	• Customer surveys
Extent of Evidence	**Moderate** One survey question asked specifically about customer advocacy of efficiency measures to others. The question did not differentiate between communications to other customers and suppliers.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** The results showed significant differences between PG&E customers and low-DSM state customers. The difference between PG&E participants and non-participants, however, was negligible.
Related Issues	The Retrofit Express Program was probably responsible in part for the high level of communications by customers.

7.3.13 Long-Term Customer Demand Increases (H16)

Although too little time has elapsed to assess the long-term demand effects of the Express Efficiency Program, customer intentions can provide some insights. In addition, the downstream portion of this Program has benefited from the Retrofit Express Program and we anticipated some effects beyond Express Efficiency Program participants.

We compared customer responses to a question about their likelihood of selecting efficiency measures in the future as a result of their experiences with efficiency measures thus far. Eighty-three percent (83%) of customers in the low-DSM states who had adopted measures said they were either somewhat or very much more likely to adopt such measures in the future. In the PG&E territory, 86.3% of non-participants and 86.9% of participants said they were somewhat or very much more likely to adopt in the future. Thus it appeared that overall future demand was likely to be high, and slightly higher in the PG&E area, possibly in part as a result of past programs.

We also asked all customers a more general question about their intentions to pursue efficiency investments. On a 10-point scale, the average rating for low-DSM state respondents was 6.8.

The average for PG&E non-participants was 7.1, which was not a statistically significant ($p<0.11$) difference from the value for Low-DSM respondents. The value for participants, however, was 8.0 which was significantly different from the values for the other two groups. These results suggested strongly that experience with efficiency measures combined with Program participation produced a significant increase in intentions to adopt measures in the future.

Table 7-17 summarizes our findings for this hypothesis.

Table 7-17
Summary of Findings Associated with Downstream Program Hypothesis H16

Element	Description
Hypothesis	Long-Term Customer Demand Increases (H16)
Indicators	• Increased and sustained long-term demand for efficiency measures
Key Sources	• Customer surveys
Extent of Evidence	**Limited** Two questions associated with future intentions were included. Since the questions addressed intentions, the responses did not represent actual behavior. The data permitted a partial separation of adoption effects from Program effects.
Overall Strength of Evidence in Supporting Hypothesis	**Limited** Over 80% of adopters indicated that they were at least somewhat more likely to adopt such measures in the future. Program participation appeared to increase the likelihood of future implementation by a significant amount. Whether intentions will translate into future behavior, however , was undetermined.
Related Issues	None

7.3.14 Sustainable Market for Efficient Products/Measures is Established (H17)

As suggested earlier, it was too early to determine whether the Express Efficiency Program would lead to a sustainable market for efficiency measures. The prior results, however, have suggested that many of the elements are in place to provide the foundation for a long-term market. For many of the measures in the downstream component of the Program (such as T8s), it appeared likely that previous programs helped establish a foundation for long-term transformation of the market. For CFLs, 75% of both the contractors and distributors interviewed indicated that their specification practices would not change if the Program were eliminated and virtually all said that they regularly specified CFLs. For less widely adopted measures, such as VSDs, it was too early to tell how much progress had been made toward establishing a viable market.

Our findings are summarized in Table 7-18.

Table 7-18
Summary of Findings Associated with Downstream Program Hypothesis H17

Element	Description
Hypothesis	Sustainable Market for Efficient Products/Measures is Established (H17)
Indicators	• Established market for increased sales of efficient products
Key Sources	• Customer surveys • Supply-side interviews • Previous evidence for other hypotheses
Extent of Evidence	**Moderate** Evidence for other hypotheses provides several indicators of market changes.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** The evidence presented for the other hypotheses indicated that several of the mechanisms identified with the Program theory have been at least partially established. Contractors and distributors indicated that they would continue to specify CFLs even without the Program. Countervailing evidence was suggested by the diminished Program participation rate in 1998 when the Program scope was scaled back from its levels under the Retrofit Express Program.
Related Issues	The Retrofit Express Program undoubtedly contributed to several of the effects observed and cannot be distinguished from the effects of the Express Efficiency Program alone.

7.4 UPSTREAM HVAC PROGRAM

This subsection presents detailed findings about the upstream portion of the Express Efficiency Program, specifically the high-efficiency packaged A/C element. It discusses findings regarding each of the hypotheses proposed earlier. Because the upstream component is aimed primarily at supply-side actors, we draw mostly upon the contractor and distributor interview data.

7.4.1 Program Promotion to Suppliers Increases Supplier Awareness/Knowledge of Energy Efficiency and Lowers Information Costs (H1) and Reduces Product Performance Uncertainty (H2)

One indicator of Program effects was familiarity with the Program. We found that a relatively small share of the contractors were familiar with the upstream Program—approximately one-third of the small contractors and one-fourth of the large contractors. This was not too surprising, however, because the Express Efficiency Program for packaged A/Cs targeted distributors and had been in effect for only one year.

Despite their limited awareness of the Program, all PG&E-area contractors interviewed were aware of the availability of the high-efficiency units covered by the Program. Similarly, in the low-DSM states, all but one of the 19 contractors interviewed were aware of the high efficiency units. Thus, it appeared that the Program could have had little effect on increasing contractor awareness. When asked to rate the effects of the Program, contractors indicated that it had had only a moderate effect on their awareness (2.2 on a 5-point scale) about energy-efficient A/Cs, their access to information, or their confidence in the quality and performance of efficient A/Cs.

The PG&E-area distributors generally had positive responses to the Program and some felt that it provided a simpler approach for customers. Over half said that they had received a Program rebate for their units. Smaller distributors were less likely to have participated in the Program—32% of the smaller distributors said that their high efficiency units had received a rebate, but 65% of the larger distributors said their units were covered by a rebate. less hassle for end users as they are not required to fill out forms like in previous program.

Our findings are summarized in Table 7-19.

Table 7-19
Summary of Findings Associated with Upstream Program Hypotheses H1 and H2

Element	Description
Hypothesis	Program Promotion Increases Supplier Awareness/Knowledge of Energy Efficiency and Lowers Information Costs (H1) and Reduces Product Performance Uncertainty (H2)
Indicators	• Increased awareness/knowledge of efficiency products • Reduced costs of getting information on efficiency products • Increased confidence in efficiency product performance
Key Sources	• HVAC contractor and distributor interviews
Extent of Evidence	**Limited** Limited information was obtained from contractors. Distributors provided information on Program participation primarily.
Overall Strength of Evidence in Supporting Hypothesis	**Limited for Distributors/Weak for Contractors** PG&E distributors were all aware of the Program, but a relatively small proportion of contractors were. Contractors were almost all aware of high-efficiency packaged A/Cs in and out of the PG&E territory. PG&E-area contractors said that the Program had little effect on their awareness, information access, or confidence in product performance.
Related Issues	None

7.4.2 Rebates Reduce Supplier Costs (H3)

The Program obviously reduced high efficiency packaged A/C costs to distributors. Contractors, however, rated the Program as only fairly effective in reducing their costs. On a 5-point scale, they gave the Program an average rating of 3.0 in terms of its effect on wholesale costs; many felt that the rebate was not being passed along. Despite the existence of the rebate, most contractors rated the higher cost of efficient units as the main barrier; however, the share rating higher costs as the main barrier rating was about one-third lower in the PG&E area than in the low-DSM states area. Some distributors argued that the rebate was problematic because contractors who were aware of it expected that the distributors would pass it along through the wholesale price.

Table 7-20 summarizes our findings about this hypothesis.

Table 7-20
Summary of Findings Associated with Upstream Program Hypothesis H3

Element	Description
Hypothesis	Rebates Reduce Supplier Costs (H3)
Indicators	• Reduced costs of efficient products throughout supply chain
Key Sources	• Contractor and distributor interviews
Extent of Evidence	**Limited** Observations were based on self-reported evidence from contractors and distributors, without any empirical data.
Overall Strength of Evidence in Supporting Hypothesis	**Limited** The distributors benefited from the rebate in offsetting higher costs, but whether most passed along the savings through the supply chain was unclear. The contractor interviews suggested that the rebates were not passed along consistently. Furthermore, a substantial proportion of contractors was not aware of the rebates so might not have even known if they received the benefits of the rebates.
Related Issues	None

7.4.3 Initial Program Effects (H1, H2, H3) Lead to Increased Supplier Stocking (H4)

The Program did appear to be effective at increasing the stocking of high-efficiency units by distributors. Half the PG&E-area distributors said that their stocking of high-efficiency units had increased at least somewhat during the past three years, whereas only half of the Low-DSM distributors gave the same response. For the smallest units, all PG&E-area distributors said that they stocked the high-efficiency units, but only 27% of Low-DSM distributors said that they did. The shares declined with the size of the unit. For the largest units, only 30% of PG&E-area distributors said that they stocked qualifying units. However, this share was three times what it was for the low-DSM state distributors. The less frequent stocking of the large, high-efficiency units was due to a number of factors that reflected the market for the large units.

The increased stocking of the high-efficiency units by distributors, however, was due only partially to the Express Efficiency Program. On the average, the PG&E-area distributors had started stocking them in 1995 or 1996, two or three years before the upstream Program began. The Program, however, was probably responsible for the large share of distributors stocking the units because all said that their stocking had increased since 1996, whereas half the Low-DSM distributors said they had not changed their stocking the past three years.

The findings for this hypothesis are summarized in Table 7-21.

Table 7-21
Summary of Findings Associated with Upstream Program Hypothesis H4

Element	Description
Hypothesis	Initial Program Effects (H1, H2, H3) Lead to Increased Supplier Stocking (H4)
Indicators	• Increased distributor stocking of efficient products • Increased vendor/contractor stocking of efficient products
Key Sources	• Contractor and distributor interviews
Extent of Evidence	**Moderate** Distributor survey addressed stocking practices.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** The distributor responses indicated that PG&E-area distributors were considerably more likely to stock high-efficiency packaged A/Cs than Low-DSM distributors. The trends in stocking practices appeared to have been due at least partially to the Express Efficiency Program.
Related Issues	The Retrofit Express Program might have contributed to increased stocking practices, but by an unknown amount.

7.4.4 Program Effects (H1-H4) and Increased Customer Demand (H9) Lead to Increased Contractor Short-Term Demand (H5) and Installation (H7)

Contractors indicated that the percentage of high-efficiency A/Cs they installed were much higher in the PG&E area than in the low-DSM state area for medium sized units (6 to 20 tons). About 35% of the units installed by PG&E-area contractors were high efficiency, whereas only about 5% of the units installed by Low-DSM contractors were. Both contractors and distributors affirmed indirectly that the Program had increased market demand for high-efficiency packaged A/Cs. When asked what they thought would happen in the absence of rebates, 71% of contractors and 80% of distributors said that sales and installations would decline.

Related evidence supporting this hypothesis was provided by contractor and distributor perceptions of the difficulty of selling high-efficiency packaged A/Cs. Only 16% of PG&E-area contractors said that it was much more difficult to sell high efficiency units, compared with 25% of contractors in the low-DSM states. None of the PG&E-area distributors said it was much more difficult, whereas 30% of the low-DSM state distributors said that it was.

Table 7-22 summarizes the findings for this hypothesis.

Table 7-22
Summary of Findings Associated with Upstream Program Hypotheses H5 and H7

Element	Description
Hypothesis	Program Direct and Indirect Effects Lead to Increased Contractor Short-Term Demand (H5) and Installation (H7)
Indicators	• Increased vendor/contractor demand for efficient products • Increased installations of high-efficiency products
Key Sources	• Contractor and distributor interviews
Extent of Evidence	**Moderate** Evidence was based on shares of high-efficiency units sold and expectations about what would happen in the absence of the Program. Information did not differentiate between direct and indirect Program effects.
Overall Strength of Evidence in Supporting Hypothesis	**Strong** The evidence indicated that the shares of high-efficiency units installed by PG&E-area contractors were much higher than installed by Low-DSM contractors and eliminating the Program would very likely reduce demand and installation of high-efficiency packaged A/Cs.
Related Issues	These results suggested that the Program had not yet accomplished fundamental market changes in terms of contractor demand for and installation of high efficiency A/Cs that would be sustained in the absence of Program rebates and information.

7.4.5 Program Effects (H1-H3 and H5) Lead to Increased Vendor/Contractor Promotion (H6)

There was significant evidence the Program had increased promotion of high-efficiency units. In the PG&E territory, 78% of contractors said that they promoted high-efficiency units, compared with only 47% in low-DSM states. PG&E-area contractors were nearly twice as likely to specify high-efficiency units than their Low-DSM counterparts. The difference was even more striking for distributors—all the PG&E-area distributors said that they promoted high-efficiency units, whereas less than half the Low-DSM distributors said that they did.

The differences between supply-side actors in the PG&E and other areas appeared to be linked indirectly to the Program. Contractors who responded that they promoted high-efficiency units often said they did so because the units were better products or energy efficiency is "the right thing" to promote and many felt that they were now more knowledgeable about the products. Presumably, these perceptions were due partly to the Program. PG&E-area distributors who said they were recommending "more" high-efficiency units now than three years ago stated that they were doing so because the rebates had made the cost difference between high-efficiency and standard units negligible and engineers and contractors were demanding them more often these days. They stated that the most important reason was that the manufacturers they represented now offered these high-efficiency models.

The findings for this hypothesis are summarized in Table 7-23.

Table 7-23
Summary of Findings Associated with Upstream Program Hypothesis H6

Element	**Description**
Hypothesis	Program Effects (H1-H3 and H5) Lead to Increased Vendor/Contractor Promotion (H6)
Indicators	• Increased marketing and promotion of efficient products to customers
Key Sources	• Contractor and distributor interviews
Extent of Evidence	**Extensive** Interviews provided direct information on whether contractors or distributors promoted efficient A/C units. The interviews provided less information on the motivations of suppliers, however, and the role of the Program.
Overall Strength of Evidence in Supporting Hypothesis	**Strong** Both PG&E contractors and distributors indicated that they promoted high-efficiency packaged A/Cs significantly more than their low-DSM states counterparts. The differences were more significant for the distributors.
Related Issues	The Retrofit Express Program may have contributed to some of the observed differences due to increased contractor and distributor awareness and more favorable attitudes toward efficient equipment in general.

7.4.6 Increased Sales/Installations (H7) Lead to Increased Vendor/Contractor Benefits from Selling/Installing Efficient Products (H10)

There was also evidence that contractors in the PG&E area benefited from the sale of high-efficiency units. In the PG&E area, 71% of the contractors said that it was at least somewhat important competitively for them to sell high-efficiency units; in the Low-DSM area only 37% stated that it was at least somewhat important. Some of the contractors noted that the margins were better on these units and other responses suggested that contractors felt that promoting and selling these units was “the right thing to do.” Of the PG&E-area distributors, 60% indicated that their margins were higher on high-efficiency units compared with 33% of the distributors outside the region.

Table 7-24 summarizes the findings for this hypothesis.

Table 7-24
Summary of Findings Associated with Upstream Program Hypothesis H10

Element	Description
Hypothesis	Program Leads to Increased Vendor/Contractor Benefits from Selling/Installing Efficient Products (H10)
Indicators	• Increased profits • Improved customer relations
Key Sources	• Contractor interviews
Extent of Evidence	**Moderate** The contractor interviews provided information about the importance of selling high-efficiency packaged A/Cs, but there were few details on the nature of the benefits.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** PG&E-area contractors were almost twice as likely to say that it was at least somewhat important to sell high-efficiency units and some identified benefits from selling high-efficiency units that included higher margins and possibly improved customer relations. The distributors were much more likely to report economic benefits.
Related Issues	The results corroborated other observations suggesting that contractors benefited less from the economic effects of the rebates than did distributors.

7.4.7 Benefits (H10) and Customer Satisfaction (H13) Lead to Supplier Positive Communications to Peers (H11)

We did not obtain any direct information about suppliers communicating the benefits of high-efficiency units to others in their profession. Even though details were lacking, these findings are summarized in Table 7-25 for consistency with the other presentations.

Table 7-25
Summary of Findings Associated with Upstream Program Hypothesis H11

Element	Description
Hypothesis	Program Increases Supplier Positive Communications to Peers (H11)
Indicators	• Increased supply-side actor communications to other supply-side actors about benefits of high-efficiency products
Key Sources	• None
Extent of Evidence	**None**
Overall Strength of Evidence in Supporting Hypothesis	**Undetermined**
Related Issues	None.

7.4.8 Benefits (H10) and Supplier Communications (H11) Lead to Increased Supply and Lower Prices (H12)

This hypothesis addressed the longer-term effects of the upstream Program. Because the Program had been in place for only a year, however, there was little evidence of these longer term effects. Overall, about one fourth of the contractors and one fifth of the distributors believed that relative prices of high-efficiency units had declined during the past three years. As noted earlier, all PG&E-area distributors indicated that they had increased their stocking of high-efficiency units over the past three years as compared with half of the Low-DSM distributors.

Our findings for this hypothesis are summarized in Table 7-26.

Table 7-26
Summary of Findings Associated with Upstream Program Hypothesis H12

Element	Description
Hypothesis	Program Leads to Increased Supply and Lower Prices (H12)
Indicators	• Increased availability of efficient products • Reduced prices of efficient products
Key Sources	• Contractor and distributor interviews
Extent of Evidence	**Very Limited** Program was not in effect long enough to compile data on longer-term effects. Perceptions of price trends and distributor product stocking information were available.
Overall Strength of Evidence in Supporting Hypothesis	**Limited** The increased distributor stocking of high-efficiency units suggested supply had increased, but the cost trends showed no clear downward trend.
Related Issues	This was a long-term effect that was unlikely to be observable after only a single year.

7.4.9 Program Promotion to Customers Increases Customer Awareness/Knowledge (H8)

We had no direct data to test this hypothesis. In addition, Program promotions to customers were a relatively small element of the upstream Program. Over three-fourths of the PG&E-area contractors stated that they did promote high-efficiency packaged A/Cs. As noted earlier, customer awareness/knowledge appeared to increase as a result of the downstream Program so general awareness about efficiency was likely to be higher as a result of the Program.

The findings for this hypothesis are summarized in Table 7-27.

Table 7-27
Summary of Findings Associated with Upstream Program Hypothesis H8

Element	Description
Hypothesis	Program Promotion to Customers Increases Customer Awareness/Knowledge (H8)
Indicators	• Increased customer awareness of efficient products • Increased customer understanding of potential energy/utility bill savings
Key Sources	• Customer surveys • Contractor interviews
Extent of Evidence	**Very Limited** Awareness/knowledge about high-efficiency packaged A/Cs was not addressed in the customer surveys although general awareness was. Contractor interviews suggested that they did promote high-efficiency units in the PG&E area.
Overall Strength of Evidence in Supporting Hypothesis	**Undetermined**
Related Issues	None

7.4.10 Supplier Marketing (H6) and Increased Customer Awareness/Knowledge (H8) Lead to Increased Short-Term Demand (H9)

To assess this hypothesis, we examined the customer survey results. The surveys specifically asked about the installation of high-efficiency packaged A/Cs. For customers who said they participated in the Program, only about 6% said that they had installed high-efficiency A/Cs under the Program. Because customers were not targeted by the 1998 Program for packaged A/Cs, it was likely that many of the respondents who said they had installed high-efficiency units under the Program actually did so under the Retrofit Express Program.

We also asked customers if they installed high-efficiency units outside the Program. Nearly 20% of Program participants said that they had, compared with about 8% of the PG&E area non-participants. Surprisingly, 23% of the low-DSM state respondents said that they had installed high-efficiency A/Cs. These responses were questionable, however, for two reasons. First, the Program has specific definitions of “high efficiency,” which might exceed the levels commonly considered to be very efficient. Second, there might be a tendency for less knowledgeable customers to over-report the efficiency of their equipment. The earlier discussion of self-reported lighting equipment efficiencies provided evidence that the Low-DSM respondents did overstate the efficiency of their lighting equipment.

Table 7-28 summarizes our findings for this hypothesis.

Table 7-28
Summary of Findings Associated with Upstream Program Hypothesis H9

Element	Description
Hypothesis	Supplier Marketing (H6) and Increased Customer Awareness/Knowledge (H8) Lead to Increased Short-Term Demand (H9)
Indicators	• Increased customer demand for efficient products
Key Sources	• Customer surveys
Extent of Evidence	**Limited** The survey asked participants if they had installed high-efficiency A/Cs under the Program and outside of the Program. Because the Express Efficiency Program targeted distributors, it was questionable whether customers would know if their A/C was covered by the Program. In addition, low-DSM state customers were likely to overstate their installation of high-efficiency A/Cs.
Overall Strength of Evidence in Supporting Hypothesis	**Weak** The proportion of participating customers who reported that they had installed high-efficiency packaged A/Cs was only 6%, while 23% of Low-DSM customers reported that they had. The accuracy of both these results was doubtful. On the other hand, 20% of participants reported that installed high-efficiency A/Cs outside of the Program so there was some evidence that it had an effect on demand indirectly.
Related Issues	None

7.4.11 Customer Installation of Measures (H7) Leads to Positive Experiences and Recognition of Benefits (H13)

For customers who said that they had installed high-efficiency packaged A/Cs, most were very satisfied with the product. Across all three customer groups, over half of each group rated their satisfaction as being between 8 and 10 on a 10-point scale. There was no significant difference for respondents who indicated that they had participated in the Program.

Table 7-29 summarizes our findings for this hypothesis.

Table 7-29
Summary of Findings Associated with Upstream Program Hypothesis H13

Element	Description
Hypothesis	Customer Installation of Measures Leads to Positive Experiences and Recognition of Benefits (H13)
Indicators	• Increased satisfaction with performance of efficient measures • Increase in other benefits of efficiency measures
Key Sources	• Customer surveys
Extent of Evidence	**Limited** Customers who said that they had installed high-efficiency packaged A/Cs were asked about their level of satisfaction. The likelihood of inconsistent definitions of "high efficiency," however, raised doubts about the accuracy of these results.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** Adopting customers in all groups rated their satisfaction high. Factors that contributed to satisfaction were not identified.
Related Issues	None

7.4.12 Contractors/Vendors (H10) and Customers (H13) Communicate Benefits of Efficiency Measures to Other Customers (H14)

We also had little information to assess this hypothesis for packaged A/Cs. As noted earlier, however, there was general evidence that customers who adopted measures did inform others about their experiences. Section 7.4.5 also indicated that there was some evidence of increased contractor promotion as a result of the Program.

Table 7-30 summarizes our findings for this hypothesis.

Table 7-30
Summary of Findings Associated with Upstream Program Hypothesis H14

Element	**Description**
Hypothesis	All Market Actors Communicate Benefits of Efficiency Measures to Customers (H14)
Indicators	• Increased communication to other customers about positive aspects of efficiency measures
Key Sources	• Customer surveys • Contractor interviews
Extent of Evidence	**Limited** No specific information was available for customer communications about specific measures. Findings presented earlier indicated that customers advocated efficiency measures to others. Earlier results suggested that contractors had increased promotions of efficient products as a result of the Program.
Overall Strength of Evidence in Supporting Hypothesis	**Moderate** The evidence presented earlier showed moderate effects on customer and supplier communications.
Related Issues	None

7.4.13 Increased Communications (H13) and Customer Satisfaction (H14) Lead to Increased Long-Term Demand (H15)

This hypothesis addressed the long-term effects of the Program on customer demand. Given that our evaluation considered only the first year of the Program, it was not possible to identify long-term changes in market demand. Because the Program did not target customers, it was also difficult to determine if customers actually knew whether their A/C was a qualified unit. As noted earlier, 71% of contractors and 80% of distributors believed that sales and installations of high-efficiency packaged A/Cs would decline if the Program rebates ended, so they felt that fundamental market demand had not been changed permanently by the Program. Overall, it was not possible to obtain accurate information on customer intentions regarding future installations of packaged A/C equipment.

Our findings for this hypothesis are presented in Table 7-31.

Table 7-31
Summary of Findings Associated with Upstream Program Hypothesis H15

Element	Description
Hypothesis	Program Leads to Increased Long-Term Customer Demand (H15)
Indicators	• Increased demand by participating customers for other efficiency measures • Increased demand by other customers for efficiency measures
Key Sources	• None
Extent of Evidence	**Very Limited** Contractor and distributor data provided their perceptions about market demand in the absence of the Program rebate.
Overall Strength of Evidence in Supporting Hypothesis	**Weak** Contractors and distributors felt that customer demand for high-efficiency packaged A/Cs would drop substantially if the rebate ended.
Related Issues	Lack of customer awareness about the Program for packaged A/Cs might limit market demand and customer ability to assess benefits of efficient units.

7.4.14 Increased Supply and Lower Prices (H12) and Long-Term Demand (H15) Produce Sustainable Market (H16)

It was not possible to assess the long-term effects of the upstream component of the Program because it had been in existence only one year and data were unavailable to assess some of the key elements needed to establish a viable, long-term market. As noted throughout this subsection, there were several market mechanisms and conditions that appeared to be in place that would help establish a market for efficient packaged A/Cs, but the sustainability of this market could not be determined given the information available thus far.

These observations are summarized in Table 7-32.

Table 7-32
Summary of Findings Associated with Upstream Program Hypothesis H16

Element	**Description**
Hypothesis	Sustainable Market for Efficient Products/Measures is Established (H16)
Indicators	• Established market for increased sales of efficient products
Key Sources	• Customer surveys • Supply-side interviews • Previous evidence for other hypotheses
Extent of Evidence	**Very Limited** Evidence for other hypotheses provides several indicators of market changes, but evidence on key factors of sustainability was unavailable.
Overall Strength of Evidence in Supporting Hypothesis	**Limited** The evidence presented for the other hypotheses indicated that several of the market mechanisms identified with the Program theory have been established at least partially. Countervailing evidence was suggested by the diminished Program participation rate in 1998 when the Program scope was scaled back from its levels under the Retrofit Express Program.
Related Issues	The Retrofit Express Program undoubtedly contributed to several of the effects observed and cannot be distinguished from the effects of the Express Efficiency Program alone.

7.5 END USER MODELING RESULTS

We conducted modeling analyses that addressed several of the important issues suggested in the preceding subsections. We summarize these results here, with more details provided in Appendix B.

One important issue that affected our analysis was consideration of the influence that self-selection by Program participants may have had on the differences observed in some of the key variables used to identify Program and market effects. In particular, participants might have come into the Program with attitudes, awareness, knowledge, preferences, and firmographic characteristics that differed from non-participants. This study was not able to measure any of these pre-Program attitudes, awareness, knowledge, and preferences, i.e., all measures were cross-sectional and thus we were not able to control statistically for any pre-Program differences.

Because selection bias is always a potential threat when dealing with nonequivalent groups, we attempted in our regression models to control statistically for any *observed* differences. A regression model was estimated with the program and market effects variables as the dependent variables, group membership as the key independent variable, and other firmographic variables as covariates. However, there may be *unobserved* differences that could still affect the program and market effects variables. To attempt to control for any unobserved differences, an inverse Mills ratio was calculated and inserted into the regression model (see Appendix B for details regarding the Mills ratio). Although this variable helped control for unobserved differences, to the extent that we were not able to control fully for the observed and unobserved bias due to self-selection one must be cautious in attributing apparent effects completely to the Program.

In all, we selected 11 of the same relationships examined in the earlier downstream Program market effects discussion (see Section 7.3) for further analysis using this technique. The purpose was twofold: to attempt to control for possible self-selection bias and to provide additional evidence for assessing the market effects hypotheses. These analyses were based on customer survey responses to questions regarding market barriers, attitudes toward and knowledge of energy efficiency, diffusion of information, and organizational policies. In testing these relationships, three comparisons were made to examine immediate *program* effects and immediate *market* effects. Program effects represented the first link in the causal chain leading to broader market effects. If the evidence of the program effects was weak, then our expectations regarding the broader market effects would be reduced. Table 7-33 presents the three types of comparisons that we made and the objective of each in terms of measuring program or market effects.

Table 7-33
Comparisons Made and the Objective of Each

Comparison Made	Objective
Participants vs In-State Non-participants	To measure immediate/near-term *program* effects
Participants vs. Low-DSM Customers	To measure immediate/near-term *program* effects
In-State Non-participants vs. Low-DSM Customers	To measure immediate/near-term *market* effects

Table 7-34 summarizes the results of these analyses. The first column presents the question or statement that was posed to the respondents during the customer survey. For all but the last two, respondents were asked to answer in terms of a 1 to 10 rating. Note that all analyses employed regression analysis except for the last one having to do with the application of long-term investment analysis. The results of the analyses for each question or statement for each of the three comparisons are shown in the next three columns. One asterisk indicates that the results were significant at least at the 0.05 level. Two asterisks indicate that the results were significant at least at the 0.01 level. “NS” indicates that the results were not significant..

The results in the unshaded cells agreed with those presented earlier in Section 7.3-24 of the 33 individual results. The shaded cells show results that differed from those presented earlier. In about half the cases where the results differed, the difference was that this approach suggested that effects existed that were not identified by the analysis presented earlier. In only 5 of the 33 cases did the results from the current analysis suggest that the effects were less than suggested by the analysis reported earlier.

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Table 7-34
Results of Analyses

Survey Question or Statement	Participants vs In-State Non-participants: *Program Effects*	Participants vs. Low-DSM Customers: *Program Effects*	In-State Non-participants vs. Low-DSM Customers: *Market Effects*
It takes too much time and hassle to get enough information to make an informed decision about energy-efficient investments	ns	ns	ns
There is too much time and hassle involved in selecting a qualified energy-efficiency contractor	*	**	*
Lack of financing is a barrier to our organization making energy-efficiency investments that we want to make	*	ns	ns
As a general rule, I believe that energy-efficient investments will significantly reduce my energy bill	ns	ns	ns
I intend to actively pursue energy-efficient investments in the future	*	**	ns
In general, energy efficient investments are easy to understand and use	ns	**	**
I actively advocate energy efficient investments and practices to others	ns	**	**
I regularly hear about energy efficient investments and practices from business contacts and/or professional organizations.	ns	*	**
How knowledgeable do you feel that you are about what energy efficiency products are available, and how they'll perform?	Ns	**	**
By what percentage do you think a business like yours can reduce its electricity bill if it implements all of the cost-effective energy efficiency products and practices that are currently available?	Ns	*	ns
Does your organization routinely apply long-term investment analysis to energy equipment selection, such as estimates of payback periods, life cycle costing, or internal rate-of-return?[7]	Ns	**	*

Notes: "*" indicates the results were significant at the 0.05 level. "**" indicates that the results were significant at the 0.01 level. "ns" indicates that the results were not statistically significant at the 0.05 level. Shaded cells identify results that differed from those discussed earlier in this section.

[7] Analyzed using chi-square.

As one can see from Table 7-34, these results provided support for the existence of both program and market effects. The participant/in-state comparison yielded 3 statistically significant program effects. The participant/Low-DSM comparison yielded 8 statistically significant program effects. Finally, the in-state/Low-DSM comparison yielded 6 statistically significant market effects. Details of these analyses including coefficients are included in Appendix B.

Two factors should be noted when comparing these results with those in Section 7.3. First, the previous results usually were based on more than just the responses to a single survey question in that they drew upon additional information (principally, the supply-side interview results). Second, some of the previous results were based on specific subgroups of respondents (such as measure adopters and non-adopters) rather than the entire groups used in the modeling analyses reported here, so the results were not completely comparable.

Overall, the results using this approach agreed with the results presented earlier in 73% of the specific cases analyzed. We believe, therefore, that these results generally provide additional support for the market effects and hypotheses findings discussed earlier and partially alleviate concerns about self-selection bias having an overriding influence on the determination of Program and market effects.

In conclusion, this analysis represented an initial attempt to apply a complementary and more quantitative technique to this study of the Program's effects. Although it generally provided more evidence supporting the findings presented earlier, it also revealed areas that would be worth exploring further to determine why the two approaches produced differing results. Consideration should be give to further exploring the relationships examined here, additional relationships, discrepancies between the two approaches, and more comprehensive analytic approaches. Such analyses should include the consideration of other useful hypotheses and the estimation of models in which all three groups are included.

8 RECOMMENDATIONS

In this section, we provide two sets of recommendations that are based on the results of this study. The first set of recommendations addresses the Program itself, while the second focuses on suggestions for further related research.

8.1 PROGRAM RECOMMENDATIONS

The discussion presented below is intended to suggest ways in which the PG&E Express Efficiency Program might be improved or modified with respect to the small/medium nonresidential market. The recommendations are not intended to provide specific program design details, but rather to suggest general areas of improvement upon which we believe policy-makers and program designers should focus their efforts.[1] We recommend that those responsible for establishing the Express Efficiency and overall small/medium nonresidential market objectives, design mechanisms, and implementation procedures:

1. Enhance end user participants' awareness, knowledge, and recognition of the Program and associated energy-efficiency benefits.
2. Consider increasing overall funding levels for financial incentives for the small/medium Express Efficiency Program. Parallel consideration should be given to consolidating the Express Efficiency/SPC offering.
3. Improve the "trickle down" of Program benefits from Distributors to contractors and end users for the upstream packaged A/C unit component of the Program.
4. Continue working to improve outreach and target marketing to supply-side actors and end users.
5. Identify and target measures for increased Program emphasis.

1. Enhance end user participants' awareness, knowledge, and recognition of the Program and associated energy-efficiency benefits. Although we did observe important differences between participant end users and the comparison groups with respect to a number of the market effects indicators developed for this Study, a large percentage of these participants did not remember that they did, in fact, participate. This may be partly attributable to the fact that the total rebate received was only $1,000 or less for about two-thirds of the 1998 participants and the fact that contractors may have handled the required paperwork for some customers. Regardless of the underlying reason, PG&E should consider encouraging or requiring one or more types and levels of follow-up communications to end users after measures have been implemented and installed. For example, contractors might be incented to conduct a follow-up visit several months after installation that focuses on reinforcing to the customer that the project was successful (or fixing

[1] As evaluators we do not seek to directly participate in the program design process; at the same time, we believe it is incumbent upon us to help improve the programs we assess by making suggestions that arise from our direct research activities.

any elements that were not), reminds the customer of the savings being achieved, and perhaps suggests additional measures for consideration (either at that time or upon burnout or renovation). In cases where this is prohibitively expensive relative to the size of the customer and potential for savings, an automated mail-based process might be tested as an alternative.

We note that this issue is likely to be more problematic in the upstream Program components because customers are less involved in the Program implementation process. For example, customers who installed rebated packaged A/C units in 1998 were unlikely to be aware of this component of the Program because the rebate focused on the distributor. In the long run, end-user demand will be critical in establishing a sustainable market and the upstream Program, as structured in 1998, did not result in adequate customer awareness and knowledge of the Program and high-efficiency packaged A/Cs. Steps such as those recommended above, and possibly others, for increasing communications to customers should be implemented in conjunction with the upstream Program components.

2. Related to the recommendation above, consider increasing overall funding levels for the small/medium Express Efficiency Program. Parallel consideration should be given to consolidating the Express Efficiency/SPC offering. Overall funding of incentive programs for small and medium commercial customers in 1998 was reduced substantially from previous years. In our opinion, the 1998 Express Program was *too small* to generate broad market effects. Although overall funding of financial incentives dropped significantly in 1998 , one of the primary reasons that the PG&E Express Efficiency Program was so small *in 1998* is because a large portion of financial incentive funds were allocated to the Nonresidential Standard Performance Contract (1998 NSPC) Program. Total Express Efficiency rebates for customers below 500 kW in 1998 were 14 percent of their peak in 1994(under the Retrofit Efficiency Program) and 33 percent of the amount expended in 1997. The number of end user participants below 500 kW was approximately one-third the number in 1994 and less than half the 1997 figure.

Our research on the 1998 NSPC indicated that the NSPC was not serving small customers very well (XENERGY 1999). As a result, the PY99 planning process produced two NSPC programs for 1999 bifurcated between the small/medium and large customer markets. We recognize a CBEE Statewide Study is currently planned to address this and related broader small business marketing strategies implemented in 1999 and, thus, it is premature to draw conclusions as to whether either the Small SPC or Express Efficiency programs have been successful in 1999. Nonetheless, based on the current study, our NSPC-related research , and unofficial reports of 1999 participation levels;[2] we are concerned about the viability and usefulness of overlap and competition between Express Efficiency and the Small Customer SPC programs. Given that creating market effects in the small/medium market is an important goal but a formidable

[2] According to utility web-sites, there are only a handful of 1999 Small SPC participants statewide to date. According to program staff familiar with the 1999 Express Program at each of the three electric IOUs, there are currently a couple of hundred participants (for comparison, there were close to 6,000 PG&E Express participants under 500 kW in 1994, 4,200 in 1997, and 1,800 in 1998). Note that the total population of electric customers under 500 kW for these same IOUs is over half a million.

challenge under any circumstances, we believe success may require a clearer, more consolidated message to the market (in the form of a single, well-funded program). Depending on the results of the 1999 programs, consideration should be given to creating a single program, perhaps even a hybrid, that combines the best of both the Express Efficiency and Small SPC Programs..[3]

3. Improve the "trickle down" of Program benefits from Distributors to contractors and end users for the upstream packaged A/C unit component of the Program . Only 28 percent of the HVAC contractors interviewed were aware of the packaged unit component of the 1998 Express Efficiency Program. There was a perception among contractors that were aware of the Program that reductions in incremental costs from the rebate were not being passed on by the distributors to the contractors or end users.[4] There is a danger with the distributor-based rebate approach that distributors simply obtain rebates for units they would have sold anyway and do not use the rebate to reduce downstream prices and increase the market share of efficient units. According to our interviews, PG&E Program staff are already aware of this possibility and understand the importance of encouraging market forces that would lead distributors to use the rebate to reduce high-efficiency unit costs (as contractor and end user awareness of the Program increases over time, it is more likely that some distributors will begin to pass on at least a portion of the savings to gain market share and this in turn, will put competitive pressure on the remaining distributors to do likewise to maintain their share of the high-efficiency market). PG&E can aid this process by increasing awareness of the Program among contractors and customers and putting distributors on notice that the continuance of the Program may be predicated on a greater sharing of benefits.

PG&E also should develop a specific sustainability plan for the upstream HVAC component. Currently, the majority of both contractors and distributors believe sales of high-efficiency units would decrease in the absence of the Program. This is obviously acceptable in the short term as it indicates the rebates are having an effect; over time, however, the percentage of vendors that believe the penetration of high-efficiency units will be sustained in the absence of the Program should increase.

Although the upstream Program component targeted at motor distributors was not implemented in 1998—our study year—it is likely that the phenomena discussed above will occur in the motors market as well. Consequently, similar concerns should be raised and addressed in PG&E's implementation of its upstream motors Program..

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[3] An unresolved question currently is whether the performance contracting (and associated M&V) element of the Small SPC is viable for the small/medium customer market. Even if it is not, some elements of the SPC objectives and mechanisms may be worth considering and incorporating into a hybrid program (e.g., requiring verification of installation, though perhaps not M&V, and some type of vendor follow-up and post-installation communication with end users).

[4] Note that only 7 of the 25 contractors interviewed were aware of the Program. Whether their perception of how distributors handle the rebate is an accurate representation of the contractor population can not be determined with any confidence given the small sample size. Further research into this issue is warranted.

4. Continue working to improve outreach and target marketing to supply-side actors and end users. Express Efficiency Program staff indicated that they currently employ a variety of direct mail and other outreach methods. Staff also indicated they have purchased and utilized databases developed by professional marketing firms to improve the targeting of their messages. These are all appropriate and useful means of raising and maintaining Program awareness. Cost-effective target marketing is not easy, nor ever complete. PG&E staff should continue their efforts to obtain or develop the best possible databases for reaching target vendors and customers. If program dollars are scarce, it may be necessary for PG&E to further consolidate their marketing messages across non-residential program elements (e.g., general advertising that serves multiple program elements).

5. Identify and target measures for increased Program emphasis. Our data and previous studies suggested that the penetration of several measures, particularly those associated with high-efficiency lighting, has increased substantially. Data for low-DSM state customers showed that measures such as T-8s were being installed frequently even in non-Program areas. Several other measures covered by the Program, however, have been installed infrequently, even under the Program. It would be useful to conduct research necessary to assess the market potential for measures installed less often and implement Program activities to increase the penetration of the most promising ones, particularly given limited Program resources.

8.2 RESEARCH RECOMMENDATIONS

The biggest implementation change in the Program in 1998, and now in 1999, was the introduction of the upstream components for packaged A/Cs and high-efficiency motors. The current study raised several important issues about the packaged A/C component of the 1998 Program that could not be addressed fully. It would be beneficial to examine these issues in more detail for the packaged A/C Program and the distributor-based motors Program component in 1999. Such research should be emphasized in the planned Statewide Nonresidential Small Business Market Strategies Study for 1999, focusing on topics such as contractor/customer awareness, the influence of rebates throughout the supply chain, and differences between the effects of rebates targeted at different market actors.

One very useful further analytic step that should be considered as a supplement to the current study is the application of structural equation modeling (SEM) to systematically investigate the market effects hypotheses. An SEM approach could be designed to test all the hypotheses within a consistent and unified analysis. The results of an SEM analysis would provide a more quantitative assessment of the strength of the hypothesized cause-effect relationships. It also would help distinguish how the direct and indirect causes contributed to the key outcomes such as adoption of energy-efficient measures and respondent expressed intentions to adopt measures in the future. Furthermore, an SEM analysis could help resolve some of the apparent differences that were noted between the results discussed in Section 7.5 and the market effects results discussed in detail Sections 7.3 and 7.4. The rich customer survey database developed in this study would be ideally suited to conduct this type of analysis.

9 STUDY METHODS

This section summarizes XENERGY's research methodologies used for this Study. It also describes the process used to select specific energy-efficiency measures for inclusion and the final selections. Finally, it describes the data collection instruments and sample designs.

9.1 METHODOLOGY

XENERGY's methodology is based on answering the following basic research questions:

1. ***Market Changes.*** *To what extent did indicators of adoption of efficient products or measures change during the study period?*
2. ***Attribution to the Program: efficient product and measure adoption.*** *To what extent did the Express Efficiency Program assist customers in overcoming barriers to the adoption of efficient products and measures?*
3. ***Attribution to the Program: reduction of market barriers.*** *In what specific ways did the Express Efficiency Program help customers overcome market barriers that may have inhibited or reduced their use of efficient products or measures? Similarly, to what extent did the Program induce manufacturers and other supply-side actors in overcoming barriers to expanded production, distribution, promotion, and specification of efficient components?* The following steps are undertaken to address this question: develop hypotheses regarding the market effects of the program; gather information to test the hypotheses; and systematically and convincingly analyze attribution.
4. ***Assessment of durability of market changes.*** *How likely is it that market effects that occurred during the study period will persist after the reduction or elimination of the Program to promote efficient commercial products and practices?*

The key steps involved in our approach are listed below:

1. Clarify and Refine the Study Objectives and Develop a Program Theory
2. Triangulate Among Methods and Market Actors
3. Prioritize and Explicitly Link Market Indicators to Elements of the Research Plan
4. Marshal All Evidence into a Convincing Case For or Against Each Hypothesized Effect
5. Provide Recommendations and Strategies for Future Work

Each of the above steps is discussed in the remainder of this subsection.

9.1.1 Clarify and Refine the Study Objectives and Develop Program Theory

We began this project by working closely with the project manager and program implementers and promoters to articulate a set of very specific objectives and researchable issues. The project initiation meeting, held on February 4, 1999, helped clarify the research objectives, Program characteristics, and data requirements. The meeting also involved staff from Quantum Consulting (QC) who are conducting a companion evaluation of PG&E's complementary SmarterEnergy and Business Energy Management Services (BEMS or Business Edge) Programs. QC is assisting XENERGY in the evaluation of the Express Efficiency Program and XENERGY is supporting QC in conducting its evaluation of the other two Programs. Both firms are supported by Megdal & Associates. The initiation meeting helped establish the process for all consultants to work together and coordinate their efforts.

XENERGY is applying a theory-based evaluation (TBE) approach in this study. The first lesson of TBE is that an evaluation must be fully informed by the causal theory that underlies the program intervention; otherwise, it is likely that the information collected will be much less useful to the final analyses and challenges of attribution than it should be. Bickman and Peterson note, "Program theory is essential for deciding what to measure in a program…With a good sense of program theory, the evaluator can move to observing program process and operation, rather than focusing on simple (and frequently uninterpretable) outcomes."[1]

To develop the appropriate program theory, we conducted three activities. First, we reviewed available Program information to develop a comprehensive understanding of the Program. Second, we conducted structured interviews with key Program staff. The first was conducted on February 12 with Sam Cohen and Scott McGaraghan of Energy Solutions. The second was conducted on February 17 with Jay Bhalla of PG&E and Sam Cohen. Third, we applied our experience from prior evaluations to compile the information in a consistent format that addressed

- program interventions,
- key actors,
- market barriers,
- mechanisms through which the program could alleviate barriers, and
- indicators of program effects.

9.1.2 Triangulate Among Methods and Market Actors

There are three basic methods that we have used to assess the extent to which energy-efficiency program interventions contribute to market changes:

- Self-reports,
- Cross-sectional analysis, and
- Longitudinal analysis.

[1] Bickman, Leonard and Keith Peterson, "Using Program Theory to Describe and Measure Program Quality," New direction for Program Evaluation, No. 47, Fall 1990, p. 63.

Our methodology relies on combinations of all of these approaches. These approaches are discussed very briefly below.

Self-reports. Information was collected from both supply- and demand-side market actors concerning their motives for adopting or promoting energy-efficient products and services. For end-users, we employed tightly structured survey questionnaires and for supply-side actors we used structured in-depth interviews. We looked for corroboration of information findings from different groups of market actors to build a strong case for our findings. The major limitations of this approach are that it often relies on respondents' *recollection* of program influence and upon their ability to sort out the relative weight of numerous possible influences on energy-related decisions. We designed our interview instruments and approach to minimize such bias in the self-reported data.

Cross-sectional Comparisons. This method involves comparing the behavior of market actors who have been affected by the Program to the behavior of market actors who have not been exposed to any energy-efficiency programs. To the extent that indicators of market effects or changes can be found among market actors in the "Program area," but not among those in the "non-Program" area, these effects may be considered to be attributable to the program. In practice, of course, it is difficult to find pure control areas. To minimize this problem, we drew our control samples from a multi-state region that had limited program interventions over the study period.

Longitudinal Comparison. This method involves examination and comparison of the behavior of market actors who have been affected by Program interventions over time. Ideally, longitudinal analyses are conducted using information collected *prior to, during* and *after* the intervention. Because this evaluation focused on the 1998 Express Efficiency Program, there was little opportunity to conduct longitudinal analyses. Our sample included a small number of respondents who participated in the preceding Retrofit Express Program and this provided some limited longitudinal information.

9.1.3 Prioritize and Link Market Indicators to Data Collection Elements of the Research Plan

For energy-efficient products and services to be self-sustaining in a market, both supply-side and demand-side interests must become aligned with respect to the value of the particular products and services. On the supply side, it is critical that the products and services are available, that vendors are aware and knowledgeable about them, and that they stock, promote, and specify them in their business interactions with end- users. On the demand side, it is critical that end-users are aware of and knowledgeable about the products and services and can justify their purchases based on analysis or judgment that demonstrates that the energy savings and other benefits exceed any incremental costs. To assess these issues for end-users for example, it is critical to understand and analyze end-users' investment criteria and perceptions about product features, quality, performance, risks, reliability, and other characteristics.

To ensure that a complete analysis of supply and demand interactions was conducted successfully, our methodology built upon the program theory. We used the program theory to design the data collection and analysis approaches. Specifically, we used the initial program theory to construct a set of preliminary hypotheses about how the Express Efficiency Program was likely to influence the energy-efficiency market for included products. These hypotheses provided the basis for structuring data collection and provided the roadmap for testing the effects of the Program.

9.1.4 Collect Data, Characterize Market, and Assess Market Effects

We collected data from several key groups of market actors: small/medium commercial customers, lighting distributors and contractors, and HVAC distributors and contractors. Data collection was conducted through structured telephone interviews with customers and in-depth telephone interviews with supply-side actors. Appendix C presents the interview instruments.

We also reviewed information from other relevant literature to supplement information collected during this study. Key sources included the *PG&E/SDG&E Lighting Market Effects Study* and the *PG&E HVAC and Motors Baseline Market Effects Study*. To develop the market characterization, we directed the primary research efforts at filling in gaps in the existing literature.

Information compiled from existing literature was combined with information provided by Program implementers and Program materials, as well as our market actor interview information, to develop the market characterization. After the data were collected from key market actors, we combined them with information gathered about the Program from other sources and prepared the market characterization.

Next, we organized the information into hypothesis-related evidence—whether supporting, refuting, or ambiguous—and then synthesized the evidence to come to an informed assessment of the key research questions developed as part of the program theory. For each hypothesis, or group of hypotheses, we organize the information developed from our primary research into a tabular format to summarize the market effects findings. Based upon the extent of supporting evidence, we focused on a *continuum* of possible attribution rather than a discrete (i.e., binary-based) answer to such questions.

9.1.5 Provide Recommendations and Strategies for Future Research

The integration of the market characterization and market effects analyses allowed us to develop a forward-looking assessment of the market potential for future program implementation. In addition, we targeted recommendations toward improving the effectiveness of the Program and identifying strategies for future data collection and analysis to further assess the market effects and transformation attributable to the Program.

9.2 MEASURES INCLUDED IN STUDY

This subsection identifies the energy-efficiency measures covered in the study.[2] The XENERGY/QC team used the following criteria to select a set of measures (and practices) that we felt could be studied adequately given the aggressive timeline and budget:

1. The measure's contribution to avoided cost for the 1998 Express Efficiency Program
2. The frequency of recommendations made in the 1998 BEMS surveys
3. The historical contribution to avoided cost for previous Retrofit Express Programs
4. The historical frequency of recommendations made in the previous BEMS Program years
5. The cost-effectiveness of the measure
6. The future potential of the measure/practice in terms of the BEMS/Express Programs being able to effectively transform the market for the measure/practice
7. Interest from PG&E staff to conduct a market characterization/process evaluation on specific measures, primarily for the purposes of future program design

The measures that we focused on in the Express Efficiency study included the following:

- T-8s – This measure has always been the highest participation measure for the Retrofit Express/Express Efficiency Program (32% of 1998 Express), and the most commonly recommended measure in BEMS (about 31% of all BEST recommendations, meaning almost every customer receives this recommendation). It is a cost-effective measure, and still has a significant amount of potential in the small business sector.
- Delamping and installation of reflectors - It should first be noted that this measure is almost always done in tandem with T-8 installations. This is generally the second highest participation measure for the Retrofit Express/Express Efficiency Program (almost 20% of 1998 Express). However, this measure is rarely recommended in the BEMS. Nevertheless, this is still a very cost-effective measure with some remaining potential, and should be evaluated.
- CFLs - This measure has also been one of the higher participation measures for the Retrofit Express/Express Efficiency Program (almost 20% of the 1998 Program), and is a frequently recommended measure in BEMS (about 5% of all BEST recommendations). It too is a cost-effective measure, and still has a significant amount of potential in the small business sector.
- Packaged A/Cs - This measure also has been one of the higher participation measures for the Retrofit Express/Express Efficiency Program (almost 15% of the 1998 Program), and is a frequently recommended measure in BEMS (about 4% of all BEST

[2] Note that the BEMS study includes a set of practices for which data were collected, but they are not discussed in any detail here.

recommendation). It too is a cost-effective measure, and still has a significant amount of potential in the small business sector.

These were the four primary measures upon which we focused the Express Efficiency Program evaluation. We developed separate market characterizations and baseline assessments for these measures.

We also created one additional set of measures that were studied in less detail. The measures included in this group are relatively low-cost (with the exception of ASDs) and are frequently included in the installation of larger lighting or HVAC projects. Furthermore, these measures require some human interaction, whereby the measures could be re-programmed or over-ridden. This group is comprised of the following:[3]

- ASDs – This measure comprised 2.3% of the avoided cost for the 1998 Express Efficiency Program. Although we initially considered including ASDs within the primary measure group above, we decided to move it to this secondary group because it was not feasible to address enough of the ASD-specific market issues within the constraints of the surveys being conducted for the four primary measures.
- Set Back Thermostats – This measure is commonly installed along with an HVAC replacement. Historically, this measure has contributed a fair amount to the program-level avoided cost (1.2% of the 1998 Program) and has been a frequently recommended measure for BEMS (about 13% of all BEST recommendations). It is a very cost-effective measure, with a fair amount of remaining potential.
- Occupancy Sensors – This measure is commonly installed along with T-8 retrofits. This measure has also contributed a modest amount to the historical program-level avoided cost (1.6% of the 1998 Program) and has had a fair number of recommendations made for BEMS (about 2% of all BEST recommendations). It is a cost-effective measure, with a reasonable amount of remaining potential.

The following is a list of measures that were more borderline that we did **not** study:

- HIDs—The Program is no longer targeting high wattage HIDs, which historically have been the largest contributors to avoided cost. In the 1998 Express Efficiency Program interior HIDs only contributed 0.7% to avoided cost and very few HID recommendations were made in the BEMS.
- Exit signs and halogens—Neither of these products has been a major contributor to the Express Efficiency Program avoided cost (2.6% combined in 1998), nor have there been a significant number of recommendations made (1.5% of BEST recommendations, combined).

[3] Note that the BEMS evaluation will address *practices* in addition to these *measures*, including HVAC maintenance and other maintenance type activities. The interview instruments will permit collection of a limited amount of information on these practices.

- Window film—Although this measure has contributed a fair amount to the historical Program-level avoided cost (1.7% of the1998 Program) and has a fairly high level of recommendations under BEMS (about 3.5% of all BEST recommendations), its cost-effectiveness is questionable. The window film market is also distinct from the HVAC market, requiring an entirely different set of upstream participants to be contacted. Given the aggressive timeline, we felt that this marginal measure should not be studied.
- Evaporative coolers and package terminal A/Cs—Neither of these measures has been a major contributor to avoided cost (1.3% combined in 1998), nor have they been recommended frequently (0.8% of BEST recommendations, combined). In addition, PG&E is evaluating the market for Natural Cooling in a separate study.
- Refrigeration—This end use comprises only 1.5% of the 1998 Express Efficiency Program avoided cost. Although it has historically provided large impacts for the CIEE Programs, it has not within the Express Efficiency Program (rather in the Customized Incentives Program). There is also a significant amount of free ridership that has been identified in previous studies for this end use. Furthermore, there has been a detailed market transformation study conducted on refrigeration technologies in supermarkets. It is unlikely that any marginal resources allocated to this end use could improve upon the existing study.[4]

9.3 DATA SOURCES

We relied on several data and information sources for this study as shown in Table 9-1. We collected background Program information to document Program components and develop the program theory and define our research approach. We also conducted interviews with key Program staff to help develop the Program theories.

[4] Note that the BEMS evaluation may address refrigeration maintenance (e.g., cleaning condensers, coils, etc.) as one of the practices considered. This practice was frequently recommended in the BEMS (about 3% of all BEST recommendations).

Table 9-1
Data and Information Sources

Source	Application
Interviews with Program staff and implementers	• Define Program characteristics • Develop Program theory • Develop research approach
Program materials	• Define Program characteristics • Develop Program theory
PG&E MDSS database	• Determine Program participation statistics • Develop customer samples
Customer interviews: PG&E Program participants, PG&E non-participants, out-of-region utility customers	• Determine customer characteristics • Identify market barriers • Characterize market • Identify and assess market effects
Supply-side actor interviews: distributors and contractors for lighting and HVAC equipment in PG&E area and out-of-region area	• Determine supply-side actor characteristics • Identify market barriers • Characterize market • Identify and assess market effects

We used PG&E's MDSS database to develop basic Program statistics and identify the customer samples. QC provided key assistance in this activity.

The Express Efficiency Program has two major elements: a downstream component targeted at customers and an upstream component targeted at supply-side actors. The products covered by these Program components differ. We relied largely on customer surveys to assess the downstream component and supply-side actor interviews to assess the upstream component, although both components were addressed by each type of data collection.

The major primary data source was survey interviews conducted with small and medium C&I customers. We included interviews with Program participants, PG&E area non-participants, and an out-of-state comparison group of comparable C&I customers. Information from these surveys provided key data for testing the hypotheses developed about Program effects and characterizing the markets of interest.

We also conducted in-depth interviews with supply-side actors. The two major actor groups were distributors and contractors for the different products. We included supply-side actors in the PG&E area and those in the comparison area.

9.4 SURVEY AND INTERVIEW INSTRUMENT DEVELOPMENT

The customer survey and supply-side actor interview instruments are presented in Appendix C. This subsection briefly discusses the process for designing them and their contents.

9.4.1 Customer Survey Instrument

XENERGY and QC collaborated to develop a single customer survey instrument that QC could format for its CATI system to conduct the telephone survey. We worked closely together to develop a common instrument that served the needs of the both the Express Efficiency and BEMS studies.

The contents of the instrument were designed to meet the objectives of both studies. The questions and structure were developed to reflect the theories constructed for both Programs and to permit testing the probable hypotheses that would be developed for the Programs.

The survey instrument was designed to permit branching through the questions that varied depending on which category a respondent was in. For example, several questions at the beginning were directed at PG&E area respondents who participated in the Express Efficiency or BEMS (or both) Programs. If a PG&E area respondent participated in neither Program, then the questioning branched to questions about efficiency measures or practices that the respondent implemented without participating in either PG&E Program. Similar branching occurred for respondents in the comparison areas.

The major sections of the instrument included

- self-assessment of equipment efficiency,
- participation information for BEMS and Express Efficiency including when respondent participated and measures/practices implemented,
- participation information for non-PG&E utility programs,
- non-program measures/practices implemented,
- experiences with efficiency measures/practices,
- effects of Express Efficiency and BEMS Programs,
- energy-efficiency barriers, attitudes, decision-making, and knowledge, and
- facility characteristics and situation.

In the interest of minimizing resource requirements and maximizing benefits of coordination between the Express Efficiency and BEMS studies, a single instrument was developed. This necessitated both eliminating some questions directly aimed at the Express Efficiency study (e.g., inquiries about the relative importance of Program marketing materials compared with the rebate) and taking a broader perspective on the types of attitudinal and awareness information collected. We made every effort to minimize deleterious effects of such constraints. Given the availability of extensive information on these markets and products and the benefits of coordinating the two studies, we believed that these tradeoffs were worthwhile.

To stay within study scope and ensure respondent cooperation, we targeted a survey length of 20 minutes on the average. In our pre-test we found that the initial survey was averaging about 30 minutes. Consequently, we reexamined the contents and wording. In a memorandum dated April 19, 1999, the XENERGY/QC team documented several recommended changes to the instrument and implemented them in subsequent interviews. The types of questions deleted or modified significantly in the instrument are summarized below:

- sources of energy-efficiency information,
- how high efficiency products are defined,
- how respondents learned about efficiency programs and why they participated,
- before and after expectations about energy savings from efficiency measures,
- ease of participating in Express Efficiency Program,
- details on efficient product decision-making,
- detailed feedback and communications questions, and
- detailed information about energy efficiency in lessor market.

9.4.2 Supply-Side Actor Interview Instruments

XENERGY and QC also worked together to develop common supply-side actor instruments that would serve the needs of the both the Express Efficiency and BEMS studies. We developed interview instruments for these four actor groups:

- lighting contractors,
- lighting distributors,
- HVAC contractors, and
- HVAC distributors.

As with the customer instruments, the contents of these instruments were designed to meet the objectives of both studies. The instrument were organized to permit collecting information from both respondents within the PG&E area and in the comparison area.

The major topical areas in each of the surveys were questions addressing the following:

- screening,
- company business characteristics,

- general market characteristics,
- characteristics of specific product markets including energy efficiency,
- energy-efficient product market barriers and customer perceptions,
- high-efficiency product costs, and
- (for in-territory respondents) effects of Express Efficiency, BEMS, and SmarterEnergy Programs.

9.5 END-USER SAMPLING

This subsection discusses the sampling plan approach for collecting end-user, or customer, data. Development of this plan was guided by the need to maximize consistency between the evaluation of the Express Efficiency program and the BEMS program (led by QC), and to maximize the efficiency of conducting these two studies. The elements addressed in the sample planning process included the following:

- General Segments and Strata
- Participant Samples
- Non-Participant Samples (Joint Sampling)
- Measure-Level Sampling
- Out-of-Territory Frame

9.5.1 General Segments and Strata

As agreed upon in the joint project kick-off meetings, the target customer population for these studies consisted of small and medium commercial customers. The definition of small and medium for PG&E customers was agreed to be those customers with demand of <500 kW as determined by their rate schedule in PG&E's CIS system. As discussed later, the non-PG&E sample was drawn from *Dun & Bradstreet's MarketPlace* (D&B) database. For these customers, size was estimated based on a conversion calculation that ties kWh consumption (and kW through a load factor conversion) to the number of employees by business type. We then segmented the populations into the following four segments for sampling and analysis purposes:

- Offices
- Retail
- Institutional
- Other

These segments were selected based on past experience analyzing which segments account for much of the observed variation in customers' decision-making patterns for energy efficiency (see, for example, the PG&E/SDG&E *Commercial Lighting Study*).

Because customer size has been shown in the past to be a good predictor of energy-efficiency related behaviors, attitudes, and actions, customers also were stratified by size in terms of electricity demand. We used the three following size categories:

- <20 kW
- 20 kW to <100 kW
- 100 kW to 499 kW

The combination of the four segments and three size strata resulted in 12 primary sampling cells into which we allocated our initial sample (PG&E region and out-of-state region) equally.

9.5.2 Non-Participant Samples

The Express Efficiency and BEMS Program study designs included two comparison groups: non-participating customers in the PG&E service territory and customers outside of California. The project team jointly decided that it would be both feasible and efficient to *share* both non-participant samples. This was because both studies were concerned with the same target population of customers and the majority of non-participant parameters of interest were relevant to both studies. Another advantage was that it simplified comparisons between the Program interventions. Lastly, this approach reduced the project team time and analytical resources required.

For both the in-territory and out-of-territory comparison groups, we planned to use sample sizes of *300 customers*. For the in-territory sample we used PG&E's CIS and MDSS databases to select a sample of non-participants that was characteristically similar to the participant sample. For the out-of-territory sample, we utilized the D&B database to construct a comparison population frame and, again, draw a sample that was similar to the sample of participants.

Based on our experience on previous, related studies, we used the D&B database as the population frame for our out-of-territory sample for the following reasons:

- *Each establishment is characterized by primary SIC code.* This allows mapping of all customers to business types that can be organized to reflect energy intensity, decision making practices, and other relevant factors in a manner consistent with the in-territory samples.
- *Each establishment is characterized by size variables that include number of employees and revenues (of the parent organization).* This information can be used to estimate energy consumption using conversion factors discussed below.

Although the D&B database contained data on number of employees, sales, and number of years in business, it did not include information on energy consumption. To characterize the energy use attributable to each building type, we developed factors of electric use per employee using the Commercial Buildings Energy Consumption Survey data (CBECS, a national survey conducted by the Energy Information Agency of DOE). The factors were developed as the sum of electricity consumption divided by the sum of the number of employees by business type. These factors were then applied to D&B population data to create a population frame with energy use as the estimated sample design variable.

We considered three possibilities for choosing the out-of-territory comparison area and settled on selecting a subset of states that had not had as much energy-efficiency program activity historically as had occurred in California. This was most appropriate because we were trying to measure program effects rather than trying to establish a baseline against which future effects might be measured. Although there was no ideal comparison area in terms of being a clinically pure control group, the states with low levels of recent (1990s) DSM activity provided a better point of comparative reference than those areas with more active programs. The historically low DSM states that we used were Arkansas, Kansas, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Oklahoma, Pennsylvania, South Carolina, and Texas.

Final issues with respect to the comparison groups involved what role measure adoption should play in the sample selection. One issue was whether or to what extent sample quotas should be based on adoption levels of BEMS and/or Express Efficiency measures. Another issue was how adoption itself should be defined, i.e., whether or not the adoption quotas (if any) should be set at the measure level for the non-participants (e.g., X number adopting T-8 lamps, Y number adopting CFLs, etc.). However, d*efining adoption at the measure level for non-participants was not feasible* for this study because the natural penetration of the non-lighting measures of interest was expected to be extremely low (i.e., 5% or less). A reasonable alternative was to define adoption based on implementation of *any one of the basket of measures* included. Going to a basket approach would increase the probability significantly that a randomly selected non-program respondent would have adopted *at least one* of the measures in the basket. Based on a recent XENERGY study, we expected that the reported rate of adoption for small customers in historically low DSM states for any one of the basket of measures would be about 20% to 30%; thus, we expected to have a sub-sample of non-program adopters of sufficient size to conduct comparative analyses of adopters and non-adopters.

Our final approach was to sample non-participants randomly (within the sectors and strata discussed previously) and to let the adopters and non-adopters *fall out in their proportions* in the population, with the expectation that enough non-program adopters would be identified to make comparisons with those in the program group. Table 9-2 summarizes our sampling plan for the two comparison groups.

Table 9-2
Non-Participant Sample Plan Characteristics

Region	Data Sources	Sector/Size	Number	Adoption
PG&E Service Territory	PG&E CIS combined with PG&E MDSS Participation records (exclude participants back to 1993)	Match participant proportions	300	75 to 125 of the 300 as an approximate goal.
Low DSM States	Dun & Bradstreet Marketplace Database	Match participant proportions	300	75 to 125 of the 300 as an approximate goal.

9.5.3 Participant Sample and Measure-Level Sampling Issues

Our targeted participant sample size was 250 customers selected from those included in PG&E's MDSS program tracking database as 1998 Program participants. The participant sample was segmented into the sector and size strata groups defined earlier.

As noted in Section 2, the five primary measures that we intended to include were these:

- T-8 Lamps with Electronic Ballasts
- Delamping and Installation of Reflectors
- Compact Fluorescent Lamps
- High-Efficiency Packaged AC Systems (CACs)
- Adjustable Speed Drives (ASDs)

To explore how best to sample these measures from the 1998 Express Efficiency population pool, participants were grouped into each of the three possible sampling dimensions (sector, size, and measure) as shown in Table 9-3 below.

Table 9-3
Distribution of Available Sample (Unique Participants) for 1998 Express Efficiency Program by Sector, Size, and Measure

	Office			Retail			Institutional			Other			Total			
Measure Group	<20	20 - <100	100 - <500	<20	20 - <100	100 - <500	<20	20 - <100	100 - <500	<20	20 - <100	100 - <500	<20	20 - <100	100 - <500	All
ASD	1	6	12	0	0	0	0	0	1	0	1	5	1	7	18	26
A/C	15	7	6	5	5	3	12	9	37	73	37	29	105	58	75	238
CFL	26	27	33	14	6	5	23	23	56	78	47	28	141	103	122	366
DLP	36	32	33	23	15	1	14	12	16	55	45	16	128	104	66	298
T8	40	28	19	53	32	17	18	11	20	66	55	22	177	126	78	381
TOTAL	118	100	103	95	58	26	67	55	130	272	185	100	552	398	359	1309

A few observations from the table are important. First, there were only 1,309 participants in 1998 and our planned sample size was 250, or nearly 20%. Second, with respect to ASDs, note that only 26 participating customers below 500 kW installed this measure. Because the population was so small, it was not feasible to attempt to target this measure in the participant sample. We did include questions about ASDs in our customer interviews, however, to obtain what information we could about this measure. Third, note that some of the populations of individual lighting measures were very small within some cells (e.g., only one customer in the Retail sector with 100 to <500 employees was in the delamping group). Because we already had 12 sample cells to manage with respect to customer segment and customer size, further setting quotas by individual lighting measure was not practical based on the populations shown in the table. As a result, we grouped the three lighting measures together for sampling purposes and let the proportion of sample that resulted for each individual measure fall out randomly. As shown in Table 9-4, the three targeted lighting measures occurred in significantly large proportions relative to each other to ensure that relatively even sample sizes of customers implementing each of the individual measures would result.

Table 9-4
Planned Breakdown of Express Efficiency Customer Participant Sample by Measure Type

Measure	Proposed Sample	Percent of Avoided Cost Savings for '98
T-8 Lamps with Electronic Ballast		32%
Delamping (includes T8s)	200	20%
Compact Fluorescent Lamps		18%
High Efficiency Packaged Units	50	16%
Total	250	86%

Our sampling plan basically split the participant sample into two groups: lighting and packaged A/Cs. We planned to complete 200 lighting participant surveys distributed evenly across the 12 segment and size cells.

For A/Cs, we planned to conduct 50 customer surveys that were not managed according to any segment or size quotas because of the limited population of participants available in the PG&E database (238 as shown in Table 9-3). Early or prospective market effects for this measure were analyzed primarily from the supply-side. The purpose of the end user sample was to explore the means by which the customer came to adopt the measure given that the 1998 rebate was received by HVAC distributors. We will focused on whether customers reported that had purchased high-efficiency units, their reported satisfaction with the units, effects of the purchase decision on their future actions, etc. Because we did not expect to have a sizable group of non-participants who also had adopted this measure, the analysis of the customer data for high-efficiency packaged A/Cs was intended to be more qualitative and process-oriented. These sample points, of course, were rolled up on a weighted basis to the quantitative analyses of the program participants as a whole.

9.5.4 Actual Customer Samples

Table 9-5 presents the number of respondents interviewed in each group by segment and size. A total of 707 interviews were completed: 186 Program participants, 299 PG&E-territory non-participants, and 222 low-DSM state customers.

Table 9-5
Number of Surveys Completed

Segment	Size	Participants	PG&E Territory	Low-DSM States
Office	<20 kW	23	25	11
	20-99 kW	10	27	15
	100-499 kW	10	25	23
	Sub total	43	77	49
Retail	<20 kW	12	25	14
	20-99 kW	15	25	25
	100-499 kW	2	25	14
	Sub total	29	75	53
Institutional	<20 kW	12	26	21
	20-99 kW	11	25	20
	100-499 kW	19	25	18
	Sub total	42	76	59
Other	<20 kW	26	21	19
	20-99 kW	26	25	23
	100-499 kW	20	25	19
	Sub total	72	71	61
Total	Total	186	299	222

The number of participants interviewed fell short of the 250 targeted. This was due primarily to the difficulty of recruiting participants from the rather limited 1998 population. As noted earlier, our sample size represented one out of five of the participant population members and, despite repeated attempts to contact participants and complete interviews and opening the sample up to all measures covered by the Program, we were able to complete only 186 of the planned 250 interviews. The desired number of participant interviews in each cell was about 20 and several of the cells fell substantially short of this number.

The number of PG&E-area non-participants interviewed basically matched our target of 25 per cell. All cells were well represented in the completed interviews.

We also were unable to reach the sample sizes by strata desired for the low-DSM state customers. Again, this was due to difficulties reaching members of and completing interviews with customers in certain strata given the available time to complete the data collection. Our completed interviews fell short of the targeted 25 in primarily the office and retail segments.

To make the samples as comparable as possible, we weighted all the survey results in a uniform way. We used weights based on the customer population distribution in the PG&E territory with electricity demand less than 500 kW. We weighted the participant and low-DSM state strata cells the same way as the PG&E territory cells so that comparisons could be made across the three markets without the need to adjust for differences in the distribution of business types and size strata between the three groups. Energy weights were used based on dividing the total energy consumption for each cell by the number of sample points in that cell.

9.6 SUPPLY-SIDE SAMPLING

Supply-side sample frames were developed for non-residential HVAC and lighting contractors and distributors. The D&B database was used as the frame for several of the segments of interest, including HVAC contractors and out-of-territory distributors. In those cases for which D&B was used as the sample frame, the approach employed was to segment the population of firms within the most appropriate SIC groups on the basis of number of full-time equivalent (FTE) employees as a proxy for the size of the establishment (since FTEs were available in D&B database for establishments, but revenues were not). Supply-side firms were segmented because we expected that the responses of interest for our surveys would vary significantly by size of service provider. Table 9-6 shows the SIC codes that we used to identify supply-side actors to contact. Table 9-7 summarizes our planned and actual sample sizes by respondent type and size.

Table 9-6
Supply-Side Sample SIC Codes

Lighting			
	Contractors	D&B SIC Codes	
		1731-0000	Electrical work
		1731-9903	General electrical contractor
		1731-9904	Lighting contractor
		7349-0105	Lighting maintenance service
	Distributors	WSDG25 Study Call list	
		Thomas Regional Website (www.thomasregional.com)	
HVAC			
	Contractors	D&B SIC Codes	
		1711-0000	Plumbing, heating, air-conditioning
		1711-0400	Heating and air conditioning contractors
		1711-0405	Warm air heating and air conditioning contractor
		7623-9901	Air conditioning repair
	Distributors	D&B SIC Codes for Non-participant Sample	
		5075-0100	Air conditioning and ventilation equipment and supplies
		5075-0101	Air conditioning equipment, except room units
		PG&E Database for Participant Sample	

Table 9-7
Supply-Side Sample Plan and Interviews Completed

Market Actor	Region	FTE Group	Sample Goal	Actual Sample Completed	Source
HVAC Contractors	PG&E Territory	2-9	5	5	D&B
		10-24	5	7	
		25-99	7.5	9	
		>=100	7.5	5	
		Total	***25***	***26***	
	Low-DSM States	2-9	5	3	D&B
		10-24	5	6	
		25-99	7.5	5	
		>=100	7.5	5	
		Total	***25***	***19***	
HVAC Distributors	PG&E ’98 Participants	None	10	10	PG&E
	Low-DSM States	None	10	11	D&B
Lighting Contractors	PG&E Territory	2-9	5	3	D&B
		10-49	5	6	
		50-99	5	6	
		>=100	5	6	
		Total	***20***	***21***	
	Low-DSM States	2-9	5	5	D&B
		10-49	5	4	
		50-99	5	5	
		>=100	5	7	
		Total	***20***	***21***	
Lighting Distributors	PG&E Territory	None	10	10	D&B
	Low-DSM States	None	10	10	D&B
		Total HVAC	***70***	***66***	
		Total Lighting	***60***	***62***	
		Grand Total	***130***	***128***	

10 SOURCES

The following list of sources includes all the cited published works in this report.

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A

END USER 1998 PARTICIPATION DATA

1998 PG&E Commercial Express Program
Gross kW, kWh, and Therm
By End Use and Measure

End Use	Measure Description	Gross kW	Gross kWh	Gross Thm	% of kW	% of kWh	% of Thm
Indoor Lighting	BALLAST: ELECTRONIC	17	83,083	0	0.1%	0.1%	-
	COMPACT FLUORESCENT: HARDWIRED FIXTURE 14-26 WATTS	340	2,127,334	0	1.8%	2.5%	-
	COMPACT FLUORESCENT: HARDWIRED FIXTURE 27-65 WATTS INCANDESCENT	1,178	6,636,341	0	6.2%	7.7%	-
	COMPACT FLUORESCENT: HARDWIRED FIXTURE 27-65 WATTS MERCURY VAPOR	2	8,189	0	0.0%	0.0%	-
	COMPACT FLUORESCENT: HARDWIRED FIXTURE 5-13 WATTS	140	804,746	0	0.7%	0.9%	-
	COMPACT FLUORESCENT: HARDWIRED FIXTURE 66-156 WATTS INCANDESCENT	362	2,221,810	0	1.9%	2.6%	-
	COMPACT FLUORESCENT: HARDWIRED FIXTURE 66-156 WATTS MERCURY VAPOR	4	21,912	0	0.0%	0.0%	-
	COMPACT FLUORESCENT: HARDWIRED FIXTURE >= 157 WATTS INCANDESCENT	40	221,737	0	0.2%	0.3%	-
	COMPACT FLUORESCENT: HARDWIRED FIXTURE >= 157 WATTS MERCURY VAPOR	4	20,866	0	0.0%	0.0%	-
	COMPACT FLUORESCENT: SCREW-IN MODULAR BLST 14-26 WATTS	278	1,824,266	0	1.5%	2.1%	-
	COMPACT FLUORESCENT: SCREW-IN MODULAR BLST 5-13 WATTS	319	1,726,910	0	1.7%	2.0%	-
	COMPACT FLUORESCENT: SCREW-IN MODULAR BLST >= 27 WATTS	132	1,005,766	0	0.7%	1.2%	-
	EXIT SIGN: LED	220	1,748,988	0	1.2%	2.0%	-
	EXIT SIGN: RETROFIT KIT	49	393,857	0	0.3%	0.5%	-
	FIXTURE: T-8 HIGH-OUTPUT LAMP & ELEC BLST (FEM or NEW FIXTURE) 8 FT	10	50,370	0	0.1%	0.1%	-
	FIXTURE: T-8 LAMP & ELEC BLST (FEM or NEW FIXTURE) 2 FT FIXT	86	435,610	0	0.5%	0.5%	-
	FIXTURE: T-8 LAMP & ELEC BLST (FEM or NEW FIXTURE) 3 FT FIXT	58	326,009	0	0.3%	0.4%	-
	FIXTURE: T-8 LAMP & ELEC BLST (FEM or NEW FIXTURE) 4 FT FIXT	4,431	22,485,980	0	23.4%	26.2%	-
	FIXTURE: T-8 LAMP & ELEC BLST (FEM or NEW FIXTURE) 8 FT FIXT	190	948,963	0	1.0%	1.1%	-
	HALOGEN LAMP: < 50 WATTS	4	18,269	0	0.0%	0.0%	-
	HALOGEN LAMP: >= 50 WATTS	241	1,154,532	0	1.3%	1.3%	-
	HID FIXTURE: INTERIOR COMPACT 36-70 WATTS LAMP INCANDESCENT	16	80,062	0	0.1%	0.1%	-
	HID FIXTURE: INTERIOR COMPACT 36-70 WATTS LAMP MERCURY VAPOR	0	491	0	0.0%	0.0%	-
	HID FIXTURE: INTERIOR COMPACT 71-100 WATTS LAMP INCANDESCENT	36	170,261	0	0.2%	0.2%	-
	HID FIXTURE: INTERIOR COMPACT 71-100 WATTS LAMP MERCURY VAPOR	0	1,035	0	0.0%	0.0%	-
	HID FIXTURE: INTERIOR STANDARD 101-175 WATTS LAMP INCANDESCENT	57	319,714	0	0.3%	0.4%	-
	HID FIXTURE: INTERIOR STANDARD 101-175 WATTS LAMP MERCURY VAPOR	2	12,342	0	0.0%	0.0%	-
	OCCUPANCY SENSOR: CEILING MOUNTED	321	1,168,497	0	1.7%	1.4%	-
	OCCUPANCY SENSOR: WALL MOUNTED	122	518,768	0	0.6%	0.6%	-
	PHOTOCELL: LIGHTING	0	25,962	0	0.0%	0.0%	-
	REFLECTORS WITH DELAMPING 2 FT LAMP REMOVED	26	135,712	0	0.1%	0.2%	-
	REFLECTORS WITH DELAMPING 3 FT LAMP REMOVED	3	14,391	0	0.0%	0.0%	-
	REFLECTORS WITH DELAMPING 4 FT LAMP REMOVED	2,685	13,268,176	0	14.2%	15.5%	-
	REFLECTORS WITH DELAMPING 8 FT LAMP REMOVED	213	1,096,141	0	1.1%	1.3%	-
	REFLECTORS WITH DELAMPING HIGH-OUTPUT 8 FT LAMP REMOVED	42	207,256	0	0.2%	0.2%	-
	TIME CLOCK: LIGHTING	0	71,136	0	0.0%	0.1%	-
Indoor Lighting Total		**11,628**	**61,355,483**	**0**	**61.5%**	**71.6%**	**-**
Outdoor Lighting	HID FIXTURE: EXTERIOR 0-100 WATTS LAMP INCANDESCENT	0	736,885	0	0.0%	0.9%	-
	HID FIXTURE: EXTERIOR 0-100 WATTS LAMP MERCURY VAPOR	0	43,296	0	0.0%	0.1%	-
	HID FIXTURE: EXTERIOR 101-175 WATTS LAMP INCANDESCENT	0	285,483	0	0.0%	0.3%	-
	HID FIXTURE: EXTERIOR 101-175 WATTS LAMP MERCURY VAPOR	0	28,290	0	0.0%	0.0%	-
	HID FIXTURE: EXTERIOR >= 176 WATTS LAMP INCANDESCENT	0	843,837	0	0.0%	1.0%	-
	HID FIXTURE: EXTERIOR >= 176 WATTS LAMP MERCURY VAPOR	0	206,665	0	0.0%	0.2%	-
Outdoor Lighting Total		**0**	**2,144,455**	**0**	**0.0%**	**2.5%**	**-**
Space Conditioning	A/C AC < 65 KBTU/HR AIR-COOLED SINGLE PACKAGE	1,375	2,196,243	0	7.3%	2.6%	-
	A/C AC < 65 KBTU/HR AIR-COOLED SPLIT-SYSTEM	55	87,909	0	0.3%	0.1%	-
	A/C AC > 240 KBTU/HR AIR-COOLED SPLIT-SYS/SNG PKG	2,694	4,220,139	0	14.2%	4.9%	-
	A/C AC >= 135 & <= 240 KBTU/HR AIR-COOLED SPLIT-SYS/SNG PKG	515	761,860	0	2.7%	0.9%	-
	A/C AC >= 65 & < 135 KBTU/HR AIR-COOLED SPLIT-SYS/SNG PKG	1,155	1,783,114	0	6.1%	2.1%	-
	A/C HP < 65 KBTU/HR AIR-COOLED SINGLE PACKAGE	21	32,994	0	0.1%	0.0%	-
	A/C HP < 65 KBTU/HR AIR-COOLED SPLIT-SYSTEM	7	11,238	0	0.0%	0.0%	-
	A/C HP < 65 KBTU/HR WTR SOURCE SPLIT-SYS/SNG PKG	112	172,467	0	0.6%	0.2%	-
	A/C: PACKAGE TERMINAL	548	508,101	0	2.9%	0.6%	-
	ADJUSTABLE SPEED DRIVE: HVAC FAN 50 HP MAX	0	3,982,241	0	0.0%	4.6%	-
	EVAPORATIVE COOLER	38	106,569	0	0.2%	0.1%	-
	REFLECTIVE WINDOW FILM	434	2,692,228	0	2.3%	3.1%	-
	THERMOSTAT: SETBACK PROGRAMMABLE	0	2,590,869	0	0.0%	3.0%	-
	TIME CLOCK: HVAC	0	145,985	0	0.0%	0.2%	-
Space Conditioning Total		**6,953**	**19,291,957**	**0**	**36.8%**	**22.5%**	**-**

1998 PG&E Commercial Express Program
Gross kW, kWh, and Therm
By End Use and Measure

End Use	Measure Description	Gross kW	Gross kWh	Gross Thm	% of kW	% of kWh	% of Thm
Refrigeration	BALLAST: ELECTRONIC FOR DISPLAY CASE	2	14,750	0	0.0%	0.0%	-
	HEATLESS DOOR	1	18,624	0	0.0%	0.0%	-
	HUMIDISTAT CONTROL FOR ANTI-SWEAT HEATERS	16	142,277	0	0.1%	0.2%	-
	NIGHT COVERS FOR DISPLAY CASES	0	188,786	0	0.0%	0.2%	-
	REFRIG: AUTO CLOSER FOR COOLER/FREEZER	69	427,735	0	0.4%	0.5%	-
	REFRIG: CASE W/DOOR: LOW TEMPERATURE CASE	52	553,112	0	0.3%	0.6%	-
	REFRIG: CASE W/DOOR: MEDIUM TEMPERATURE CASE	18	188,991	0	0.1%	0.2%	-
	REFRIG: COOLER/FREEZER DOOR GASKETS	15	133,824	0	0.1%	0.2%	-
	REFRIG: SUCTION LINE INSULATION	0	69,520	0	0.0%	0.1%	-
	STRIP CURTAINS FOR WALK-IN	116	843,754	0	0.6%	1.0%	-
Refrigeration Total		**289**	**2,581,371**	**0**	**1.5%**	**3.0%**	**-**
Motors	MOTOR: 1 HP PREMIUM EFFICIENCY	2	10,960	0	0.0%	0.0%	-
	MOTOR: 1.5 HP PREMIUM EFFICIENCY	0	2,850	0	0.0%	0.0%	-
	MOTOR: 10 HP PREMIUM EFFICIENCY	3	16,213	0	0.0%	0.0%	-
	MOTOR: 100 HP PREMIUM EFFICIENCY	4	26,504	0	0.0%	0.0%	-
	MOTOR: 125 HP PREMIUM EFFICIENCY	3	22,134	0	0.0%	0.0%	-
	MOTOR: 15 HP PREMIUM EFFICIENCY	5	32,626	0	0.0%	0.0%	-
	MOTOR: 2 HP PREMIUM EFFICIENCY	1	7,419	0	0.0%	0.0%	-
	MOTOR: 20 HP PREMIUM EFFICIENCY	2	14,915	0	0.0%	0.0%	-
	MOTOR: 200 HP PREMIUM EFFICIENCY	5	31,538	0	0.0%	0.0%	-
	MOTOR: 25 HP PREMIUM EFFICIENCY	5	30,298	0	0.0%	0.0%	-
	MOTOR: 3 HP PREMIUM EFFICIENCY	1	7,031	0	0.0%	0.0%	-
	MOTOR: 30 HP PREMIUM EFFICIENCY	1	5,462	0	0.0%	0.0%	-
	MOTOR: 40 HP PREMIUM EFFICIENCY	4	23,202	0	0.0%	0.0%	-
	MOTOR: 5 HP PREMIUM EFFICIENCY	2	14,439	0	0.0%	0.0%	-
	MOTOR: 50 HP PREMIUM EFFICIENCY	5	30,083	0	0.0%	0.0%	-
	MOTOR: 60 HP PREMIUM EFFICIENCY	3	17,071	0	0.0%	0.0%	-
	MOTOR: 7.5 HP PREMIUM EFFICIENCY	1	6,735	0	0.0%	0.0%	-
	MOTOR: 75 HP PREMIUM EFFICIENCY	2	12,710	0	0.0%	0.0%	-
Motors Total		**49**	**312,190**	**0**	**0.3%**	**0.4%**	**-**
TOTAL		**18,920**	**85,685,456**	**0**	**100.0%**	**100.0%**	**-**

1998 PG&E Commercial Express Program
Gross kW, kWh, and Therm
By End Use and Business Type

End Use	Business Type	Gross kW	Gross kWh	Gross Therm	% of kW	% of kWh	% of Therm
Indoor Lighting	Office	2,789	13,159,793	0	14.7%	15.4%	-
	Retail	1,961	9,299,649	0	10.4%	10.9%	-
	Col/Univ	692	3,742,190	0	3.7%	4.4%	-
	School	2,155	10,339,918	0	11.4%	12.1%	-
	Grocery	180	1,170,667	0	1.0%	1.4%	-
	Restaurant	25	158,208	0	0.1%	0.2%	-
	Health Care/Hospital	646	3,622,149	0	3.4%	4.2%	-
	Hotel/Motel	836	6,863,826	0	4.4%	8.0%	-
	Warehouse	149	623,501	0	0.8%	0.7%	-
	Personal Service	172	960,923	0	0.9%	1.1%	-
	Community Service	940	5,240,905	0	5.0%	6.1%	-
	Misc. Commercial	1,082	6,173,756	0	5.7%	7.2%	-
Indoor Lighting Total		**11,628**	**61,355,483**	**0**	**61.5%**	**71.6%**	**-**
Outdoor Lighting	Office	0	107,838	0	0.0%	0.1%	-
	Retail	0	60,860	0	0.0%	0.1%	-
	Col/Univ	0	311,633	0	0.0%	0.4%	-
	School	0	634,631	0	0.0%	0.7%	-
	Grocery	0	40,770	0	0.0%	0.0%	-
	Restaurant	0	4,535	0	0.0%	0.0%	-
	Health Care/Hospital	0	1,443	0	0.0%	0.0%	-
	Hotel/Motel	0	303,137	0	0.0%	0.4%	-
	Warehouse	0	17,581	0	0.0%	0.0%	-
	Personal Service	0	0	0	0.0%	0.0%	-
	Community Service	0	281,145	0	0.0%	0.3%	-
	Misc. Commercial	0	380,882	0	0.0%	0.4%	-
Outdoor Lighting Total		**0**	**2,144,455**	**0**	**0.0%**	**2.5%**	**-**
Space Conditioning	Office	274	4,611,625	0	1.4%	5.4%	-
	Retail	43	640,353	0	0.2%	0.7%	-
	Col/Univ	3	34,338	0	0.0%	0.0%	-
	School	2	1,330,272	0	0.0%	1.6%	-
	Grocery	4	82,493	0	0.0%	0.1%	-
	Restaurant	14	36,518	0	0.1%	0.0%	-
	Health Care/Hospital	32	313,347	0	0.2%	0.4%	-
	Hotel/Motel	531	527,938	0	2.8%	0.6%	-
	Warehouse	9	143,283	0	0.0%	0.2%	-
	Personal Service	10	140,077	0	0.1%	0.2%	-
	Community Service	35	1,000,432	0	0.2%	1.2%	-
	Misc. Commercial	5,996	10,431,279	0	31.7%	12.2%	-
Space Conditioning Total		**6,953**	**19,291,957**	**0**	**36.8%**	**22.5%**	**-**
Refrigeration	Office	0	0	0	0.0%	0.0%	-
	Retail	5	44,509	0	0.0%	0.1%	-
	Col/Univ	0	0	0	0.0%	0.0%	-
	School	0	0	0	0.0%	0.0%	-
	Grocery	251	2,225,528	0	1.3%	2.6%	-
	Restaurant	9	76,628	0	0.0%	0.1%	-
	Health Care/Hospital	0	0	0	0.0%	0.0%	-
	Hotel/Motel	0	0	0	0.0%	0.0%	-
	Warehouse	17	120,432	0	0.1%	0.1%	-
	Personal Service	0	0	0	0.0%	0.0%	-
	Community Service	0	0	0	0.0%	0.0%	-
	Misc. Commercial	7	114,275	0	0.0%	0.1%	-
Refrigeration Total		**289**	**2,581,371**	**0**	**1.5%**	**3.0%**	**-**
Motors	Office	0	0	0	0.0%	0.0%	-
	Retail	0	0	0	0.0%	0.0%	-
	Col/Univ	0	0	0	0.0%	0.0%	-
	School	0	0	0	0.0%	0.0%	-
	Grocery	0	0	0	0.0%	0.0%	-
	Restaurant	0	0	0	0.0%	0.0%	-
	Health Care/Hospital	0	0	0	0.0%	0.0%	-
	Hotel/Motel	0	0	0	0.0%	0.0%	-
	Warehouse	0	0	0	0.0%	0.0%	-
	Personal Service	0	0	0	0.0%	0.0%	-
	Community Service	0	0	0	0.0%	0.0%	-
	Misc. Commercial	49	312,190	0	0.3%	0.4%	-
Motors Total		**49**	**312,190**	**0**	**0.3%**	**0.4%**	**-**
TOTAL		**18,920**	**85,685,456**	**0**	**100.0%**	**100.0%**	**-**

1998 PG&E Commercial Express Program
Avoided Costs and Shareholder Incentive
By End Use and Business Type

End Use	Business Type	Avoided Costs ($)	Shareholder Incentive ($)	% of Avoided Costs	% of Shareholder Incentive
Indoor Lighting	Office	7,420,150	1,033,563	17.3%	17.9%
	Retail	4,883,144	685,550	11.4%	11.9%
	Col/Univ	1,895,367	263,678	4.4%	4.6%
	School	5,849,301	775,541	13.6%	13.5%
	Grocery	595,208	82,270	1.4%	1.4%
	Restaurant	68,245	9,432	0.2%	0.2%
	Health Care/Hospital	1,887,419	263,742	4.4%	4.6%
	Hotel/Motel	2,823,057	407,712	6.6%	7.1%
	Warehouse	360,356	48,837	0.8%	0.8%
	Personal Service	496,573	68,250	1.2%	1.2%
	Community Service	2,630,986	364,121	6.1%	6.3%
	Misc. Commercial	3,224,137	451,088	7.5%	7.8%
Indoor Lighting Total		**32,133,943**	**4,453,785**	**74.7%**	**77.3%**
Outdoor Lighting	Office	41,837	6,015	0.1%	0.1%
	Retail	23,612	3,413	0.1%	0.1%
	Col/Univ	120,902	17,593	0.3%	0.3%
	School	246,213	35,743	0.6%	0.6%
	Grocery	15,817	2,291	0.0%	0.0%
	Restaurant	1,759	246	0.0%	0.0%
	Health Care/Hospital	560	79	0.0%	0.0%
	Hotel/Motel	117,606	17,126	0.3%	0.3%
	Warehouse	6,821	982	0.0%	0.0%
	Personal Service	0	0	0.0%	0.0%
	Community Service	109,074	15,718	0.3%	0.3%
	Misc. Commercial	144,915	20,960	0.3%	0.4%
Outdoor Lighting Total		**829,117**	**120,166**	**1.9%**	**2.1%**
Space Conditioning	Office	1,181,553	148,470	2.7%	2.6%
	Retail	164,612	20,336	0.4%	0.4%
	Col/Univ	9,110	1,148	0.0%	0.0%
	School	266,192	39,230	0.6%	0.7%
	Grocery	19,410	2,555	0.0%	0.0%
	Restaurant	17,021	1,786	0.0%	0.0%
	Health Care/Hospital	79,362	10,633	0.2%	0.2%
	Hotel/Motel	504,921	46,304	1.2%	0.8%
	Warehouse	32,569	4,575	0.1%	0.1%
	Personal Service	33,217	4,588	0.1%	0.1%
	Community Service	229,446	30,938	0.5%	0.5%
	Misc. Commercial	6,754,286	777,742	15.7%	13.5%
Space Conditioning Total		**9,291,698**	**1,088,303**	**21.6%**	**18.9%**
Refrigeration	Office	0	0	0.0%	0.0%
	Retail	7,504	963	0.0%	0.0%
	Col/Univ	0	0	0.0%	0.0%
	School	0	0	0.0%	0.0%
	Grocery	583,966	79,647	1.4%	1.4%
	Restaurant	16,790	2,214	0.0%	0.0%
	Health Care/Hospital	0	0	0.0%	0.0%
	Hotel/Motel	0	0	0.0%	0.0%
	Warehouse	17,851	2,643	0.0%	0.0%
	Personal Service	0	0	0.0%	0.0%
	Community Service	0	0	0.0%	0.0%
	Misc. Commercial	14,939	1,998	0.0%	0.0%
Refrigeration Total		**641,049**	**87,464**	**1.5%**	**1.5%**
Motors	Office	0	0	0.0%	0.0%
	Retail	0	0	0.0%	0.0%
	Col/Univ	0	0	0.0%	0.0%
	School	0	0	0.0%	0.0%
	Grocery	0	0	0.0%	0.0%
	Restaurant	0	0	0.0%	0.0%
	Health Care/Hospital	0	0	0.0%	0.0%
	Hotel/Motel	0	0	0.0%	0.0%
	Warehouse	0	0	0.0%	0.0%
	Personal Service	0	0	0.0%	0.0%
	Community Service	0	0	0.0%	0.0%
	Misc. Commercial	109,604	13,510	0.3%	0.2%
Motors Total		**109,604**	**13,510**	**0.3%**	**0.2%**
TOTAL		**43,005,412**	**5,763,228**	**100.0%**	**100.0%**

<500 kW Customers

			Retrofit Express										Express Efficiency	
			1994		1995		1996		1997		1998		1998	
End Use	Key Technologies	Unit of Measure	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated
Lighting	Compact Fluorescent Lamps	Lamp	67,021	573,666	39,826	311,215	23,611	186,032	40,017	341,436	2,946	20,900	20,475	157,750
	T-8 Lamps and Electronic Ballasts	Ballast	598,688	9,828,221	363,049	5,312,586	277,706	3,308,276	336,392	3,356,845	39,564	361,364	134,224	983,837
	Delamp Fluorescent Fixtures	Lamp	246,715	2,344,986	115,202	916,107	112,042	746,672	112,257	654,843	16,311	89,074	57,306	80,375
	Controls	Control	11,037	238,271	4,120	71,680	3,273	49,400	3,454	46,480	424	5,837	2,309	28,742
	Total End Use			14,255,237		7,145,589		4,589,556		4,692,276		497,480		1,278,290
HVAC	Central A/C : 0 <= tons < 5.4	A/C	1,627	730,235	967	556,703	1,210	782,069	1,991	1,346,648	73	41,360	383	72,231
	Central A/C : 5.4 <= tons < 11.3	A/C	189	118,503	146	100,973	132	102,956	227	198,468	38	24,870	74	26,375
	Central A/C : 11.3 <= tons < 20.0	A/C	18	10,086	19	19,500	21	23,166	39	50,528	4	7,210	1	750
	Central A/C : 20.0 <= tons < 63.3	A/C	24	22,804	10	31,878	15	30,039	17	38,732	6	12,925	2	2,500
	Adjustable Speed Drives	HP	1,341	61,875	1,528	62,925	849	38,040	2,556	102,220	22	880	1,167	45,437
	Set-Back Thermostat	Therm.	1,182	32,686	944	14,620	842	10,526	1,376	16,557	52	624	584	7,543
	Total End Use			1,926,818		944,167		1,168,938		1,969,716		103,338		383,985
TOTAL PROGRAM				16,833,948		8,467,864		5,927,679		6,919,368		600,819		1,701,035
	Unique Sites			5670		4459		3825		4199		409		1375

All Customers

ALL CUSTOMERS and for 1998 Express, Nonres New Construction

			Retrofit Express									
			1994		1995		1996		1997		1998	
End Use	Key Technologies	Unit of Measure	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated	Units Installed	Dollars Rebated
Lighting	Compact Fluorescent Lamps	Lamp	124,490	1,023,679	70,162	515,628	46,231	374,241	61,776	503,319	7,325	53,276
	T-8 Lamps and Electronic Ballasts	Ballast	1,094,903	17,095,934	619,342	8,999,651	522,934	6,412,492	567,902	5,522,549	72,746	666,167
	Delamp Fluorescent Fixtures	Lamp	447,055	3,901,655	192,007	1,531,919	156,031	1,045,073	195,558	1,089,210	23,162	126,604
	Controls	Control	23,543	503,959	8,936	163,927	7,092	109,912	6,785	89,354	1,171	18,356
	Total End Use			25,356,627		11,931,438		8,429,341		7,699,331		892,980
HVAC	Central A/C : 0 <= tons < 5.4	A/C	1,876	864,690	1,028	597,325	1,364	887,309	2,301	1,538,923	89	50,846
	Central A/C : 5.4 <= tons < 11.3	A/C	241	141,559	157	106,529	177	144,952	281	245,682	44	31,002
	Central A/C : 11.3 <= tons < 20.0	A/C	35	19,126	21	22,126	32	38,209	45	60,794	6	9,435
	Central A/C : 20.0 <= tons < 63.3	A/C	48	42,177	19	61,659	16	31,414	28	47,597	10	26,664
	Adjustable Speed Drives	HP	4,255	193,343	6,227	238,323	1,316	123,460	5,244	209,740	410	16,400
	Set-Back Thermostat	Therm.	1,373	37,451	984	15,175	908	11,257	1,589	19,001	58	696
	Total End Use			4,859,363		1,362,724		1,485,365		2,507,470		162,408
TOTAL PROGRAM				32,881,670		13,865,516		10,170,299		10,537,798		1,055,388

Express Efficiency			
1998 Commercial		1998 Com New Const.	
Units Installed	Dollars Rebated	Units Installed	Dollars Rebated
37,361	277,203	-	-
238,718	1,743,342	-	-
100,694	140,551	-	-
3,669	48,836	-	-
	2,289,184		-
899	178,195	1,026	205,765
243	88,700	351	135,779
28	20,475	64	45,827
15	17,750	284	830,525
4,447	172,465	-	-
632	8,135	-	-
	774,414		1,217,896
	3,159,439		1,223,591

B MODELING RESULTS

B.1 SELF-SELECTION

The logit model estimated for participation in the 1998 Express Efficiency Program. takes the following form:

$$P_{P_i} = \frac{e^{\beta Z_i}}{1 + e^{\beta Z_i}} \qquad (1)$$

where

P_{p_i} = the probability of participating in Program activities for the i^{th} customer

Z_i = the vector of explanatory variables corresponding to the i^{th} customer that affect the choice to participate

β = the vector of estimated coefficients that maximizes P_{P_i}.

The variables included in vector Z were premise characteristics that may have affected the decision to participate. Included among these characteristics were such variables as the total square footage of the facility, number of employees at the site, and whether the facility was owned or leased.

Next, an inverse Mills ratio was calculated using the estimated probability of participation. For participants, it was calculated as:

$$\text{Mills} = -\left[\frac{(1-P)\times\ln(1-P)}{P} + \ln P\right] \qquad (2)$$

For nonparticipants, it was calculated as:

$$\text{Mills} = \frac{(P)\times\ln(P)}{1-P} + \ln(1-P) \qquad (3)$$

where

P= the probability of participation.

Then, the regression model was estimated, incorporating the inverse Mills ratio as an additional independent variable.[1]

[1] Such an approach is called an analysis of covariance (ANCOVA).

Thus, the general form of the regression model was:

$$Y_i = \alpha + \beta_1 Mills_i + \beta_2 Part_i + \sum \beta_k X_{k,i} + \varepsilon_i \quad (4)$$

where

Y_i = the dependent variable of interest, e.g.., performance uncertainty

$Mills_I$ = the Mills ratio associated with the i^{th} customer

$Part_I$ = the binary variable indicating whether one participated in the Program

X_k = the vector of explanatory variables corresponding to the i^{th} customer that affected the dependent variable of interest

β_1 = a coefficient that reflected the change in the dependent variable associated with a one unit change in the Mills ratio

β_2 = a coefficient that reflected the change in the dependent variable associated with being a participant or not

β_k = a vector of coefficients that reflected the changes in the dependent variable associated with one unit changes in the explanatory variables

* Only one Mills ratio was required since the analysis is cross-sectional.

** Regression models were based on weighted data

Three logit models were estimated to predict the probability of being in one group or another. One model was estimated to predict whether a customer was in the participant group or in the in-state non-participant group. Another model was estimated to predict whether a customer was in the participant group or the out-of-state group. The third model was estimated to predict whether a customer was in the in-state non-participant group or the out-of-state group.

A few words are in order with respect to the second and third models. The term self selection is typically used to describe a situation in which subjects or customer with particular characteristics choose to join a program and these characteristics affect the program outcome in addition to the program itself. In terms of the in- and out-of-state groups, while customers may self-select into California, our focus was on whether any of the observed or unobserved differences between the two in-state groups and the out-of-state group affect the dependent variables, and if so, how to control for these confounding variables.

While there were some *observed* differences among the three groups in terms of firmographic characteristics, the creation of the Mills ratio addressed the question as to whether there were differences among the three groups that were *unobservable*. However, our ability to model the selection process was quite poor (i.e., the predictive accuracy of all logit models was quite low). One model was able to correctly predict group membership with only 58 percent accuracy, while the other two exhibited less than 50 percent accuracy, i.e., it performs worse than a simple coin flip to assign customers to the correct group. . Thus, given the available variables, our ability to model the effects of unobserved variables that may have affected participation *and* might also be related to the dependent variables (i.e., the program and market effects variables) was severely limited. Nevertheless, the calculated Mills ratios were included in the regressions models. However, there inclusion produced severe collinearity (condition indices greater than 200), and were therefore dropped from the model. The result was that while we were able to control statistically for *observed* differences among the three groups by including observed variables in the regression models, the effects of self selection due to *unobserved* variables might still produce biased results.

B.2 LOGISTIC AND REGRESSION MODEL RESULTS

In this section, we present the logistic and regression model results for the comparison between Participants and In-State Nonparticipants. Note that all statistical models were estimated on weighted data since all other findings presented in this study are based on analyses using weighted data.

Response Variable: GROUP

Response Levels: 2

Number of Observations: 475

Weight Variable: PARTWT

Sum of Weights: 524662009.71

Link Function: Logit

Ordered Value	GROUP	Count	Total Weight
1	PG&E Territory	290	258483616
2	Participants	185	266178394

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	727223131	694682389	.
SC	727223135	694682405	.
-2 LOG L	727223129	694682381	32540748 with 3 DF (p=0.0001)
Score	.	.	31759243 with 3 DF (p=0.0001)

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	-2.2968	0.000466	24246186.8	0.0001	.	.
FG135	1	0.9532	0.000208	20960979.9	0.0001	245.060546	2.594
FG140	1	0.6204	0.000185	11288391.9	0.0001	176.629676	1.860
SEG	1	0.0274	0.000075	134836.498	0.0001	19.213342	1.028

Association of Predicted Probabilities and Observed Responses

Concordant	= 58.2%	Somers' D	= 0.235
Discordant	= 34.7%	Gamma	= 0.253
Tied	= 7.1%	Tau-a	= 0.112
(53650 pairs)		c	= 0.618

Dependent Variable: BR0921 BR092_1 bill savings might be less

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	8705989.5152	8705989.5152	1.123	0.2899
Error	472	3659698505.2	7753598.5279		
C Total	473	3668404494.7			

Root MSE	2784.52842	R-square	0.0024
Dep Mean	6.55443	Adj R-sq	0.0003
C.V.	42483.17518		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.939785	0.38337907	18.102	0.0001
GROUP	1	-0.257154	0.24268088	-1.060	0.2899

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0922 BR092_2 time/hassel to get info

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	11646518.022	11646518.022	1.265	0.2613
Error	480	4418909792	9206062.0667		
C Total	481	4430556310			

Root MSE	3034.14932	R-square	0.0026
Dep Mean	4.68185	Adj R-sq	0.0006
C.V.	64806.58718		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	4.238483	0.41544572	10.202	0.0001
GROUP	1	0.295110	0.26237539	1.125	0.2613

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0923 BR092_3 time/hassel to pick contractor

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	52820466.345	26410233.173	2.841	0.0594
Error	453	4210434985.3	9294558.4664		
C Total	455	4263255451.6			

Root MSE	3048.69783	R-square	0.0124
Dep Mean	4.64607	Adj R-sq	0.0080
C.V.	65618.82344		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	3.881563	0.51761738	7.499	0.0001
GROUP	1	0.616171	0.27520775	2.239	0.0256
FG142	1	-0.068407	0.10124888	-0.676	0.4996

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG142	1	FG142 firm is X location

Dependent Variable: BR0924 BR092_4 non-utility info not reliable

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1259234.4333	1259234.4333	0.136	0.7120
Error	467	4308679449.4	9226294.3242		
C Total	468	4309938683.8			

Root MSE	3037.48158	R-square	0.0003
Dep Mean	5.85351	Adj R-sq	-0.0018
C.V.	51891.64746		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	5.706048	0.42071758	13.563	0.0001
GROUP	1	0.098255	0.26595910	0.369	0.7120

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0925 BR092_5 info not helpful

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	17493978.956	17493978.956	2.121	0.1460
Error	455	3752462508.6	8247170.3485		
C Total	456	3769956487.5			

Root MSE	2871.78870	R-square	0.0046
Dep Mean	4.60182	Adj R-sq	0.0025
C.V.	62405.54813		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	4.049911	0.39951036	10.137	0.0001
GROUP	1	0.368590	0.25307636	1.456	0.1460

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0926 BR092_6 lack of financing

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	60082287.773	60082287.773	4.519	0.0340
Error	475	6315081189.3	13294907.767		
C Total	476	6375163477.1			

Root MSE	3646.21828	R-square	0.0094
Dep Mean	5.26455	Adj R-sq	0.0073
C.V.	69259.87576		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	4.258673	0.49891471	8.536	0.0001
GROUP	1	0.672691	0.31643546	2.126	0.0340

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0927 BR092_7 not available from supplier

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	82158245.186	82158245.186	9.628	0.0020
Error	453	3865604972.4	8533344.31		
C Total	454	3947763217.6			

Root MSE	2921.18885	R-square	0.0208
Dep Mean	3.87634	Adj R-sq	0.0186
C.V.	75359.49141		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	2.671473	0.40933906	6.526	0.0001
GROUP	1	0.803837	0.25906088	3.103	0.0020

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0928 BR092_8 ee falls below other priorities

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	201989171.39	201989171.39	21.189	0.0001
Error	466	4442177910.5	9532570.6234		
C Total	467	4644167081.9			

Root MSE	3087.48613	R-square	0.0435
Dep Mean	5.47285	Adj R-sq	0.0414
C.V.	56414.57912		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	3.610254	0.42648766	8.465	0.0001
GROUP	1	1.240814	0.26955509	4.603	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0929 BR092_9 businesses should consider ee

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	109331.16343	109331.16343	0.029	0.8650
Error	482	1819897080.5	3775720.0841		
C Total	483	1820006411.7			

Root MSE	1943.12122	R-square	0.0001
Dep Mean	8.88026	Adj R-sq	-0.0020
C.V.	21881.35855		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	8.923054	0.26509020	33.660	0.0001
GROUP	1	-0.028522	0.16761279	-0.170	0.8650

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR092_10 BR092_10 ee products reduce my bill

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	84185915.323	42092957.662	9.151	0.0001
Error	476	2189541056.2	4599876.1685		
C Total	478	2273726971.5			

Root MSE	2144.73219	R-square	0.0370
Dep Mean	8.33569	Adj R-sq	0.0330
C.V.	25729.50611		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.750506	0.40264543	19.249	0.0001
GROUP	1	-0.185599	0.18961188	-0.979	0.3282
FG132	1	0.213578	0.05476748	3.900	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees

Dependent Variable: BR092_11 BR092_11 I will pursue ee investments

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	95001986.705	47500993.353	10.981	0.0001
Error	192	830575303.45	4325913.0388		
C Total	194	925577290.15			

Root MSE	2079.88294	R-square	0.1026
Dep Mean	7.30989	Adj R-sq	0.0933
C.V.	28452.99249		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.755349	0.66738217	14.617	0.0001
GROUP	1	-0.800265	0.36088761	-2.217	0.0278
FG137	1	-0.562442	0.14149426	-3.975	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG137	1	FG137 firm is X active in equip purchase

Dependent Variable: DI131 DI131 saving money is important for firm

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	75301036.631	75301036.631	21.245	0.0001
Error	483	1711977384.6	3544466.6349		
C Total	484	1787278421.3			

Root MSE	1882.67539	R-square	0.0421
Dep Mean	8.89649	Adj R-sq	0.0401
C.V.	21162.00917		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	10.018776	0.25666013	39.035	0.0001
GROUP	1	-0.748193	0.16232612	-4.609	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: DI1312 DI1312 conserve energy=good corp citizen

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	6796622.957	6796622.957	2.422	0.1203
Error	483	1355139420.8	2805671.6787		
C Total	484	1361936043.8			

Root MSE	1675.01393	R-square	0.0050
Dep Mean	9.04939	Adj R-sq	0.0029
C.V.	18509.69623		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.386558	0.22835020	41.106	0.0001
GROUP	1	-0.224781	0.14442135	-1.556	0.1203

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: DI1313 DI1313 ee is as good as/better than se

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	30349837.388	15174918.694	5.783	0.0036
Error	189	495919513.58	2623912.7702		
C Total	191	526269350.96			

Root MSE	1619.84961	R-square	0.0577
Dep Mean	8.08262	Adj R-sq	0.0477
C.V.	20041.14200		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.546921	0.54440056	17.537	0.0001
GROUP	1	-0.497475	0.29195761	-1.704	0.0900
FG137	1	-0.309741	0.10925649	-2.835	0.0051

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG137	1	FG137 firm is X active in equip purchase

Dependent Variable: DI1314 DI1314 ee has important benefits

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	32027304.716	32027304.716	6.937	0.0087
Error	476	2197662595.3	4616938.2254		
C Total	477	2229689900			

Root MSE	2148.70617	R-square	0.0144
Dep Mean	7.98189	Adj R-sq	0.0123
C.V.	26919.76464		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	8.723873	0.29686291	29.387	0.0001
GROUP	1	-0.493159	0.18724210	-2.634	0.0087

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: DI1315 DI1315 ee equip is easy to use/understnd

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	11556910.002	11556910.002	1.806	0.1796
Error	472	3020571432.6	6399515.7471		
C Total	473	3032128342.6			

Root MSE	2529.72642	R-square	0.0038
Dep Mean	7.02821	Adj R-sq	0.0017
C.V.	35993.89878		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.470309	0.34690866	21.534	0.0001
GROUP	1	-0.295860	0.22016002	-1.344	0.1796

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: DI1316 DI1316 I actively advocate ee to others

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	90236074.502	30078691.501	5.407	0.0014
Error	186	1034713937.2	5562978.1572		
C Total	189	1124950011.7			

Root MSE	2358.59665	R-square	0.0802
Dep Mean	6.46243	Adj R-sq	0.0654
C.V.	36497.06770		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.551331	0.96770805	7.803	0.0001
GROUP	1	0.647812	0.43219788	1.499	0.1356
FG134	1	-0.782929	0.40911544	-1.914	0.0572
FG137	1	-0.473536	0.16356366	-2.895	0.0042

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG134	1	FG134 specific person monitors energy us
FG137	1	FG137 firm is X active in equip purchase

Dependent Variable: DI1317 DI1317 I regularly hear about ee

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	303910791.36	151955395.68	16.883	0.0001
Error	470	4230181997.7	9000387.2291		
C Total	472	4534092789.1			

Root MSE	3000.06454	R-square	0.0670
Dep Mean	5.45545	Adj R-sq	0.0631
C.V.	54992.02301		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.155990	0.53428723	13.394	0.0001
GROUP	1	0.381864	0.26514586	1.440	0.1505
FG134	1	-1.532955	0.26528963	-5.778	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG134	1	FG134 specific person monitors energy us

Dependent Variable: DM101 DM101 importance of ee to decision maker

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	11675797.577	3891932.5256	7.059	0.0001
Error	465	256375048.93	551344.19125		
C Total	468	268050846.51			

Root MSE	742.52555	R-square	0.0436
Dep Mean	1.70191	Adj R-sq	0.0374
C.V.	43628.94267		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.065308	0.17057814	6.245	0.0001
GROUP	1	0.205537	0.06696935	3.069	0.0023
FG132	1	0.008300	0.01915504	0.433	0.6650
FG134	1	0.199499	0.06634337	3.007	0.0028

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG134	1	FG134 specific person monitors energy us

Dependent Variable: DM107

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	18481782.256	9240891.128	1.770	0.1782
Error	67	349738195.51	5219973.0673		
C Total	69	368219977.77			

Root MSE	2284.72604	R-square	0.0502
Dep Mean	3.94171	Adj R-sq	0.0218
C.V.	57962.85359		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	3.308339	0.82547812	4.008	0.0002
GROUP	1	0.741221	0.45146801	1.642	0.1053
SEG	1	-0.173478	0.18026172	-0.962	0.3393

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
SEG	1	Segment

Dependent Variable: DM108 DM108 knowledge of ee prod avail/perform

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	5	128511068.38	25702213.677	5.956	0.0001
Error	166	716343797.67	4315324.0823		
C Total	171	844854866.05			

Root MSE	2077.33581	R-square	0.1521
Dep Mean	5.44387	Adj R-sq	0.1266
C.V.	38159.19560		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.068933	1.05357514	6.709	0.0001
GROUP	1	-0.102256	0.37919893	-0.270	0.7878
FG133	1	0.179964	0.12443614	1.446	0.1500
FG137	1	-0.360559	0.14598052	-2.470	0.0145
FG140	1	0.175436	0.39861251	0.440	0.6604
SEG	1	-0.633212	0.14672220	-4.316	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG133	1	FG133 total square footage of facility
FG137	1	FG137 firm is X active in equip purchase
FG140	1	FG140 remodeled space since 1/96
SEG	1	Segment

Dependent Variable: DM109 DM109 implementing ee reduces bill by X

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	4462698385.5	1487566128.5	4.437	0.0052
Error	139	46598835315	335243419.53		
C Total	142	51061533701			

Root MSE	18309.65373	R-square	0.0874
Dep Mean	25.54713	Adj R-sq	0.0677
C.V.	71670.09657		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	14.059716	7.26719867	1.935	0.0551
GROUP	1	-1.315668	3.72051961	-0.354	0.7242
FG137	1	1.378901	1.37815475	1.001	0.3188
FG142	1	4.152654	1.22846290	3.380	0.0009

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG137	1	FG137 firm is X active in equip purchase
FG142	1	FG142 firm is X location

II. In this section, we present the logistic and regression model results for the comparison between the In-State Nonparticipants and the Out-of-State Comparison Group.

Response Variable: GROUP

Response Levels: 2
Number of Observations: 508
Weight Variable: PARTWT
Sum of Weights: 524372396.12
Link Function: Logit

Ordered Value	GROUP	Count	Total Weight
1	Low-DSM States	218	265888780
2	PG&E Territory	290	258483616

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	726829919	718670545	.
SC	726829923	718670558	.
-2 LOG L	726829917	718670539	8159377.8 with 2 DF (p=0.0001)
Score	.	.	8115960.3 with 2 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	1.0937	0.00039	7857699.26	0.0001	.	.
FG135	1	-0.3953	0.00019	4316164.15	0.0001	-102.804261	0.673
FG140	1	-0.3363	0.000182	3408240.09	0.0001	-91.327816	0.714

Association of Predicted Probabilities and Observed Responses

Concordant	= 42.7%	Somers' D	= 0.136
Discordant	= 29.2%	Gamma	= 0.189
Tied	= 28.1%	Tau-a	= 0.067
(63220 pairs)		c	= 0.568

Dependent Variable: BR0921 BR092_1 bill savings might be less

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	36880587.419	18440293.709	2.781	0.0629
Error	507	3361814691.5	6630798.2081		
C Total	509	3398695278.9			

Root MSE	2575.03363	R-square	0.0109
Dep Mean	6.46799	Adj R-sq	0.0069
C.V.	39811.98208		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.974011	0.62030280	11.243	0.0001
GROUP	1	0.041503	0.22482417	0.185	0.8536
FG132	1	-0.162610	0.06899655	-2.357	0.0188

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees

Dependent Variable: BR0922 BR092_2 time/hassel to get info

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	33880876.464	16940438.232	2.171	0.1151
Error	513	4002763556	7802658.0039		
C Total	515	4036644432.4			

Root MSE	2793.32383	R-square	0.0084
Dep Mean	5.05684	Adj R-sq	0.0045
C.V.	55238.47237		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	3.687292	0.66831869	5.517	0.0001
GROUP	1	0.457570	0.24119404	1.897	0.0584
SEG	1	0.086618	0.09999668	0.866	0.3868

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
SEG	1	Segment

Dependent Variable: BR0923 BR092_3 time/hassel to pick contractor

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	74927038.217	37463519.109	4.312	0.0139
Error	488	4240121745.6	8688774.0689		
C Total	490	4315048783.8			

Root MSE	2947.67265	R-square	0.0174
Dep Mean	5.25124	Adj R-sq	0.0133
C.V.	56132.90948		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	4.100553	0.69607107	5.891	0.0001
GROUP	1	0.641756	0.26317658	2.439	0.0151
FG142	1	-0.181865	0.09958021	-1.826	0.0684

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG142	1	FG142 firm is X location

Dependent Variable: BR0924 BR092_4 non-utility info not reliable

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	8525829.3039	8525829.3039	1.141	0.2860
Error	498	3721278290.6	7472446.3667		
C Total	499	3729804119.9			

Root MSE	2733.57758	R-square	0.0023
Dep Mean	5.77564	Adj R-sq	0.0003
C.V.	47329.44024		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.416751	0.61214620	10.482	0.0001
GROUP	1	-0.257097	0.24069108	-1.068	0.2860

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0925 BR092_5 info not helpful

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	107869860.2	35956620.066	9.240	0.0001
Error	200	778321729.24	3891608.6462		
C Total	203	886191589.44			

Root MSE	1972.71606	R-square	0.1217
Dep Mean	5.25380	Adj R-sq	0.1085
C.V.	37548.37973		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.121143	0.96959530	9.407	0.0001
GROUP	1	-0.637687	0.34083988	-1.871	0.0628
FG133	1	-0.568988	0.11325317	-5.024	0.0001
FG137	1	-0.310974	0.12795282	-2.430	0.0160

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG133	1	FG133 total square footage of facility
FG137	1	FG137 firm is X active in equip purchase

Dependent Variable: BR0926 BR092_6 lack of financing

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	57054302.915	28527151.457	2.585	0.0765
Error	475	5242656879.1	11037172.377		
C Total	477	5299711182			

Root MSE	3322.22401	R-square	0.0108
Dep Mean	5.43394	Adj R-sq	0.0066
C.V.	61138.39852		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.956954	0.84160706	8.266	0.0001
GROUP	1	-0.383118	0.30197617	-1.269	0.2052
FG133	1	-0.172263	0.08603672	-2.002	0.0458

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG133	1	FG133 total square footage of facility

Dependent Variable: BR0927 BR092_7 not available from supplier

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	26231816.711	26231816.711	2.950	0.0865
Error	482	4286696526	8893561.2574		
C Total	483	4312928342.8			

Root MSE	2982.20745	R-square	0.0061
Dep Mean	4.50618	Adj R-sq	0.0040
C.V.	66180.36808		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	3.368436	0.67560827	4.986	0.0001
GROUP	1	0.455355	0.26513936	1.717	0.0865

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: BR0928 BR092_8 ee falls below other priorities

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	30190816.274	10063605.425	1.231	0.2977
Error	489	3996593874.9	8172993.6092		
C Total	492	4026784691.2			

Root MSE	2858.84480	R-square	0.0075
Dep Mean	5.96208	Adj R-sq	0.0014
C.V.	47950.47469		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.401905	0.77750875	8.234	0.0001
GROUP	1	-0.398467	0.25303895	-1.575	0.1160
FG134	1	0.196888	0.25789325	0.763	0.4456
SEG	1	0.092146	0.10362262	0.889	0.3743

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG134	1	FG134 specific person monitors energy us
SEG	1	Segment

Dependent Variable: BR0929 BR092_9 businesses should consider ee

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	66922717.65	33461358.825	7.824	0.0005
Error	500	2138286441.6	4276572.8831		
C Total	502	2205209159.2			

Root MSE	2067.98764	R-square	0.0303
Dep Mean	8.53463	Adj R-sq	0.0265
C.V.	24230.53862		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.682843	0.48492977	19.968	0.0001
GROUP	1	-0.617384	0.18292911	-3.375	0.0008
FG142	1	0.160279	0.06910357	2.319	0.0208

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG142	1	FG142 firm is X location

Dependent Variable: BR092_10 BR092_10 ee products reduce my bill

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	74648045.73	37324022.865	7.868	0.0004
Error	499	2367104459.2	4743696.311		
C Total	501	2441752504.9			

Root MSE	2178.00283	R-square	0.0306
Dep Mean	8.05938	Adj R-sq	0.0267
C.V.	27024.44907		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.952818	0.51362941	15.484	0.0001
GROUP	1	-0.236162	0.19304764	-1.223	0.2218
FG142	1	0.280989	0.07296691	3.851	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG142	1	FG142 firm is X location

Dependent Variable: BR092_11 BR092_11 I will pursue ee investments

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	175496633.97	87748316.984	17.704	0.0001
Error	215	1065604028.9	4956297.8089		
C Total	217	1241100662.9			

Root MSE	2226.27442	R-square	0.1414
Dep Mean	6.72160	Adj R-sq	0.1334
C.V.	33121.20724		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.336137	0.87972653	10.613	0.0001
GROUP	1	-0.406399	0.35584505	-1.142	0.2547
FG137	1	-0.743062	0.13257129	-5.605	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG137	1	FG137 firm is X active in equip purchase

Dependent Variable: DI131 DI131 saving money is important for firm

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	37196734.197	18598367.098	5.969	0.0030
Error	219	682372434.93	3115855.8673		
C Total	221	719569169.13			

Root MSE	1765.17871	R-square	0.0517
Dep Mean	8.50845	Adj R-sq	0.0430
C.V.	20746.18668		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	10.502410	0.69050318	15.210	0.0001
GROUP	1	-0.605099	0.27976676	-2.163	0.0316
FG137	1	-0.242181	0.10378096	-2.334	0.0205

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG137	1	FG137 firm is X active in equip purchase

Dependent Variable: DI1312 DI1312 conserve energy=good corp citizen

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	6002238.4655	6002238.4655	1.642	0.2006
Error	519	1896794960.1	3654710.9058		
C Total	520	1902797198.6			

Root MSE	1911.72982	R-square	0.0032
Dep Mean	8.83138	Adj R-sq	0.0012
C.V.	21647.01733		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.359470	0.42023881	22.272	0.0001
GROUP	1	-0.211237	0.16483122	-1.282	0.2006

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: DI1313 DI1313 ee is as good as/better than se

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1432961.194	1432961.194	0.313	0.5759
Error	504	2305567562.8	4574538.8151		
C Total	505	2307000524			

Root MSE	2138.81715	R-square	0.0006
Dep Mean	7.75714	Adj R-sq	-0.0014
C.V.	27572.23593		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	8.018418	0.47605559	16.843	0.0001
GROUP	1	-0.104406	0.18654505	-0.560	0.5759

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: DI1314 DI1314 ee has important benefits

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	56495944.697	28247972.348	6.012	0.0026
Error	485	2278869069.9	4698699.1133		
C Total	487	2335365014.6			

Root MSE	2167.64829	R-square	0.0242
Dep Mean	7.54524	Adj R-sq	0.0202
C.V.	28728.68445		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.687550	0.54707983	14.052	0.0001
GROUP	1	-0.280237	0.19606781	-1.429	0.1536
FG133	1	0.167189	0.05583608	2.994	0.0029

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG133	1	FG133 total square footage of facility

Dependent Variable: DI1315 DI1315 ee equip is easy to use/understnd

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	227209873.64	113604936.82	19.352	0.0001
Error	503	2952868284.7	5870513.4885		
C Total	505	3180078158.4			

Root MSE	2422.91426	R-square	0.0714
Dep Mean	6.37246	Adj R-sq	0.0678
C.V.	38021.66761		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.940184	0.58839744	13.495	0.0001
GROUP	1	-1.023422	0.21200521	-4.827	0.0001
FG132	1	0.264014	0.06503128	4.060	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees

Dependent Variable: DI1316 DI1316 I actively advocate ee to others

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	303513743.74	101171247.91	17.965	0.0001
Error	212	1193882192.1	5631519.7741		

Source	DF	Sum of Squares
C Total	215	1497395935.9

Root MSE	2373.08234	R-square	0.2027
Dep Mean	5.75035	Adj R-sq	0.1914
C.V.	41268.49026		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	13.507838	1.08042420	12.502	0.0001
GROUP	1	-2.021070	0.37982580	-5.321	0.0001
FG134	1	-1.644679	0.39514022	-4.162	0.0001
FG137	1	-0.100331	0.14776725	-0.679	0.4979

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG134	1	FG134 specific person monitors energy us
FG137	1	FG137 firm is X active in equip purchase

Dependent Variable: DI1317 DI1317 I regularly hear about ee

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	124827325.4	124827325.4	14.353	0.0002
Error	517	4496271552.9	8696850.199		
C Total	518	4621098878.3			

Root MSE	2949.04225	R-square	0.0270
Dep Mean	5.03334	Adj R-sq	0.0251
C.V.	58590.20459		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.448907	0.65020629	11.456	0.0001
GROUP	1	-0.965575	0.25486616	-3.789	0.0002

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	

Dependent Variable: DM101 DM101 importance of ee to decision maker

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	9	7378051.1162	819783.45736	2.052	0.0357
Error	194	77488585.832	399425.70016		
C Total	203	84866636.948			

Root MSE	632.00135	R-square	0.0869
Dep Mean	1.92219	Adj R-sq	0.0446
C.V.	32879.19630		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	0.415957	0.47356978	0.878	0.3808
GROUP	1	0.264729	0.11713545	2.260	0.0249
FG132	1	0.003215	0.04664894	0.069	0.9451
FG133	1	-0.009174	0.04735470	-0.194	0.8466
FG134	1	0.213891	0.11644534	1.837	0.0678
FG136	1	0.023375	0.09220022	0.254	0.8001
FG137	1	0.012546	0.04449703	0.282	0.7783
FG140	1	0.173137	0.12392616	1.397	0.1640
FG142	1	0.031153	0.04256667	0.732	0.4651
SEG	1	0.047988	0.04525524	1.060	0.2903

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility
FG134	1	FG134 specific person monitors energy us
FG136	1	FG136 firm pays X much of utility bill l
FG137	1	FG137 firm is X active in equip purchase
FG140	1	FG140 remodeled space since 1/96
FG142	1	FG142 firm is X location
SEG	1	Segment

Dependent Variable: DM107

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	9435246.5573	4717623.2787	0.692	0.5050
Error	55	375074057.86	6819528.3247		
C Total	57	384509304.41			

Root MSE	2611.42266	R-square	0.0245
Dep Mean	4.19669	Adj R-sq	-0.0109
C.V.	62225.72335		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	5.961804	1.78283341	3.344	0.0015
GROUP	1	-0.492277	0.70591552	-0.697	0.4885
SEG	1	-0.245006	0.25757431	-0.951	0.3457

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
SEG	1	Segment

Dependent Variable: DM108 DM108 knowledge of ee prod avail/perform

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	548178114.74	182726038.25	31.280	0.0001
Error	455	2657909815.9	5841560.035		
C Total	458	3206087930.7			

Root MSE	2416.93195	R-square	0.1710
Dep Mean	5.52391	Adj R-sq	0.1655
C.V.	43754.03000		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.975587	0.66997957	10.412	0.0001
GROUP	1	-0.717147	0.21995038	-3.260	0.0012
FG133	1	0.431739	0.06313732	6.838	0.0001
SEG	1	-0.425883	0.09172026	-4.643	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG133	1	FG133 total square footage of facility
SEG	1	Segment

Dependent Variable: DM109 DM109 implementing ee reduces bill by X

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	2195672443.1	1097836221.6	2.328	0.0988
Error	398	187655994353	471497473.25		
C Total	400	189851666797			

Root MSE	21713.99257	R-square	0.0116
Dep Mean	26.08292	Adj R-sq	0.0066
C.V.	83249.84029		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	18.925044	5.65045897	3.349	0.0009
GROUP	1	1.193384	2.08535021	0.572	0.5675
FG142	1	1.627203	0.79188380	2.055	0.0405

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG142	1	FG142 firm is X location

III. In this section, we present the logistic and regression model results for the comparison between the In-State Nonparticipants and the Out-of-State Comparison Group.

Response Variable: GROUP

Response Levels: 2
Number of Observations: 403
Weight Variable: PARTWT
Sum of Weights: 532067174.01
Link Function: Logit

Ordered Value	GROUP	Count	Total Weight
1	Low-DSM States	218	265888780
2	Participants	185	266178394

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	737601567	729814064	.
SC	737601571	729814076	.
-2 LOG L	737601565	729814058	7787507.3 with 2 DF (p=0.0001)
Score	.	.	7735486.2 with 2 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	-1.0074	0.000392	6606638.82	0.0001	.	.
FG135	1	0.5157	0.000211	5971277.75	0.0001	136.776381	1.675
FG140	1	0.2412	0.000176	1880795.63	0.0001	76.032167	1.273

Association of Predicted Probabilities and Observed Responses

Concordant	= 42.5%	Somers' D	= 0.132
Discordant	= 29.3%	Gamma	= 0.184
Tied	= 28.2%	Tau-a	= 0.066
(40330 pairs)		c	= 0.566

Dependent Variable: BR0921 BR092_1 bill savings might be less

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	204087913.8	68029304.6	9.055	0.0001
Error	373	2802184954.8	7512560.2007		
C Total	376	3006272868.6			

Root MSE	2740.90500	R-square	0.0679
Dep Mean	6.50639	Adj R-sq	0.0604
C.V.	42126.34709		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	8.119023	0.47426208	17.119	0.0001
GROUP	1	-0.203428	0.12803795	-1.589	0.1130
FG132	1	-0.440832	0.08786673	-5.017	0.0001
FG133	1	0.164739	0.08487411	1.941	0.0530

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility

Dependent Variable: BR0922 BR092_2 time/hassel to get info

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	263484038.02	87828012.673	9.848	0.0001
Error	376	3353240281.2	8918192.2373		
C Total	379	3616724319.2			

Root MSE	2986.33425	R-square	0.0729
Dep Mean	4.79599	Adj R-sq	0.0655
C.V.	62267.29572		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.047002	0.51411108	11.762	0.0001
GROUP	1	0.202987	0.13869940	1.464	0.1442
FG132	1	-0.350865	0.09386254	-3.738	0.0002
FG133	1	-0.060661	0.09107935	-0.666	0.5058

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility

Dependent Variable: BR0923   BR092_3 time/hassel to pick contractor

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	355797855.18	88949463.796	8.521	0.0001
Error	364	3799711304.6	10438767.32		
C Total	368	4155509159.8			

Root MSE	3230.90813	R-square	0.0856
Dep Mean	4.92734	Adj R-sq	0.0756
C.V.	65570.98586		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	3.548421	0.82408988	4.306	0.0001
GROUP	1	0.625187	0.15365087	4.069	0.0001
FG132	1	-0.245938	0.10529635	-2.336	0.0201
FG133	1	0.045798	0.10517893	0.435	0.6635
FG140	1	0.633585	0.31810953	1.992	0.0471

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility
FG140	1	FG140 remodeled space since 1/96

Dependent Variable: BR0924 BR092_4 non-utility info not reliable

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	38827846.034	19413923.017	1.937	0.1455
Error	386	3868352012.9	10021637.339		
C Total	388	3907179858.9			

Root MSE	3165.69698	R-square	0.0099
Dep Mean	5.72576	Adj R-sq	0.0048
C.V.	55288.64772		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.442447	0.42934731	15.005	0.0001
GROUP	1	-0.073079	0.13951903	-0.524	0.6007
SEG	1	-0.218332	0.11587605	-1.884	0.0603

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
SEG	1	Segment

Dependent Variable: BR0925 BR092_5 info not helpful

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	341965517.92	85491379.481	10.013	0.0001
Error	348	2971344332.6	8538345.7833		
C Total	352	3313309850.5			

Root MSE	2922.04479	R-square	0.1032
Dep Mean	4.58543	Adj R-sq	0.0929
C.V.	63724.56961		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	5.874249	0.54846289	10.710	0.0001
GROUP	1	0.242737	0.14083809	1.724	0.0857
FG132	1	-0.504261	0.09716679	-5.190	0.0001
FG133	1	0.145657	0.09213972	1.581	0.1148
FG142	1	-0.101448	0.11211076	-0.905	0.3661

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility
FG142	1	FG142 firm is X location

Dependent Variable: BR0926 BR092_6 lack of financing

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	104659607.14	34886535.713	2.388	0.0685
Error	388	5667412500.3	14606733.248		
C Total	391	5772072107.4			

Root MSE	3821.87562	R-square	0.0181
Dep Mean	5.13702	Adj R-sq	0.0105
C.V.	74398.74068		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	5.728093	0.82584737	6.936	0.0001
GROUP	1	0.142231	0.16883760	0.842	0.4001
FG132	1	-0.234915	0.10146380	-2.315	0.0211
FG140	1	0.057397	0.33823755	0.170	0.8653

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG140	1	FG140 remodeled space since 1/96

Dependent Variable: BR0927 BR092_7 not available from supplier

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	88617407.57	22154351.893	3.520	0.0096
Error	112	704847907.61	6293284.8894		
C Total	116	793465315.18			

Root MSE	2508.64204	R-square	0.1117
Dep Mean	3.73375	Adj R-sq	0.0800
C.V.	67188.20618		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	4.516700	0.97597919	4.628	0.0001
GROUP	1	0.275300	0.26234464	1.049	0.2963
FG132	1	0.351803	0.16283024	2.161	0.0329
FG133	1	-0.513513	0.17606242	-2.917	0.0043
FG137	1	-0.429193	0.18766888	-2.287	0.0241

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility
FG137	1	FG137 firm is X active in equip purchase

Dependent Variable: BR0928 BR092_8 ee falls below other priorities

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	289255657.07	144627828.53	15.951	0.0001
Error	389	3527013827.3	9066873.5921		
C Total	391	3816269484.4			

Root MSE	3011.12497	R-square	0.0758
Dep Mean	5.30578	Adj R-sq	0.0710
C.V.	56751.81370		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	3.138940	0.40718921	7.709	0.0001
GROUP	1	0.448953	0.13175644	3.407	0.0007
SEG	1	0.486497	0.10896580	4.465	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
SEG	1	Segment

Dependent Variable: BR0929   BR092_9 businesses should consider ee

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	155184115.66	51728038.552	10.049	0.0001
Error	389	2002336541.4	5147394.7079		
C Total	392	2157520657			

Root MSE	2268.78706	R-square	0.0719
Dep Mean	8.56361	Adj R-sq	0.0648
C.V.	26493.33880		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.583944	0.45843876	16.543	0.0001
GROUP	1	-0.285498	0.10326993	-2.765	0.0060
FG132	1	0.257172	0.06035376	4.261	0.0001
FG134	1	0.330507	0.20531874	1.610	0.1083

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG134	1	FG134 specific person monitors energy us

Dependent Variable: BR092_10   BR092_10 ee products reduce my bill

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	239336235.15	79778745.049	15.498	0.0001
Error	377	1940735742.2	5147840.165		
C Total	380	2180071977.3			

Root MSE	2268.88523	R-square	0.1098
Dep Mean	8.19765	Adj R-sq	0.1027
C.V.	27677.25503		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.107844	0.39157914	18.152	0.0001
GROUP	1	-0.165482	0.10526623	-1.572	0.1168
FG132	1	0.062169	0.07109427	0.874	0.3824
FG133	1	0.322131	0.06918061	4.656	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility

Dependent Variable: BR092_11 BR092_11 I will pursue ee investments

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	238965996.08	119482998.04	14.317	0.0001
Error	388	3238018683.3	8345408.9776		
C Total	390	3476984679.4			

Root MSE	2888.84215	R-square	0.0687
Dep Mean	7.47653	Adj R-sq	0.0639
C.V.	38638.81081		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.626400	0.43964745	21.896	0.0001
GROUP	1	-0.451530	0.13036532	-3.464	0.0006
FG134	1	-0.812285	0.26123073	-3.109	0.0020

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG134	1	FG134 specific person monitors energy us

Dependent Variable: DI131 DI131 saving money is important for firm

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	242820711.87	80940237.291	17.698	0.0001
Error	404	1847649925	4573390.9035		
C Total	407	2090470636.9			

Root MSE	2138.54878	R-square	0.1162
Dep Mean	8.75744	Adj R-sq	0.1096
C.V.	24419.78600		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.778158	0.39525498	24.739	0.0001
GROUP	1	-0.467741	0.09361019	-4.997	0.0001
FG132	1	0.155947	0.05572308	2.799	0.0054
SEG	1	-0.275843	0.07661635	-3.600	0.0004

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
SEG	1	Segment

Dependent Variable: DI1312 DI1312 conserve energy=good corp citizen

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	68730534.367	17182633.592	4.399	0.0017
Error	378	1476327513.7	3905628.3431		
C Total	382	1545058048			

Root MSE	1976.26626	R-square	0.0445
Dep Mean	8.92499	Adj R-sq	0.0344
C.V.	22143.07505		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	8.729091	0.40351623	21.633	0.0001
GROUP	1	-0.151228	0.09156236	-1.652	0.0994
FG132	1	0.089175	0.06186999	1.441	0.1503
FG133	1	0.093573	0.06050153	1.547	0.1228
SEG	1	-0.080021	0.07457559	-1.073	0.2840

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility
SEG	1	Segment

Dependent Variable: DI1313 DI1313 ee is as good as/better than se

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	201523151.7	67174383.899	13.889	0.0001
Error	396	1915302287.5	4836621.9382		
C Total	399	2116825439.2			

Root MSE	2199.23212	R-square	0.0952
Dep Mean	8.05678	Adj R-sq	0.0883
C.V.	27296.65342		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	8.798311	0.43074608	20.426	0.0001
GROUP	1	-0.300104	0.09766105	-3.073	0.0023
FG132	1	0.174987	0.05954126	2.939	0.0035
SEG	1	-0.326643	0.08058741	-4.053	0.0001

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
SEG	1	Segment

Dependent Variable: DI1314 DI1314 ee has important benefits

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	155930241.68	38982560.42	7.262	0.0001
Error	373	2002177755.7	5367768.7819		
C Total	377	2158107997.3			

Root MSE	2316.84457	R-square	0.0723
Dep Mean	7.79300	Adj R-sq	0.0623
C.V.	29729.81284		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	8.251178	0.48770941	16.918	0.0001
GROUP	1	-0.330213	0.10849519	-3.044	0.0025
FG132	1	0.019954	0.07643723	0.261	0.7942
FG133	1	0.162129	0.07273417	2.229	0.0264
SEG	1	-0.178989	0.08849658	-2.023	0.0438

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility
SEG	1	Segment

Dependent Variable: DI1315 DI1315 ee equip is easy to use/understnd

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	236972564.1	118486282.05	15.320	0.0001
Error	396	3062783770.8	7734302.4516		
C Total	398	3299756334.9			

Root MSE	2781.06139	R-square	0.0718
Dep Mean	6.52983	Adj R-sq	0.0671
C.V.	42590.10236		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.369583	0.43270784	17.031	0.0001
GROUP	1	-0.621337	0.12227743	-5.081	0.0001
FG132	1	0.097610	0.07301947	1.337	0.1821

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees

Dependent Variable: DI1316 DI1316 I actively advocate ee to others

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	532118428.37	177372809.46	14.808	0.0001
Error	402	4815213190.9	11978142.266		
C Total	405	5347331619.3			

Root MSE	3460.94529	R-square	0.0995
Dep Mean	6.29076	Adj R-sq	0.0928
C.V.	55016.31835		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	6.397075	0.74309334	8.609	0.0001
GROUP	1	-0.593284	0.15181653	-3.908	0.0001
FG132	1	0.397216	0.09151067	4.341	0.0001
FG140	1	-0.352631	0.30431630	-1.159	0.2472

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG140	1	FG140 remodeled space since 1/96

Dependent Variable: DI1317 DI1317 I regularly hear about ee

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	142835557.7	47611852.567	3.798	0.0104
Error	402	5038929825.7	12534651.308		
C Total	405	5181765383.4			

Root MSE	3540.43095	R-square	0.0276
Dep Mean	4.98077	Adj R-sq	0.0203
C.V.	71082.00982		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	5.575580	0.75997988	7.336	0.0001
GROUP	1	-0.366205	0.15514290	-2.360	0.0187
FG132	1	0.148240	0.09309007	1.592	0.1121
FG140	1	-0.300053	0.31104455	-0.965	0.3353

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG140	1	FG140 remodeled space since 1/96

Dependent Variable: DM101 DM101 importance of ee to decision maker

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	9	10820422.38	1202269.1534	2.576	0.0100
Error	107	49930369.133	466638.96386		
C Total	116	60750791.513			

Root MSE	683.10977	R-square	0.1781
Dep Mean	1.97304	Adj R-sq	0.1090
C.V.	34622.26752		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	0.734895	0.43830645	1.677	0.0965
GROUP	1	0.086233	0.07557064	1.141	0.2564
FG132	1	-0.043373	0.04951397	-0.876	0.3830
FG133	1	0.020895	0.05383501	0.388	0.6987
FG134	1	0.296783	0.15738920	1.886	0.0621
FG136	1	0.180389	0.12330359	1.463	0.1464
FG137	1	0.001973	0.05432797	0.036	0.9711
FG140	1	0.291536	0.16103224	1.810	0.0730
FG142	1	-0.044341	0.06059813	-0.732	0.4659
SEG	1	0.028245	0.06506210	0.434	0.6651

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility
FG134	1	FG134 specific person monitors energy us
FG136	1	FG136 firm pays X much of utility bill l
FG137	1	FG137 firm is X active in equip purchase
FG140	1	FG140 remodeled space since 1/96
FG142	1	FG142 firm is X location
SEG	1	Segment

Dependent Variable: DM107

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	6257039.9869	1564259.9967	1.378	0.3234
Error	8	9081330.98	1135166.3725		
C Total	12	15338370.967			

Root MSE	1065.44187	R-square	0.4079
Dep Mean	2.70477	Adj R-sq	0.1119
C.V.	39391.27532		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.045630	2.09564159	0.499	0.6312
GROUP	1	0.245658	0.37798634	0.650	0.5340
FG134	1	-0.973733	0.72949561	-1.335	0.2187
FG136	1	0.352902	0.50927043	0.693	0.5080
FG140	1	1.575229	0.84239634	1.870	0.0984

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG134	1	FG134 specific person monitors energy us
FG136	1	FG136 firm pays X much of utility bill l
FG140	1	FG140 remodeled space since 1/96

Dependent Variable: DM108 DM108 knowledge of ee prod avail/perform

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	6	160746480.01	26791080.002	5.918	0.0001
Error	116	525127268.37	4526959.2101		
C Total	122	685873748.39			

Root MSE	2127.66520	R-square	0.2344
Dep Mean	4.64399	Adj R-sq	0.1948
C.V.	45815.48602		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	9.304117	1.02285378	9.096	0.0001
GROUP	1	-0.607131	0.22123125	-2.744	0.0070
FG134	1	-0.858955	0.45141136	-1.903	0.0595
FG137	1	-0.189992	0.15170667	-1.252	0.2130
FG140	1	0.485971	0.44868742	1.083	0.2810
FG142	1	-0.302483	0.15368268	-1.968	0.0514
SEG	1	-0.517071	0.18449462	-2.803	0.0059

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG134	1	FG134 specific person monitors energy us
FG137	1	FG137 firm is X active in equip purchase
FG140	1	FG140 remodeled space since 1/96
FG142	1	FG142 firm is X location
SEG	1	Segment

Dependent Variable: DM109 DM109 implementing ee reduces bill by X

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	6	6748326805.8	1124721134.3	6.545	0.0001
Error	93	15981881213	171848185.09		
C Total	99	22730208019			

Root MSE	13109.08788	R-square	0.2969
Dep Mean	22.81377	Adj R-sq	0.2515
C.V.	57461.28710		

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	36.584479	9.22691713	3.965	0.0001
GROUP	1	-3.226982	1.53277764	-2.105	0.0380
FG132	1	-2.389188	1.13036090	-2.114	0.0372
FG133	1	4.503925	1.24818627	3.608	0.0005
FG134	1	-7.445766	3.10616783	-2.397	0.0185
FG137	1	4.103795	1.07061823	3.833	0.0002
FG140	1	-5.597495	3.31189857	-1.690	0.0944

Variable	DF	Variable Label
INTERCEP	1	Intercept
GROUP	1	
FG132	1	FG132 number of employees
FG133	1	FG133 total square footage of facility
FG134	1	FG134 specific person monitors energy us
FG137	1	FG137 firm is X active in equip purchase
FG140	1	FG140 remodeled space since 1/96

C

SURVEY INSTRUMENTS

C.1 END USER SURVEY

BEMS/EXPRESS EFFICIENCY END USER MARKET EFFECTS – MAIN SURVEY

SC001. Hello, this is <INTERVIEWER NAME> calling from Quantum Consulting on behalf of PG&E. We are conducting a survey on commercial energy products and services. May I speak with the office manager?

[IF NEEDED:] This is a fact-finding survey only – we are NOT interested in selling anything, and responses will not be connected with your firm in any way.

[DO NOT RECORD INFORMATION FOR INDIVIDUAL AT SOME OTHER BUILDING OR LOCATION. WE WANT THE INDIVIDUAL MOST KNOWLEDGEABLE AT THIS LOCATION, EVEN IF BUILDING IS OWNED BY OFF-SITE MANAGER.]

1	Current individual is best contact	SC002
2	Transferred to best contact	SC002
3	Given best contact's name and number	Record for future contact
99	Don't know/refused	Thank & terminate

[WHEN CORRECT RESPONDENT IS ON-LINE (REPEAT AS NEEDED WHEN CURRENT INDIVIDUAL IS BEST CONTACT):]
SC002. Hello, this is <INTERVIEWER NAME> calling from Quantum Consulting, a national energy market research firm. I understand that you are the office manager. Today we're conducting a very important study on the needs and perceptions of firms like yours, regarding energy use, and energy efficiency. Do you have any knowledge regarding your company's cooling and lighting equipment? This survey should take no more than 15 to 20 minutes, and it's an important opportunity to make sure your views are represented. We believe you'll find it quite interesting.

[IF NEEDED:] This is a fact-finding survey only – we are NOT interested in selling anything, and responses will not be connected with your firm in any way.

[IF NEEDED:] This research is sponsored by a utility that wants to understand how businesses think about and manage their energy consumption.

1	Current individual is best contact	AW005
2	Transferred to best contact	Repeat SC002 w/best contact
3	Given best contact's name and number	Record for future contact
99	Don't know/refused	Thank & terminate

AW005. Different people have different definitions of "energy efficiency." For a couple of products, I'd like to get a sense for how you might distinguish between "high-efficiency" and "standard-efficiency" products.

[IF NECESSARY: This isn't some kind of test – your opinions are the ones that matter. As I mentioned a moment ago, different people have different definitions of "energy efficiency."]

First, please think about the lighting used in your business. Do you consider your lighting to be high-efficiency, standard efficiency, or a combination?

1	High efficiency	AW008
2	Standard efficiency	AW008
3	Mix of high and standard efficiency	AW008
99	DK/NA	AW008

AW008. Have you installed any new air conditioning equipment in the last three years or so, that is, since January 1996?

1	Yes	AW010
2	No	CH017
9	DK/NA	CH017

AW010. Did you install standard efficiency air conditioning equipment, or did you pay more for high efficiency air conditioning equipment?

1	Standard efficiency AC equipment	CH017
2	High efficiency AC equipment	CH017
3	DO NOT READ: Mix of efficiency levels	CH017
8	Other [SPECIFY – DO NOT CODE]	CH017
9	DK/NA	CH017

[WITHIN PG&E TERRITORY ONLY; NON-PG&E COMPARISON MARKETS GO TO CH039:]
CH017. Since January 1996, has your business participated in a PG&E-sponsored energy audit? This audit might have been called Business Edge or "BEST," and it involves answering questions about your business and its energy use, then receiving a set of recommendations specific to your business.

1	Yes	CH018
2	No	CH025
99	DK/NA	CH025

CH018. In what year was this audit? [IF MORE THAN ONE, RECORD MOST RECENT]

1	1996	CH021
2	1997	CH021
3	1998 (or claimed 1999)	CH021
99	DK/NA	CH021

CH021. Were any product or practice changes recommended in that audit? [RECORD MULTIPLE MENTIONS BELOW.] [PROMPT "MOST RECENT AUDIT" IF NECESSARY.]

1	"T8" fluorescent lamps	CH022
2	Reflectors in lighting fixtures (with de-lamping)	CH022
3	Compact fluorescent lamps, or CFLs	CH022
4	Energy efficient central air conditioning unit	CH022
5	Set-back thermostat	CH022
6	Regular maintenance of your air conditioning system	CH022
7	Adjustable-speed drive controllers, or ASDs [record only for HVAC fans or air handlers.]	CH022
8	Lighting occupancy sensors	CH022
88	Other measures (SPECIFY-UNCODED)	CH022
99	DK/None/No more	CH025

CH022. And did you install any of the products or materials in your business, or make any permanent changes in your energy consumption practices, that were recommended by the audit? In particular, I'm thinking about changes you probably WOULD NOT have made without the audit recommendations. [RECORD ALL MENTIONS]

1	"T8" fluorescent lamps	CH023 pre-skip
2	Reflectors in lighting fixtures (with de-lamping)	CH023 pre-skip
3	Compact fluorescent lamps, or CFLs	CH023 pre-skip
4	Energy efficient central air conditioning unit	CH023 pre-skip
5	Set-back thermostat	CH023 pre-skip
6	Regular maintenance of your air conditioning system	CH023 pre-skip
7	Adjustable-speed drive controllers, or ASDs [record only for HVAC fans or air handlers]	CH023 pre-skip
8	Lighting occupancy sensors	CH023 pre-skip
88	Other measures (SPECIFY-UNCODED)	CH023 pre-skip
99	DK/None/No more	CH023 pre-skip

[ASK CH023 FOR EACH PRE-LISTED RESPONSE 1-8 IN CH022; IF NONE GO TO CH025.]

CH023. In what year did you begin using [CH022 RESPONSE] as recommended by the audit? [GO TO CH025 WHEN FINISHED.]

1	1996	CH023 pre-skip
2	1997	CH023 pre-skip
3	1998 (or claimed 1999)	CH023 pre-skip
99	DK/NA	CH023 pre-skip

CH025. Since January 1996, has your business participated in a PG&E-sponsored program, called Express Efficiency or Retrofit Express, that pays customers rebates for installing energy efficient measures?

1	Yes	CH026
2	No	CH031 pre-skip
99	DK/NA	CH031 pre-skip

CH026. In what years since 1996 did you participate? [ACCEPT MULTIPLE RESPONSES.]

1	1996	CH029
2	1997	CH029
3	1998 (or claimed 1999)	CH029
99	DK/NA	CH029

[ASK CH029 FOR EACH PROGRAM YEAR PARTICIPATION WAS INDICATED IN CH026.]
CH029. Do you recall what measure or product your business installed [in 1996/1997/1998], under the PG&E Express Efficiency or Retrofit Express program? [RECORD MULTIPLE MENTIONS BELOW.]
[GO TO CH030 PRE-SKIP WHEN FINISHED.]

1	"T8" fluorescent lamps	CH029 pre-skip
2	Reflectors in lighting fixtures (with de-lamping)	CH029 pre-skip
3	Compact fluorescent lamps, or CFLs	CH029 pre-skip
4	Energy efficient central air conditioning unit	CH029 pre-skip
5	Set-back thermostat	CH029 pre-skip
6	Regular maintenance of your air conditioning system	CH029 pre-skip
7	Adjustable-speed drive controllers, or ASDs [record only for HVAC fans or air handlers]	CH029 pre-skip
8	Lighting occupancy sensors	CH029 pre-skip
88	Other measures (SPECIFY-UNCODED)	CH029 pre-skip
99	DK/None/No more	CH029 pre-skip

[ASK CHO30 FOR EACH PRE-LISTED MEASURE MENTIONED IN CH029; IF NONE PRE-LISTED, GO TO CH031 PRE-SKIP.]
CH030. Thinking about the [MEASURE] change, WITHOUT the rebate program, would you have made that change anyway at about the same time, would you have made the change but somewhat later, or would you NOT have made the change? [GO TO CH031 PRE-SKIP WHEN FINISHED.]

1	Would have made change at about same time	pre-skip
2	Would have made change, but later	pre-skip
3	Would NOT have made change	pre-skip
99	DK/NA	pre-skip

[ASK EACH OF CH031-CH036 AS CORRESPONDING CHANGES WERE MENTIONED IN CH022 OR CH029. WHEN SEQUENCE IS COMPLETE, GO TO CH061.]

"Still thinking about the high efficiency installations you've made since the beginning of 1996…"

CH031. In how many light fixtures did you install the skinnier, T8 lamps?

#		pre-skip

CH032. In how many fixtures did you have reflectors installed after de-lamping?

#		pre-skip

CH033. In how many light fixtures did you install compact fluorescent lights, or CFLs?

#		pre-skip

CH034. How many high efficiency air conditioning units did you install?

#		pre-skip

CH035. On how many HVAC fans or air handlers were adjustable speed drives, or ASDs, installed?

#		pre-skip

CH036. How many lighting occupancy sensors did you install?

#		pre-skip

[WITHIN NON-PG&E COMPARISON MARKETS ONLY; PG&E CUSTOMERS GO TO CH061.]

CH039. Since January 1996, has your business participated in an audit of your energy consumption? This would have involved answering questions about your business and its energy use, then receiving a set of recommendations specific to your business.

1	Yes	CH040
2	No	CH046
99	DK/NA	CH046

CH040. In what year was this audit? [IF MORE THAN ONE, RECORD MOST RECENT]

1	1996	CH043
2	1997	CH043
3	1998 (or claimed 1999)	CH043
99	DK/NA	CH043

CH043. What product or practice changes were recommended in that audit? [RECORD MULTIPLE MENTIONS BELOW.] [PROMPT "MOST RECENT AUDIT" IF NECESSARY.]

1	"T8" fluorescent lamps	CH044
2	Reflectors in lighting fixtures (with de-lamping)	CH044
3	Compact fluorescent lamps, or CFLs	CH044
4	Energy efficient central air conditioning unit	CH044
5	Set-back thermostat	CH044
6	Regular maintenance of your air conditioning system	CH044
7	Adjustable-speed drive controllers, or ASDs [record only for HVAC fans or air handlers]	CH044
8	Lighting occupancy sensors	CH044
88	Other measures (SPECIFY-UNCODED)	CH044
99	DK/None/No more	CH044

CH044. And did you install any of the products or materials in your business, or make any permanent changes in your energy consumption practices, that were recommended by the audit? In particular, I'm thinking about changes you probably WOULD NOT have made without the audit recommendations. [RECORD ALL MENTIONS]

1	"T8" fluorescent lamps	CH045 pre-skip
2	Reflectors in lighting fixtures (with de-lamping)	CH045 pre-skip
3	Compact fluorescent lamps, or CFLs	CH045 pre-skip
4	Energy efficient central air conditioning unit	CH045 pre-skip
5	Set-back thermostat	CH045 pre-skip
6	Regular maintenance of your air conditioning system	CH045 pre-skip
7	Adjustable-speed drive controllers, or ASDs [record only for HVAC fans or air handlers]	CH045 pre-skip
8	Lighting occupancy sensors	CH045 pre-skip
88	Other measures (SPECIFY-UNCODED)	CH045 pre-skip
99	DK/None/No more	CH045 pre-skip

[ASK CH045 FOR EACH PRE-LISTED RESPONSE 1-8 IN CH044; IF NONE GO TO CH046.]

CH045. In what year did you begin using [CH044 RESPONSE] as recommended by the audit? [GO TO CH046 WHEN FINISHED.]

1	1996	CH045 pre-skip
2	1997	CH045 pre-skip
3	1998 (or claimed 1999)	CH045 pre-skip
99	DK/NA	CH045 pre-skip

CH046. Since January 1996, has your business participated in a utility-sponsored program that pays customers rebates for installing energy efficient measures?

1	Yes	CH047
2	No	CH052 pre-skip
99	DK/NA	CH052 pre-skip

CH047. In what years since 1996 did you participate? [ACCEPT MULTIPLE RESPONSES.]

1	1996	CH050
2	1997	CH050
3	1998 (or claimed 1999)	CH050
99	DK/NA	CH050

[ASK FOR EACH YEAR 1996-1998 PARTICIPATION WAS INDICATED IN CH047:]
CH050. Do you recall what measure or product your business installed [in 1996/1997/1998], under the utility-sponsored rebate program? [RECORD MULTIPLE MENTIONS BELOW.] [GO TO CH052 PRE-SKIP WHEN FINISHED.]

1	"T8" fluorescent lamps	CH050 pre-skip
2	Reflectors in lighting fixtures (with de-lamping)	CH050 pre-skip
3	Compact fluorescent lamps, or CFLs	CH050 pre-skip
4	Energy efficient central air conditioning unit	CH050 pre-skip
5	Set-back thermostat	CH050 pre-skip
6	Regular maintenance of your air conditioning system	CH050 pre-skip
7	Adjustable-speed drive controllers, or ASDs [record only for HVAC fans or air handlers]	CH050 pre-skip
8	Lighting occupancy sensors	CH050 pre-skip
88	Other measures (SPECIFY-UNCODED)	CH050 pre-skip
99	DK/None/No more	CH050 pre-skip

[ASK CHO51 FOR EACH PRE-LISTED MEASURE MENTIONED IN CH050; IF NONE PRE-LISTED, GO TO CH052 PRE-SKIP.]
CH051. Thinking about the [MEASURE] change, WITHOUT the rebate program, would you have made that change anyway at about the same time, would you have made the change but somewhat later, or would you NOT have made the change? [GO TO CH052 PRE-SKIP WHEN FINISHED.]

1	Would have made change at about same time	pre-skip
2	Would have made change, but later	pre-skip
3	Would NOT have made change	pre-skip
99	DK/NA	pre-skip

[ASK EACH OF CH052-CH057 AS CORRESPONDING CHANGES WERE MENTIONED IN CH044/CH045 OR CH050. WHEN SEQUENCE IS COMPLETE, GO TO CH061.]

"Now, thinking about the high efficiency installations you've made since the beginning of 1996…"

CH052. In how many light fixtures did you install the skinnier, T8 lamps?

#		pre-skip

CH053. In how many fixtures did you have reflectors installed after de-lamping?

#		pre-skip

CH054. In how many light fixtures did you install compact fluorescent lights, or CFLs?

#		pre-skip

CH055. How many high efficiency air conditioning units did you install?

#		pre-skip

CH056. On how many HVAC fans or air handlers were adjustable speed drives, or ASDs, installed?

#		pre-skip

CH057. How many lighting occupancy sensors did you install?

#		pre-skip

[ALL RESPONDENTS – ASK FOR EACH OF FOLLOWING MEASURES/PRACTICES NOT ALREADY CHANGED IN PRECEDING CH022, CH029, CH044, OR CH050:]

CH061. Have you made any of these product or practice changes since January 1996? To clarify, we want to know about changes you made that WERE NOT done as part of a utility program. [READ LIST; GO TO CHO62 PRE-SKIP WHEN FINISHED.]

1	Installed "T8" fluorescent lamps, more energy efficient lamps that you may have noticed are "skinnier" than the lamps they replaced	CH061 pre-skip
2	The installation of reflectors that allow for fewer lamps to be put in than were taken out (or, "de-lamping")	CH061 pre-skip
3	Installed compact fluorescent lamps, or CFLs	CH061 pre-skip
4	Installed an energy efficient central air conditioning unit	CH061 pre-skip
5	Installed and use a set-back thermostat that is programmed to cut back on air conditioning during off hours	CH061 pre-skip
6	Regular preventative maintenance and adjustment of your air conditioning system	CH061 pre-skip
7	Installed adjustable-speed drive controller, or ASD, on an HVAC fan or air handler	CH061 pre-skip
8	Installed and consistently use lighting occupancy sensors	CH061 pre-skip
99	[DO NOT READ:] DK/NA	CH061 pre-skip

[ASK EACH OF CH062-CH067 AS CORRESPONDING CHANGES WERE MENTIONED IN CH061.]

CH062. In how many light fixtures did you install the skinnier, T8 lamps?

#		Pre-skip

CH063. In how many fixtures did you have reflectors installed after de-lamping?

#		Pre-skip

CH064. In how many light fixtures did you install compact fluorescent lights, or CFLs?

#		Pre-skip

CHO65. How many high efficiency air conditioning units did you install?

#		Pre-skip

CH066. On how many HVAC fans or air handlers were adjustable speed drives, or ASDs, installed?

#		Pre-skip

CH067. How many lighting occupancy sensors did you install?

#		Pre-skip

[IF NO MEASURE/PRACTICE CHANGES AT CH022, CH029, CH044, CH050, OR CH061, SKIP TO CH081 PRE-SKIP.]

CH071. Has {MEASURE/ PRACTICE} increased, decreased or had no impact on your confidence that energy efficient investments will reduce your energy bills? [ASK FOR EACH KEY MEASURE/PRACTICE INSTALLED/ CHANGED IN CH022, CH029, CH044, CH050, OR CH061]

1	Increased	CH073
2	Decreased	CH073
3	Had no impact	CH073
9	DK/refused	CH073

You're doing great. I have just a few more questions about these energy efficient product and practice changes, and then we'll talk about your reactions to some important ideas.

CH073. Using a scale from 1 to 10, where 1 means very dissatisfied and 10 means very satisfied, please rate your satisfaction with the energy savings and general performance of [MEASURE/PRACTICE]? [ASK FOR EACH KEY MEASURE/PRACTICE INSTALLED/ CHANGED IN CH022, CH029, CH044, CH050, OR CH061. }

#	"T8" fluorescent lamps	CH075
#	Reflectors in lighting fixtures with de-lamping	CH075
#	Compact fluorescent lamps, or CFLs	CH075
#	Energy efficient central air conditioning unit	CH075
#	Set-back thermostat	CH075
#	Regular maintenance of your air conditioning system	CH075
#	Adjustable-speed drive controllers, or ASDs on HVAC fans or air handlers	CH075
#	Lighting occupancy sensors	CH075

CH075. Based on your firm's experiences with energy efficient investments to date, would you say they have made you … [READ LIST]… to select energy efficient options in the future?

1	Much less likely	CH076 pre-skip
2	Somewhat less likely	CH076 pre-skip
3	About as likely	CH076 pre-skip
4	Somewhat more likely, or	CH076 pre-skip
5	Much more likely	CH076 pre-skip
99	DK/NA	CH076 pre-skip

[ASK CH078-CH080 IF PARTICIPATED IN EXPRESS – YES AT CH025 – OTHERWISE GO TO CH081 PRE-SKIP.]

CH078. What influence did the Express Efficiency or Retrofit Express program have on your likelihood of selecting energy efficient options in the future? Please give me a rating from 1 to 10, where 1 means your participation in that program had no impact on your likelihood of selecting energy efficient options, and 10 means your participation caused you to be much more likely to select energy efficient options.

#		CH079

CH079. How important was the program rebate in helping you to get over any initial cost barriers? Please give me a rating from 1 to 10, where 1 means the rebate was totally unimportant in helping you get over initial cost barriers, and 10 means it was critically important.

#		CH080

CH080. How important was the program rebate in convincing you that the high efficiency measure(s) you installed would perform as described? Please give me a rating from 1 to 10, where 1 means the rebate was totally unimportant in convincing you of the measure's performance, and 10 means it was critically important.

#		CH081 pre-skip

[ASK CH081 IF PARTICIPATED IN BEMS AUDIT – YES AT CH017 – OTHERWISE GO TO BR092.]

CH081. Please think about the PG&E Business Edge or "BEST" audit program, which you indicated earlier you've participated in. What influence did this program experience, including any changes you made because of it, have on your likelihood of selecting energy efficient options in the future? Please give me a rating from 1 to 10, where 1 means your participation in that program had no impact on your likelihood of selecting energy efficient options, and 10 means your participation caused you to be much more likely to select energy efficient options.

#		CH082 pre-skip

[ASK CHO82 ONLY OF THOSE WHO PARTICIPATED IN <u>BOTH</u> BEMS AUDIT <u>AND</u> EXPRESS; OTHERWISE SKIP TO BR092.]

CH082. Comparing the information provided in the audit to the rebate offered in the rebate program, please pick from the following responses to describe what was most important in persuading you to make an energy efficient investment. [READ LIST]

1	The audit information was much more important to me than the rebate	BR092
2	The audit information was somewhat more important to me than the rebate	BR092
3	The audit information and the rebate were equally important to me	BR092
4	The rebate was somewhat more important to me than the audit information	BR092
5	The rebate was much more important to me than the audit information	BR092
9	[DO NOT READ:] DK/NA	BR092

BR092. Now I'd like to read a series of statements and I'd like you to tell me how well each statement describes your beliefs about energy efficient investments or practices. We'll again use a 1-to-10 scale, where 1 means you don't agree at all with the statement, and 10 means you agree completely with the statement. The first/next one is … [RANDOMIZE, READ AND OBTAIN A RATING FOR EACH. WHEN SEQUENCE COMPLETE, GO TO BR093 PRE-SKIP.]

When considering a new energy efficiency investment, I am concerned that the actual bill savings will be less than what was estimated

It takes too much time and hassle to get enough information to make an informed decision about energy efficient investments

There is too much time and hassle involved in selecting a qualified energy efficiency contractor

I feel uncertain about the reliability of information provided by non-utility firms proposing energy efficient investments for my business

I'm able to find information about energy efficient investments from sources I trust, but the information just isn't very helpful to me in making decisions

Lack of financing is a barrier to our organization making energy efficiency investments that we want to make

I read or hear about specific kinds of energy efficient investments that simply don't seem to be available from the suppliers we work with

There are energy efficient investments that I'm interested in making, but they always seem to fall below other priorities

In general, I believe that energy efficient investments are something that all businesses should consider

As a general rule, I believe that energy efficient investments will significantly reduce my energy bill

I intend to actively pursue energy efficient investments in the future

[ASK BR093 IF NO HIGH EFFICIENCY LIGHTING CHANGES – RESPONSES 1, 2, OR 3 – AT QUESTIONS CH022, CH029, CH044, CH050, OR CH061. IF HIGH EFFICIENCY LIGHTING CHANGES ARE REPORTED, GO TO BR094 PRE-SKIP.]

BR093. Based on your responses, your firm has not installed high efficiency lighting equipment like T8s, reflectors with de-lamping, compact fluorescents (or CFLs), or occupancy sensors in the last few years. What would you say is the main reason your firm hasn't installed high efficiency lighting equipment like these recently? [CATI - DISTINGUISH FIRST-MENTION FROM OTHER RESPONSES.]

1	No need/satisfied with current lighting solution/equipment	BR094 pre-skip
2	Too expensive compared to other equipment	BR094 pre-skip
3	Electronic ballasts (T8s) not reliable	BR094 pre-skip
4	It would have taken too much time/work to make the change	BR094 pre-skip
5	Designer or contractor recommended not to use	BR094 pre-skip
6	Not readily available from distributors/vendors/contractors	BR094 pre-skip
7	Energy savings not adequate to justify extra initial cost	BR094 pre-skip
8	Company policy to use magnetic ballasts	BR094 pre-skip
9	Didn't really make a formal comparison between high &	BR094 pre-skip

	standard efficiency	
10	Rest of facility(ies) use(s) standard efficiency lighting	BR094 pre-skip
11	We lease the space; not worth the extra expense	BR094 pre-skip
12	Color/tone of light not appropriate for intended application	BR094 pre-skip
13	Wasn't aware of high efficiency options	BR094 pre-skip
14	Uncertain about performance of occupancy sensors	BR094 pre-skip
88	Other (SPECIFY – NOT CODED)	BR094 pre-skip
99	None/No more/DK/NA	BR094 pre-skip

[ASK BR094 IF NO HIGH EFFICIENCY CAC INSTALLED – RESPONSE 4 – AT QUESTIONS CH022, CH029, CH044, CH050, OR CH061. IF HIGH EFFICIENCY CAC INSTALL IS REPORTED, GO TO DM101.]

BR094. Based on your responses, your firm has not installed an energy efficient central air conditioning system in the last few years. What would you say is the main reason your firm hasn't installed an energy efficient central air conditioning system recently? [CATI - DISTINGUISH FIRST-MENTION FROM OTHER RESPONSES.]

1	No need/satisfied with current CAC/it hasn't broken	DM101
2	Too expensive compared to other equipment	DM101
3	High-efficiency CACs not reliable	DM101
4	It would have taken too much time/work to make the change	DM101
5	Designer or contractor recommended not to use	DM101
6	Not readily available from distributors/vendors/contractors	DM101
7	Energy savings not adequate to justify extra initial cost	DM101
8	Company policy to use standard efficiency CACs	DM101
9	Didn't really make a formal comparison between high & standard efficiency	DM101
10	Rest of facility(ies) use(s) standard efficiency CACs	DM101
11	We lease the space; not worth the extra expense	DM101
12	Issues with/concern about occupant comfort	DM101
13	Wasn't aware of high efficiency options	DM101
88	Other (SPECIFY – NOT CODED)	DM101
99	None/No more/DK/NA	DM101

DM101. In general, do the decision-makers at your business find energy efficiency very important, somewhat important, not very important, or not at all important?

1	Very important	DM102
2	Somewhat important	DM102
3	Not very important	DM102
4	Not at all important	DM102
9	DK/NA	DM102

DM102. Has your organization developed a policy for the selection of energy efficient equipment?

1	Yes	DM105
2	No	DM105
99	DK/NA/Refused	DM105

DM105. Does your organization routinely apply long-term investment analysis to energy equipment selection, such as estimates of payback periods, life cycle costing, or internal rate-of-return?

1	Yes	DM106
2	No	FC121
9	DK/NA	FC121

DM106. What is the PRIMARY investment criterion you use? [ACCEPT ONLY ONE RESPONSE; PROMPT WITH LIST AS NECESSARY.]

1	Payback period	DM107
2	Life cycle costing analysis	DM108
3	Internal rate of return	DM108
4	Something else (SPECIFY – NOT CODED:)	DM108
9	DK/NA	FC121

DM107. What's the longest the payback can be for an energy efficiency investment, for it to be acceptable to your organization?

#	Enter years/months data	DM108

DM108. Using a scale from 1 to 10, where 1 means you aren't knowledgeable at all, and 10 means you are fully knowledgeable, please how knowledgeable you feel that you are about what energy efficiency products are available, and how they'll perform?

#	Enter 1-10 rating	DM109

DM109. By what percentage do you think a business like yours can reduce its electricity bill if it implements all of the cost-effective energy efficiency products and practices that are currently available? [I.E., "A BUSINESS LIKE YOURS," NOT "YOUR PARTICULAR BUSINESS."]

#	Enter %	DM110 pre-skip

[ASK DM110 ONLY IF PARTICIPATED IN EXPRESS AT CH025; OTHERWISE GO TO DM111 PRE-SKIP.]

DM110. Using a scale from 1 to 10, where 1 means your participation in the program had no impact on your long-term investment analysis of energy equipment, and 10 means your participation significantly impacted your long-term investment analysis of energy equipment, please rate the influence of the Express Efficiency program on your policies for long-term investment analysis regarding energy equipment selection

#		DM111 pre-skip

[ASK DM111 ONLY IF PARTICIPATED IN BEMS AT CH017; OTHERWISE GO TO DI131.]

DM111. Using the same scale of 1 to 10, please rate the influence of the PG&E "Business Edge" or "BEST" audit experience, including any changes you made because of it, on your policies for long-term investment analysis regarding energy equipment selection?

#		DI131

DI131. For each of the next seven statements, please rate your agreement on a scale from 1 to 10, where 1 means you don't agree at all with the statement, and 10 means you agree completely. They are [RANDOMIZE AND OBTAIN RESPONSE FOR EACH]:

#	Saving money on energy is important for my business	FG132
#	Conserving energy is an important part of being a good corporate citizen	FG132
#	In general, energy efficient investments and practices provide comfort, quality, and reliability that are as good as, as, or better than, standard efficiency solutions	FG132
#	There are important practical benefits that come with energy efficient investments, apart from saving money	FG132
#	In general, energy efficient investments are easy to understand and use	FG132
#	I actively advocate energy efficient investments and practices to others	FG132
#	I regularly hear about energy efficient investments and practices from business contacts and/or professional organizations.	FG132

FG132. OK, these last few questions are just to make sure we talked to a cross-section of businesses in your area.
Which of the following categories describes the number of employees your firm has at this location? [READ LIST].

1	1 to 5	FG133
2	6 to 10	FG133
3	11 to 20	FG133
4	21 to 50	FG133
5	51 to 100	FG133
6	Over 100	FG133
9	[DO NOT READ:] DK/NA/refused	FG133

FG133. Can you estimate the total square footage of the facility at this location to be … [READ LIST]?

1	Less than 5,000 square feet	FG134
2	5,000 but less than 10,000 square feet	FG134
3	10,000 but less than 20,000 square feet	FG134
4	20,000 but less than 50,000 square feet	FG134
5	50,000 but less than 100,000 square feet	FG134
6	100,000 but less than 1 million square feet	FG134
7	Over 1 million square feet	FG134
9	[DO NOT READ:] DK/NA/refused	FG134

FG134. Has your organization assigned responsibility for controlling or monitoring energy usage to a specific person?

1	Yes	FG135
2	No	FG135
9	DK/NA/refused	FG135

FG135. Does your business own or lease the facility?

1	Own	FG139
2	Lease/rent	FG136
9	DK/NA/refused	FG136

FG136. Does your business pay for all, a portion, or none of the electric utility bill for your space at this facility?

1	Pay ALL of bill – NO electric utilities in the lease	FG137
2	Pay some portion of electric utility bill – some through lease	FG137
3	Pay NONE of bill – ALL electric utilities through lease	FG137
9	DK/NA/refused	FG137

FG137. How active a role does your business take in making lighting and climate control equipment purchase decisions at this facility? [READ LIST.]

1	Very active – involved in all phases and have veto power	FG140
2	Somewhat active – we approve decisions and provide some input and review	FG140
3	Slightly active – we have a voice but it's not the dominant voice	FG140
4	Not active at all – we're part of a larger firm	FG140
5	Not active at all – our firm doesn't get involved in HE issues	FG140
9	DK/NA/refused	FG140

FG140. Have you remodeled this space since January 1996?

1	Yes	FG141
2	No	FG141
3	DK/NA/refused	FG141

FG141. And finally, what is your job title or role?

Thank you very much for your participation in this very important survey, you've been extremely helpful. I hope you found the process interesting and enjoyable. Thanks again, and have a great day.

BEMS-ExpressEUDraft6
4/19/99

C.2 A/C CONTRACTOR SURVEY

EXPRESS EFFICIENCY MARKET EFFECTS STUDY
IN-DEPTH INTERVIEW GUIDE
COMMERCIAL HVAC CONTRACTORS & DESIGNERS

Name *Title*	*Phone*
Company	*Fax*
Street Address	*email*
City, State, ZIP	*Interviewer*
D&B Sales	*Call dates*
D&B Employees	*Complete Date*

Lead-in

Hello, my name is __________ and I am calling on behalf of Pacific Gas & Electric. We are contacting HVAC contractors as part of a study of the commercial HVAC market.

[SCREENING QUESTIONS]

S.1 Does your company ...

Manufacture commercial packaged HVAC units 1
Install commercial **air-cooled** packaged AC units.......................... 2
Sell commercial packaged units... 3
Design commercial air-cooled packaged AC systems 4

[IF S.1 NOT EQUAL TO 2 or 4, THEN TERMINATE]

S.2 Does your company do more than $100,000 in commercial packaged HVAC unit business a year? [IF RELUCTANT TO RESPOND TO THIS SCREEN ASK IF THEY INSTALL/SPECIFY >10 PACKAGE UNIT SYSTEMS PER YEAR]

Yes.. 1
No... 2
Don't Know.. 3

IF S.2 = 1 OR 3, THEN PROCEED
IF NO, TERMINATE SURVEY

S.3 Besides air-cooled packaged AC units, which of the following products does your company install or specify? [O= does not sell, 1= does sell]

a) Water-cooled or evaporative air conditioners .... ______
b) Heat pumps .... ______
c) VSDs (variable speed drive controllers) .... ______
d) Programmable thermostats.. ______
e) Other__________________.. ______

May I speak with the individual who is in charge of your commercial HVAC business?

IF THE CONTACT IS NOT AVAILABLE, ASK FOR NAME AND BEST TIME TO CALL BACK. FAX RESPONSE MATRICES. ONCE CONTACT IS ON THE LINE, REPEAT LEAD IN IF NECESSARY, THEN:

We would like to ask you a few questions about trends in your experience installing and specifying HVAC equipment and your perceptions of changes in the market. The whole interview should take about 15 minutes. Please be assured that the information you provide in the interview will remain confidential with XENERGY. We will not identify or attribute any of your comments or company information. In order to minimize your time spent on the phone, I have faxed a discussion guide that should help to steer you through some of the questions that have multiple answers. Do you have the discussion guide in front of you?

WAIT UNTIL RESPONDENT HAS THE RESPONSE SHEET, THEN BEGIN.

First of all, we would like to learn a little about your business

1.1 Which of the following best describes your firm?

HVAC contractor 1
Sheet metal contractor.. 2
General contractor 3
Part of a design-build firm 4
A&E Design firm 5
Other:___________________________________ 6

1.2 And does your firm do a quarter or more of your HVAC business with small and medium-sized commercial customers [defined as customers who have less than 50 full-time equivalent employees]?

Yes.. 1
No 2
Don't Know... 3

[IF NO, TERMINATE]

1.3 [IN-TERRITORY ONLY] Does your company have more than one location in California?

Yes.. 1
No 2

IF YES, THEN ASK [And for all other respondents]

1.3.1 Is this location...

Your headquarters 1
or a branch.. 2

1.3.2 [IF BRANCH, ASK HOW MANY OTHER BRANCHES AND IN WHAT STATES]
____

All Respondents:

1.4 How many years has your company been in business?

ENTER NUMBER OF YEARS.. ______

1.5 About how many full time equivalent workers of all types do you employ at this location?

ENTER NUMBER OF FTEs .... ______

1.6 And approximately what were the total sales of all products and services for your company in 1998 <u>at this location</u>? [If reluctant or refuses ask if they could choose which range they would fall in.]

<$1 million 1
$1 - $10 million.. 2
>$10 million 3
Don't know/Proprietary 4

1.7 About what percentage of your company's total sales <u>at this location</u> came from products or services related to commercial packaged units?

ENTER PERCENTAGE... ______%

Market Characteristics Section

Now we would like to ask a few questions about the characteristics of the market you serve <u>at this location</u>.

2.1 Looking at Number 1 on the fax sheet, in rough terms, what percent of your sales of packaged HVAC units go to each of the following?

a) Other contractors.. ______%
b) Direct to end users .... ______%
c) Developers.. ______%
d) Other: ________________________ .... ______%

total should add to ___100_%

2.2 Now looking at Number 2, in rough terms, what is the breakdown of your sales of packaged units in terms of:

a) Planned replacement of existing units................................%____
b) Emergency replacement of existing units..........................%____
c) New units in existing buildings (expansion)......................%____
d) New units in new buildings...%____
e) Other: ______________________...................................%____
total should add to ___100 %

[IF ABOVE IS TOO TOUGH, ASK FOR % NEW VERSUS % EXISTING]

2.3 And roughly what percent of your business at this location serves commercial versus residential and industrial customers?

a) Commercial...______%
b) Residential...______%
c) Industrial ....______%
d) Other: ______________________ ....______%
total should add to ___100 %

2.4 Referring to Number 3 on the fax sheet, what percentage of your purchases of **air-cooled** packaged air conditioners comes from each of the following.

a) Wholesalers, distributors and manufacturer's reps ....______%
b) Directly from manufacturers..______%
c) Retail outlets, such as Home Depot ....______%
d) Other: ______________________ ....______%
total should add to ___100 %

Now we would like to ask a couple of questions about the market for packaged HVAC units

2.5 <deleted>

2.6 Could you please describe what you believe were the most important trends in the packaged air-conditioner market over the past 3 years?

2.6.1 And what types of changes in the packaged AC market do you anticipate over the next three years, if any?

2.7 And what are the most important factors you consider when deciding *which* packaged HVAC unit to specify for your customers?

2.8 Now I'd like you to rate the following characteristics of packaged units in terms of their importance to *your customers* in deciding what unit to purchase. Please rate the characteristics using a scale of 1 to 5, where one means not at all important and 5 means extremely important:

a) Price.. ______
b) Brand.. ______
c) Dimensions (esp. need for compact)................................ ______
d) Energy Efficiency .... ______
e) Reliability... ______

2.9 With respect to the efficiency of units, we're trying to get a sense of what "high efficiency" means in the market right now. If a customer asked for a high efficiency 15-ton packaged air-cooled air conditioner, what would be the EER of the unit you would recommend?

ENTER EFFICIENCY OF 15-TON UNIT................ EER = ______
ENTER EFFICIENCY OF 5-TON UNIT................ SEER = ______

FOR THE PURPOSES OF THE REMAINDER OF OUR QUESTIONS, PLEASE REFER TO THE **DEFINITIONS OF HIGH-EFFICIENCY UNITS PROVIDED IN TABLE 1 OF THE DISCUSSION GUIDE**.

2.9.1 Prior to this conversation, were you aware that packaged units are available at the efficiency levels shown in the guide?

Yes.. 1
No... 2

[IF 2.9.1 = "NO", THEN DO A QUICK CONFIRMATION OF OBVIOUS RESPONSES TO THE REMAINDER OF QUESTIONS IN THIS SECTION]

2.10 Do you actively promote or market high-efficiency packaged units?

Yes.. 1
No... 2

2.10.1 Probe: Why or Why Not?

IF 2.10=YES, THEN ASK 2.10.2 ELSE GO TO 2.11

2.10.2 And, in general, how do you market high-efficiency packaged systems?

2.11 In what percent of **all your jobs** do you recommend or specify high-efficiency packaged units instead of or as an option to standard efficiency units?

ENTER PERCENTAGE .... ______%

[IF 2.11 = 0% SKIP TO 2.12]

2.11.1 And in what percent of cases, if any, would you say customers object to your specification of high-efficiency packaged units?

ENTER PERCENTAGE .... ______%

2.11.2 And in these cases, do you try to work with the customer to overcome their objections...

In all cases 1
In some cases.. 2
In none of these cases 3
DK/NA 4

2.11.2.1 And why is that? *[open-end]*

2.11.3 And would you say you are recommending high-efficiency units more or less than you were three years ago?

More 1
Less... 2
About the same.. 3

2.11.3.1 And why is that? *[open-end]*

2.12 And, in general, how difficult or easy is it to sell a high efficiency package unit compared to a standard one? Would you say it is:

Much more difficult 1
Somewhat more difficult... 2
About the same.. 3
Somewhat less difficult 4
Much less difficult.. 5

2.12.1 And why is that? [open-end]

2.14 In terms of maintaining your firm's competitive position, how important is offering high-efficiency packaged units in your installations? Would you say ...

Very important 1
Somewhat important 2
Not very important 3
Not at all important 4

Now we would like to ask some questions about your company's installation of packaged HVAC units

2.15 Approximately how many packaged units does your firm install per year?
ENTER NUMBER.. ______

2.16 What would you say is the average number of packaged HVAC units you install per job?
ENTER AVERAGE.. ______

2.17 Looking at the table at Table 1 of the guide, do you ever install any of the listed high-efficiency unitary equipment?
Yes.. 1
No 2

IF YES, THEN ASK

2.17.1 Approximately what percentage of your packaged HVAC jobs for units >5 ton did high-efficiency units represent in 1998?
ENTER PERCENTAGE.. ______%

2.17.2 And about what was the percentage in 1996?
ENTER PERCENTAGE.. ______%

Barriers / Perceptions Section

Now we would like to ask a few questions about issues associated with specifying high-efficiency packaged units

3.1a Thinking back to 1996, what was the main obstacle to specifying high-efficiency packaged systems? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

3.1b Thinking back to 1996, were there any other obstacles to specifying high-efficiency packaged systems? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

	3.1.a **Most Important** *[Circle only one]*	3.1.b **Other** *[Circle all that apply]*
Distributor wouldn't stock because...		
Margin too low	1	1
Incomplete product line	2	2
Sale takes more time (hassle factor)	3	3
Other:	4	4
Contractor wouldn't specify/install because...		
Poor value for money	5	5
Reluctant to change when old tech. works	6	6
Product not readily available	7	7
Not enough information	8	8
Other:	9	9
End User wouldn't buy because...		
Uncertainty over savings	10	10
Reluctant to change when old tech. works	11	11
Split incentive (Owner/Tenant issue)	12	12
Credibility of offer in doubt	13	13
Not enough information	14	14
Incremental value too low to justify cost	15	15
Other:	16	16

3.2 Let's go through each of the obstacles you mentioned, to what extent, if any, have these barriers been reduced since 1996? [MAKE SURE A RESPONSE IS OBTAINED FOR EACH ITEM PROVIDED IN 3.1. CLEARLY LABEL BARRIER TO WHICH RESPONSE CORRESPONDS]

IF BARRIER REDUCED, THEN ASK

3.3 [If **out-of-territory** ask if they know of any utility rebate programs for HVAC equipment] IF YES, AND FOR **PARTICIPANTS**, continue:

Do you think that utility energy efficiency programs contributed to reducing this barrier to using high-efficiency packaged equipment? If so, how? [CLEARLY LABEL BARRIERS TO WHICH RESPONSES CORRESPOND. MAKE SURE TO EXPLICITLY NOTE AN DIRECT MENTIONS OF BEMS OR SMARTER .... ENERGY]

3.4 [If not yet determined ask what they believe is the most important remaining barrier to using high-efficiency packaged systems in today's market?]] [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

	Other [Circle all that apply]
Distributor wouldn't stock because...	
Margin too low	1
Incomplete product line	2
Sale takes more time (hassle factor)	3
Other:	4
Contractor wouldn't specify/install because...	
Poor value for money	5
Reluctant to change when old tech. works	6
Product not readily available	7
Not enough information	8
Other:	9
End User wouldn't buy because...	
Uncertainty over savings	10
Reluctant to change when old tech. works	11
Split incentive (Owner/Tenant issue)	12
Credibility of offer in doubt	13
Not enough information	14
Incremental value too low to justify cost	15
Other:	16

3.6 Now I'd like to read a series of statements and I'd like you to tell me how well each statement describes your customers' beliefs about energy efficient investments or practices. We'll use a 1-to-10 scale, where 1 means you don't agree at all with the statement, and 10 means you agree completely with the statement. The first/next one is …

Score

a._____ When considering a new energy efficiency investment, customers are concerned that the actual savings on their bill will be less than estimated

b._____ Customers believe there is too much time and hassle involved in selecting a contractor who knows a lot about energy efficiency

c._____ Customers feel uncertain about the reliability of information provided by non-utility firms proposing energy efficient investments for their business

d._____ Lack of financing is a barrier to customers' making energy efficiency investments that they want to make

Economics Section

4.1a On a typical project, how much more does it cost your customers per ton to buy a 15-ton air-cooled air conditioner with an EER of 9.7 than one with an EER of 8.5?

ENTER INCREMENTAL COST IN $/TON............\_\_\_\_\_\_$/TON

4.1b And how about for a 5-ton air-cooled air conditioner with an SEER of 11.0 rather than one with an SEER of 9.7?
ENTER INCREMENTAL COST IN $/TON............______$/TON

[IF RESPONDENT CAN BETTER CHARACTERIZE IN TERMS OF % INCREASE, GET % AND BASE COST FOR 8.5 EER UNIT]

4.2 Has the price difference between HE and standard AC of the same size and design increased, decreased, or stayed about the same over the past 3 years?
Increased... 1
Stayed about the same 2
Decreased 3
Don't know.. 4

4.2.1 [IF 1 or 3 ABOVE] To what do you attribute the change? *[open-end]*

[IF QS.3=4, PROCEED TO VSD SECTION, ELSE SKIP TO SB.1]

[DO THE VSD THE SET BACK SECTIONS ONLY IF YOU JUDGE THE RESPONDENT WILL MAKE IT THROUGH THESE PLUS THE REST OF THE SURVEY, OTHERWISE SKIP TO THE PROGRAM SECTION**]**

VSD Section

Now we would like to ask some questions about any experience you might have with VSDs

V.1 How familiar would you say your firm is with the application of variable-speed drives to air-handling units in commercial buildings?
Very familiar 1
Somewhat familiar 2
Somewhat unfamiliar 3
Very unfamiliar 4

V.2 Over the past 3 years, approximately how many variable-speed drives has your firm installed on air-handling units in commercial buildings?
ENTER NUMBER.. ______

[IF IN-TERRITORY ASK V.2.1, ELSE SKIP TO V3]

V.2.1 And on what percent of these projects, if any, did the customer receive a utility rebate?
ENTER %..______%

V.3 How has the number of VSDs you install changed over the past 3 years?

Increased... 1
Stayed about the same 2
Decreased 3
Don’t know... 4

V.3.1 And why is that? *[open-end]*

V.4 And, in general, how would you characterize the market for variable-speed drives in existing commercial buildings? [Probes: Potential for savings, cost-effectiveness, effects on operations (positive or negative)]

V.5 And what would you say are the primary obstacles, if any, to greater implementation of VSDs in existing commercial buildings?

[IF QS.3=5, PROCEED, ELSE SKIP TO 5.1 FOR IN-TERRITORY, OR END SURVEY FOR OUT-OF-TERRITORY**]**

Set-Back Thermostat Section

SB.1 How has the number of setback thermostats you install changed over the past 3 years?

Increased... 1
Stayed about the same 2
Decreased 3
Don’t know... 4

SB.1.1 And why do you think that is? *[open-end]*

SB.2 How would you rate the effect of utility rebate or audit programs on the market for setback thermostats for small and medium-sized commercial customers?

Significant effect 1
Modest effect... 2
No effect... 3
Don’t know... 4

SB.2.1 Describe why *[open-end][PROBE: REBATE OR AUDIT MORE EFFECTIVE?]*

[FOR <u>OUT-OF-TERRITORY</u> THANK AND END SURVEY]

Express Efficiency Program

5.1 Are you familiar with PG&E's 1998 Express Efficiency rebate program for high-efficiency packaged HVAC units?

Yes.. 1
No... 2

IF NO, SKIP TO 5.5

5.2 Could you describe for me how the packaged HVAC part of the program works? [WE ARE TRYING TO DETERMINE FROM THIS IF THEY ARE AWARE THAT THE REBATE GOES TO THE DISTRIBOR]

[IF RESPONDENT DID NOT KNOW REBATE WENT TO DISTRIBUTOR IN 1998 SKIP TO 5.4]

5.3 In what percent of the high-efficiency packaged unit projects that your firm installed in 1998 was a PG&E rebate obtained by the distributor?

ENTER PERCENTAGE..______%

5.3.1 And in these cases, were there any benefits of the rebate program that your firm received? [SUBTLE POINT HERE IS TO SEE IF THE OFFER ANY INFO ON DEALS OR DISTRIBUTOR SHARING REBATE WITH THEM]

5.4 From whom did you first hear about PG&E's 1998 Express rebate program for packaged HVAC units?

Trade Organization.. 1
Business colleague 2
PG&E Representative 3
Mail advertisement.. 4
HVAC Distributor... 5
Other:________________________________............................ 6

5.5 And do you think the approach of rebating packaged units to distributors has been more or less effective than previous end user rebate programs for this technology?

More effective 1
Less effective.. 2
About the same.. 3
Don't Know... 4

5.5.1 And why is that?

5.6 How do you think your installations or specifications of high-efficiency packaged units would change in the absence of PG&E's rebate program?

Decrease 1
Stay about the same.. 2
Increase.. 3

5.6.1 And why is that?

5.6.2 Now, I'd like to know how much of an effect you think the Express Efficiency Program has had in some specific areas. On a scale from 1 to 5, where 1 means little effect at all and 5 means a major effect, do you think the program has...

a) Increased your awareness about energy-efficient A/C..... ______
b) Improved access to information on efficient A/C........... ______
c) Improved your opinion of quality & performance of efficient A/C.. ______
d) Reduced the wholesale cost of high efficiency A/C .... ______

5.7 What do you think it will take to maintain demand for high-efficiency packaged units in the absence of utility or other energy-efficiency programs?

Smarter Energy/BEMS Section

6.1 Prior to this conversation, were you aware of PG&E's SmarterEnergy website? Located at www.pge.com/smarterenergy

Yes 1
No 2

IF NO, THEN: The SmarterEnergy website is the place where PG&E puts all of its rebate and energy efficiency program information. It provides product information, articles, and some vendor information as well. You can look it up at <www.pge.com/smarterenergy>.

6.1.1 Do you remember it now?

Yes 1
No 2

IF NO, THEN GO TO **6.2**
IF YES, THEN ASK

6.1.2 Have you ever looked at the website?

Yes 1
No 2

IF NO, THEN GO TO **6.2**

6.1.3 Do you think the information about the programs, efficient equipment, and vendors is useful?

Yes 1
No 2
Can't remember/don't know 3

6.1.3.1 And why is that?

6.1.3.2 And to what extent do you think the Smarter Energy website will increase customer awareness, consideration and purchase of high-efficiency air conditioners?

6.2 Prior to this call, were you aware that PG&E provided energy audits to small and medium sized businesses?

Yes 1
No 2

IF NO, SKIP TO 6.3, else continue.

6.2.1 In the past 3 years, has your firm obtained any business installing energy saving measures for customers based on recommendations they received from PG&E? [IF NEEDED, PROVIDE EXAMPLES, E.G., SET-BACK THERMOSTATS & HVAC MAINTENANCE]

Yes 1
No 2

6.2.2 And which of the following best characterizes the effect, if any, of PG&E's energy audit program on your business? Would you say the effect of PG&E's energy audits on the percent of energy-efficiency related business your firm does with small and medium-sized commercial customers is:

Very significant 1
Somewhat significant 2
Somewhat insignificant 3
Very insignificant 4

6.2.2.1 And why is that?

6.2.2.2 And to what extent do you think PG&E's audits increase customer awareness, consideration and purchase of high-efficiency air conditioners?

6.3 Finally, do you have any concluding thoughts on how you think energy efficiency programs could be improved to more effectively promote the specification and use of efficient HVAC equipment? [open-end]

Thank you very much for your assistance in this important project
[END]

FAX Survey Guide

1. Approximate breakdown of your packaged HVAC sales to each of the following:
   - Other Contractors...%____
   - End Users ....%____
   - Developers ....%____
   - Other: ________________________.........................%____

2. Approximate breakdown of packaged HVAC installations by:
   - Planned replacement of existing units....................%____
   - Emergency replacement of existing units ....%____
   - New units in existing buildings (expansion)..........%____
   - New units in new buildings ....%____
   - Other: ________________________.........................%____

3. Approximate breakdown of packaged HVAC purchases from:
   - Wholesalers/distributors/manufacturer's reps....______%
   - Directly from manufacturers..............................______%
   - Retail outlets, such as Home Depot...................______%
   - Other: ________________________....................______%

Table 1:

Qualifications for **High** Efficiency Air-Cooled AC Units

A. <= 5 ton……………SEER = 11.0 (or higher)
B. 6 - 12 ton…………..EER = 10.3 (or higher)
C. 13 - 20 ton…………EER = 9.7 (or higher)
D. > 20 - ton…………..EER = 9.5 (or higher)

Table 2:
ASHRAE **Standard** Efficiency for Air-Cooled AC Units

A. < 5 ton…………SEER = 9.7
B. 6 - 12 ton………EER = 8.9
C. > 13 ton…………EER = 8.5

Thank you very much for your assistance in this important project

C.3 A/C DISTRIBUTOR SURVEY

EXPRESS EFFICIENCY MARKET EFFECTS STUDY
IN-DEPTH INTERVIEW GUIDE
COMMERCIAL HVAC DISTRIBUTORS

Name	*Title*	*Phone*
Company		*Fax*
Street Address		*email*
City, State, ZIP		*Interviewer*
D&B Sales		*Call dates*
D&B Employees		*Complete Date*

Lead-in
Hello, my name is __________ and I am calling on behalf of Pacific Gas & Electric. We are contacting HVAC distributors as part of a study of the commercial HVAC market.

[SCREENING QUESTIONS]

PARTICIPANT SCREENER

May I speak with <CONTACT NAME FROM PG&E DBASE>?

ONCE CONTACT IS ON THE LINE

SP.1 According to PG&E's records, your company was a participant in PG&E's packaged air conditioner rebate program for distributors in 1998. Is this correct?

Yes.. 1
No.. 2
Don't Know.. 3

IF 2 OR 3, PROBE ON WHETHER SOMEONE ELSE MAY BE ABLE TO CONFIRM. IF NOT, TERMINATE AND REPORT DISPOSITION BACK TO PG&E.

We are conducting an independent assessment of the 1998 PG&E Distributor Rebate Program on PG&E's behalf.

We would like to ask you a few questions about the program, as well as trends in selling efficient HVAC equipment and your perceptions of changes in the market. The whole interview should take about 15 minutes. Please be assured that the information you provide in the interview will remain confidential with XENERGY. We will not identify or attribute any of your comments or company information.

In order to minimize your time spent on the phone, I have faxed a discussion guide that should help to steer you through some of the questions that have multiple answers. Do you have the discussion guide in front of you?

WAIT UNTIL RESPONDENT HAS THE RESPONSE SHEET, THEN BEGIN.

SP.2 First, before we get into our specific questions, is there anything in general you would like to say about your experience in the 1998 program, or would you like to offer any suggestions for this type of program or related programs in the future?

PROCEED TO QUESTION 1.1.

NON-PARTICIPANT SCREENER

S.1 Does your company ...

Manufacture commercial packaged HVAC units 1
Install commercial packaged units 2
Sell commercial **air-cooled** packaged AC units 3
Design commercial packaged unit systems.................................... 4

IF S.1 = 1or 4, TERMINATE SURVEY.
IF S.1 = 2, THEN USE CONTRACTOR SURVEY.
IF S.1 = 3, CONTINUE.

S.2 Are you a wholesale distributor that sells primarily to contractors and installers, a retailer that sells primarily to end users, or do you do both?

Exclusively Retail 1
Exclusively Wholesale 2
Both 3

IF S.2 = 1, THEN SWITCH TO CONTRACTOR SURVEY OR TERMINATE

S.3 Does your company do more than $500,000 in wholesale commercial packaged HVAC unit business a year? [IF RELUCTANT TO RESPOND TO THIS SCREEN ASK IF THEY SELL >100 PACKAGE UNITS A YEAR]

Yes.. 1
No 2
Don't Know... 3

IF S.3 = 1 OR 3, THEN PROCEED
IF S.3 = NO, TERMINATE SURVEY

May I speak with the individual who is in charge of your commercial HVAC business?

IF THE CONTACT IS NOT AVAILABLE, ASK FOR NAME AND BEST TIME TO CALL BACK. FAX RESPONSE MATRICES. ONCE CONTACT IS ON THE LINE, REPEAT LEAD IN IF NECESSARY, THEN:

We would like to ask you a few questions about trends in your experience selling HVAC equipment and your perceptions of changes in the market. The whole interview should take about 15 minutes. Please be assured that the information you provide in the interview will remain confidential with XENERGY. We will not identify or attribute any of your comments or company information. In order to minimize your time spent on the phone, I have faxed a discussion guide that should help to steer you through some of the questions that have multiple answers. Do you have the discussion guide in front of you?

WAIT UNTIL RESPONDENT HAS THE RESPONSE SHEET, THEN BEGIN.

FOR IN-TERRITORY, ASK 0.1

0.1 Are you the contact for residential as well as commercial HVAC?

Residential and Commercial 1
Commercial Only 2

IF 0.1=2, SKIP TO 1.1

It is unlikely, but possible that someone else from PG&E will contact you about the residential HVAC business within the next two months. This survey only addresses commercial HVAC.

First of all, we would like to learn a little about your business

1.1 Which of the following best describes your commercial HVAC distribution business? (0= No, 1= Yes)

Manufacturer representative... ______
IF MFG REP, RECORD NAME OF MFG__________________
General industrial supplier (multiple mfrs.) .... ______
RECORD NAMES OF MFG____________________________
Catalog/mail order firm.. ______
Other:__________________________________ .... ______

1.2 And does your firm do a quarter or more of your HVAC business with small and medium-sized commercial customers [defined as customers who have less than 50 full-time equivalent employees]?

Yes.. 1
No 2
Don't Know 3

IF NO, TERMINATE

1.3 [IN-TERRITORY ONLY] Does your company have more than one location in California?

Yes.. 1
No 2

IF YES, THEN ASK [And for all other respondents]

1.3.1 Is this location...
Your headquarters 1
or a branch 2
1.3.2 [IF BRANCH, ASK HOW MANY OTHER BRANCHES AND IN WHAT STATES]
____

1.4 How many years has your company been in business?
ENTER NUMBER OF YEARS.. ______

1.5 About how many full time equivalent workers of all types do you employ at this location?
ENTER NUMBER OF FTEs .... ______

1.6 And approximately what were the total sales of all products and services for your company in 1998 at this location? [If reluctant or refuses ask if they could choose which range they would fall in.]
< $1 million 1
$1.1 - $10 million 2
>$10 million 3
Don't know/Proprietary 4

1.7 About what percentage of your company's total sales at this location came from products or services related to commercial packaged units?
ENTER PERCENTAGE ....______%

1.8 In addition to air-cooled AC units which of the following products does your company sell? [O= does not sell, 1= does sell]
a) Water-cooled or evaporative air conditioners .... ______
b) Heat pumps .... ______
c) VSDs (variable speed drive controllers) .... ______
d) Programmable thermostats... ______
e) Other___________________.. ______

1.9 In 1998, what was the approximate percentage of number of **air-cooled** package AC units in each of the following four size categories?
a) <= 5 ton……………………………………………..._____%
b) 6 - 12 ton .... _____%
c) 13 - 20 ton .... _____%
d) > 20 ton .... _____%
total should add to ___100 %

Now we would like to ask a couple of questions about the characteristics of the market you serve at this location.

2.1 Looking at Number 1 on the fax, in rough terms, what percent of packaged units would you say go to each of the following: (not in sales)

a) Contractors……………………………………………______%
b) End Users (direct sales)……………………………______%
c) Other distributors……………………………………..______%
d) Retail (e.g., Home Depot)…………………………….______%
total should add to ___100 %

2.2 Now looking at Number 2 on the fax, in rough terms, what is the percentage breakdown of your packaged units sold in terms of:

a) Planned replacement of existing units..............................%____
b) Emergency replacement of existing units........................%____
c) New units in existing buildings (expansion)....................%____
d) New units in new buildings...%____
e) Other: _______________________.................................%____
total should add to ___100 %

[IF ABOVE IS TOO TOUGH, ASK FOR % NEW VERSUS % EXISTING]

Now we would like to ask a couple of questions about the market for packaged HVAC units

2.3 What would you say is your most popular packaged unit and what are its big selling points? *[open-end]*

2.4 Now I'd like you to rate the following characteristics of packaged units in terms of their importance to your customers in deciding what unit to purchase. Please rate the characteristics using a scale of 1 to 5, where one means not at all important and 5 means extremely important:

a) Price.. ______
b) Brand... ______
c) Dimensions (esp. need for compact)............................... ______
d) Energy Efficiency .... ______
e) Reliability.. ______

2.5 With respect to the efficiency of units, we're trying to get a sense of what "high efficiency" means in the market right now. If a customer asked for a high efficiency 15-ton packaged air-cooled air conditioner, what would be the EER of the unit you would recommend?

ENTER EFFICIENCY OF 15-TON UNIT................ EER = ______
ENTER EFFICIENCY OF 5-TON UNIT.................. EER = ______

FOR THE PURPOSES OF THE REMAINDER OF OUR QUESTIONS, PLEASE REFER TO THE DEFINITIONS OF HIGH-EFFICIENCY UNITS PROVIDED **TABLE 1** OF THE FAX.

[ASK 2.5.1 FOR NON-PARTICIPANTS ONLY, FOR PARTS SKIP TO 2.6]

2.5.1 Prior to this conversation, were you aware that packaged air-conditioners are available at these efficiency levels?

Yes.. 1
No.. 2

[IF 2.5.1 = "NO", THEN DO A QUICK CONFIRMATION OF OBVIOUS RESPONSES TO THE REMAINDER OF QUESTIONS IN THIS SECTION]

2.6 Do you actively promote or market high-efficiency packaged units?

Yes.. 1
No.. 2

2.6.1 Probe: Why or Why Not?

[IF THEY DO NOT MARKET HE, SKIP TO 2.9, ELSE CONTINUE]

2.7 And, in general, how do you market high-efficiency packaged systems?

2.8 Do you believe that marketing high-efficiency packaged systems distinguishes your business from your competitor's?

Yes.. 1
No.. 2

2.8.1 Probe: Why or Why Not? [open-end]

2.9 In what percent of cases do you recommend or specify high-efficiency packaged units instead of or as an option to standard efficiency units?

ENTER PERCENTAGE.. ______%

2.10 Are you recommending high-efficiency units more or less than you were three years ago?
- More 1
- Less.. 2
- About the same.. 3

2.10.1 And why is that? [open-end]

2.11 And, in general, how difficult or easy is it to sell a high efficiency package unit compared to a standard one? Would you say it is:
- Extremely difficult 1
- Somewhat More difficult 2
- About the same.. 3
- Somewhat less difficult.. 4
- Extremely less difficult 5

2.11.1 And why is that? [open-end]

Now I would like to ask some questions about your sales and stocking of HVAC packaged units

2.12 Looking at **Table 1**, which of the following AIR-COOLED high-efficiency packaged units do you currently stock in quantities sufficient to ensure timely delivery? [ENTER 1 FOR STOCKED AND 0 FOR NOT STOCKED]
- a) <5 ton with 11.0 SEER or higher................................ a. ______
- b) 6 -12 ton with 10.3 EER or higher................................ b. ______
- c) 13 - 20 ton with 9.7 EER or higher .... c. ______
- d) >20 ton with 9.5 EER or higher................................ d. ______

IF NO HE UNITS STOCKED IN ANY GROUP, ASK 2.12.1, ELSE ASK 2.13

2.12.1 What are the main reasons you do not stock high-efficiency units? [open-end]

2.13 And, FOR THOSE UNITS THAT YOU STOCK, in what year did you begin carrying these AIR-COOLED package air conditioners in quantities sufficient to ensure timely delivery?
- ENTER YEAR. .... **Year**
- a) <5 ton with 11.0 SEER or higher................................ a. ______
- b) 6 -12 ton with 10.3 EER or higher................................ b. ______
- c) 13 - 20 ton with 9.7 EER or higher .... c. ______
- d) >20 ton with 9.5 EER or higher................................ d. ______

2.14 How has your stock of high-efficiency air-cooled packaged units (as defined above) changed over the past three years?

Significantly increased 1
Somewhat increased 2
Stayed about the same 3
Somewhat decreased 4
Significantly decreased 5

2.15 For each major size category (Table 1), what percentage of your sales of air-cooled packaged units were these high-efficiency units in 1998? [CONFIRM % H.E. PLUS % STANDARD = 100% WITHIN EACH SIZE GROUP]

a) <5 ton with 11.0 SEER or higher .... a. ____%
b) 6 -12 ton with 10.3 EER or higher .... b. ____%
c) 13 - 20 ton with 9.7 EER or higher .... c. ____%
d) >20 ton with 9.5 EER or higher .... d. ____%

2.16 And thinking back to 1996, what would estimate the percentages were then?.........

a) <5 ton with 11.0 SEER or higher .... a. ____%
b) 6 -12 ton with 10.3 EER or higher .... b. ____%
c) 13 - 20 ton with 9.7 EER or higher .... c. ____%
d) >20 ton with 9.5 EER or higher .... d. ____%

Barriers / Perceptions

Now we would like to ask a few questions issues associated with selling high-efficiency packaged units

3.1 a. Thinking back to 1996, what was the main obstacle to selling or specifying high-efficiency packaged systems? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

3.1b Thinking back to 1996, were there any other obstacles to selling or specifying high-efficiency packaged systems? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

	3.1.a **Most Important** *[Circle only one]*	3.1.b **Other** *[Circle all that apply]*
Distributor wouldn't stock because…		
Margin too low	1	1
Incomplete product line	2	2
Sale takes more time (hassle factor)	3	3
Market uncertainty (difficulty forecasting sales)	4	4
Other:	5	5
Contractor wouldn't specify/install because...		
Poor value for money	6	6
Reluctant to change when old tech. works	7	7
Product not readily available	8	8
Not enough information	9	9
Other:	10	10
End User wouldn't buy because...		
Uncertainty over savings	11	11
Reluctant to change when old tech. works	12	12
Split incentive (Owner/Tenant issue)	13	13
Credibility of offer in doubt	14	14
Not enough information	15	15
Incremental value too low to justify cost	16	16
Other:	17	17

3.2 Let's go through each of the obstacles you mentioned, to what extent, if any, have these barriers been reduced since 1996? [MAKE SURE A RESPONSE IS OBTAINED FOR EACH ITEM PROVIDED IN 3.1. CLEARLY LABEL BARRIER TO WHICH RESPONSE CORRESPONDS]

IF BARRIER REDUCED, THEN ASK

3.3 Have there been any utility rebate programs for promoting energy efficient HVAC units in your distribution areas? If so, do you think that they have contributed to reducing any barrier to using high-efficiency packaged equipment? If so, how? [CLEARLY LABEL BARRIERS TO WHICH RESPONSES CORRESPOND]

3.4 [Determine, if not already, whether there are any remaining barriers to using high efficiency packaged systems]] [ENTER RESPONSES ON LIST BELOW]

	Other *[Circle all that apply]*
Distributor wouldn't stock because...	
Margin too low	1
Incomplete product line	2
Sale takes more time (hassle factor)	3
Sale takes more time (hassle factor)	3
Market uncertainty (difficulty forecasting sales)	4
Other:	5
Contractor wouldn't specify/install because...	
Poor value for money	6
Reluctant to change when old tech. works	7
Product not readily available	8
Not enough information	9
Other:	10
End User wouldn't buy because...	
Uncertainty over savings	11
Reluctant to change when old tech. works	12
Split incentive (Owner/Tenant issue)	13
Credibility of offer in doubt	14
Not enough information	15
Incremental value too low to justify cost	16
Other:	17

Economics

4.1a On a typical project, how much more does it cost your customers per ton to buy a 15-ton air-cooled air conditioner with an EER of 9.7 than one with an EER of 8.5?
ENTER INCREMENTAL COST IN $/TON............______$/TON

4.1b And how about for a 5-ton air-cooled air conditioner with an SEER of 11.0 rather than one with an SEER of 9.7?
ENTER INCREMENTAL COST IN $/TON............______$/TON

4.2 Has the price difference between HE and standard AC of the same size and design increased, decreased, or stayed about the same over the past 3 years?

Increased.. 1
Stayed about the same 2
Decreased 3

4.2.1 [IF 1 or 3 ABOVE] To what do you attribute the change? *[open-end]*

4.3 Do your margins for packaged units differ for standard and high-efficiency units?

Yes, Higher.. 1
Yes, Lower 2
No, Same 3

4.3.1 Probe: If so, how? [open-end]

[FOR <u>OUT-OF-TERRITORY</u> SKIP TO THANKS AND END SURVEY]

[FOR <u>IN-TERRITORY NON-PARTICIPANTS</u>, SKIP TO QUESTION 6.1]

[FOR <u>IN-TERRITORY PARTICIPANTS</u> CONTINUE]

Express Efficiency Program - PARTICIPANTS ONLY

5.1 From whom did you first hear about the PG&E's Express Efficiency Program for Distributors?

Trade Organization.. 1
Business colleague 2
PG&E Representative 3
Mail advertisement... 4
Other:__________________________________............................ 5

5.1.1 Why did you decide to participate in this program?

5.2 And do you think the approach of rebated packaged units to distributors has been more or less effective than previous end user rebate programs for this technology?

More effective 1
Less effective.. 2
About the same... 3

5.2.1 And why is that?

5.3 What percentage of your sales of high-efficiency packed units in 1998 involved an Express Efficiency rebate?

ENTER PERCENTAGE .... _____%

5.4 How do you think your sales of qualifying high-efficiency packaged units would change, if at all, if the PG&E rebate program stopped today?

Decrease 1
Stay about the same 2
Increase 3

5.4.1 And why is that?

5.5 And if the PG&E rebate program stopped today, would you continue to promote, stock, and specify high-efficiency packaged units?

Yes 1
No 2

5.5.1 And why is that?

5.6 What do you think it will take to maintain demand for high-efficiency packaged units in the absence of utility or other energy-efficiency programs?

[SKIP TO SMARTER ENERGY SECTION, QUESTION 7.1]

Express Efficiency Program - IN-TERRITORY NON-PARTS ONLY

6.1 Have you heard of the PG&E's Express Efficiency Program for Distributors? [CLARIFY, IF NEEDED]

Yes 1
No 2

IF YES, THEN ASK 6.1.1, ELSE SKIP TO 7.1

6.1.1 From whom did you first hear about it?
- Trade Organization.. 1
- Business colleague 2
- PG&E Representative 3
- Mail advertisement.. 4
- Other:__________________________________............................ 5

6.1.2 Even though your firm did not participate directly, do think the program had any effect on your sales of packaged units in 1998?

6.1.3 And why did you decide not to participate in this program?

Smarter Energy/BEMS - IN-TERRITORY ONLY

7.1 Prior to this conversation, were you aware of PG&E's SmarterEnergy website? Located at www.pge.com/smarterenergy
- Yes... 1
- No 2

IF NO, THEN: The SmarterEnergy website is the place where PG&E puts all of its rebate and energy efficiency program information. You can look it up at <www.pge.com/smarterenergy>.

IF YES, THEN ASK

7.1.1 Have you ever looked at the website?
- Yes... 1
- No 2

7.1.2 Are you listed on the website?
- Yes... 1
- No 2
- Don't know.. 3

IF YES, THEN ASK 7.1.2.1, ELSE ASK 7.1.2.2

7.1.2.1 Could you describe the quantity and quality of leads ?
Yes.. 1
No.. 2
Don't know.. 3

IF NO, THEN ASK

7.1.2.2 Do you plan to be listed on the website?
Yes.. 1
No.. 2
Don't know.. 3

7.2 Prior to this call, were you aware that PG&E provided energy audits to small and medium sized businesses?
Yes.. 1
No.. 2

7.2.1 In the past 3 years, has your firm obtained any business installing energy saving measures for customers based on recommendations they received from PG&E? [IF NECESSARY, PROVIDE EXAMPLES: SET-BACK THERMOSTATS, TIMECLOCKS, HE PACKAGED UNITS, VSDS]
Yes.. 1
No.. 2
Don't know.. 3

IF AWARE OF PG&E ENERGY AUDITS (7.2 = YES), THEN ASK

7.2.2 Which of the following best characterizes the effect, if any, of PG&E's energy audit program on your business? Would you say the effect of PG&E's energy audits on the percent of energy-efficiency related business your firm does with small and medium sized commercial customers is:
Very significant.. 1
Somewhat significant.. 2
Somewhat insignificant... 3
Very insignificant.. 4

7.2.2.1 And why is that?

7.3 Finally, returning to our very first question, do you have any concluding thoughts on how you think energy efficiency programs could be improved to more effectively promote the specification and use of efficient HVAC equipment? [open-end]

Thank you very much for your assistance in this important project
[END]

Check reportage against PG&E SmarterEnergy website for particular brands at:
http://www.pge.com/customer_services/business/energy/express/html/central_ac_query.html

FAX Survey Guide

1. Approximate breakdown of your packaged HVAC sales to each of the following:
    - Contractors ....%____
    - End Users (direct sales) ....%____
    - Other distributors ....%____
    - Retail (e.g., Home Depot).....................................%____
    - Other: ______________________ ....%____

2. Approximate breakdown of packaged HVAC sales in terms of:
    - Planned replacement of existing units...................%____
    - Emergency replacement of existing units ....%____
    - New units in existing buildings (expansion)..........%____
    - New units in new buildings ....%____
    - Other: ______________________ ....%____

Table 1:

Qualifications for High Efficiency Air-Cooled AC Units

A. <5 ton	SEER	= 11.0 (or higher)
B. 6 -12 ton	EER	= 10.3 (or higher)
C. 13 - 20 ton	EER	= 9.7 (or higher)
D. >20 ton	EER	= 9.5 (or higher)

Table 2:
ASHRAE Standard Efficiency for Air-Cooled AC Units

A. < 5 ton	SEER	= 9.7
B. 6 - 12- ton	EER	= 8.9
C. > 13 ton	EER	= 8.5

Thank you very much for your assistance in this important project

C.4 LIGHTING CONTRACTOR SURVEY

EXPRESS EFFICIENCY MARKET EFFECTS STUDY
IN-DEPTH INTERVIEW GUIDE
COMMERCIAL LIGHTING CONTRACTORS

Name Title	Phone
Company	Fax
Street Address	email
City, State, ZIP	Interviewer
D&B Sales	Call dates
D&B Employees	Complete Date

Lead-in

Hello, my name is __________ and I am calling on behalf of Pacific Gas & Electric. We are contacting lighting contractors as part of a study of the commercial lighting market.

[SCREENING QUESTIONS]

S.1 Does your company ...
- Manufacture commercial lighting equipment 1
- Install commercial lighting equipment... 2
- Sell commercial lighting equipment 3
- Design or layout commercial lighting.. 4

[IF S.1 NOT EQUAL TO 2 or 4, THEN TERMINATE]

S.2 Does your company do more than $50,000 in commercial lighting business a year?
- Yes.. 1
- No 2
- Don't Know.. 3

IF S.2 = 1 OR 3, THEN PROCEED

S.3 And does your firm do a quarter or more of your lighting business with small and medium-sized commercial customers [defined as customers who have less than 50 full-time equivalent employees]?
- Yes.. 1
- No 2
- Don't know... 3

IF NO, THEN TERMINATE

May I speak with the individual who is in charge of your commercial lighting business.

IF THE CONTACT IS NOT AVAILABLE, ASK FOR NAME AND BEST TIME TO CALL BACK. FAX RESPONSE MATRICES.

ONCE CONTACT IS ON THE LINE, REPEAT LEAD IN IF NECESSARY, THEN: We would like to ask you a few questions about trends in your experience installing and specifying lighting equipment and your perceptions of changes in the market. The whole interview should take about 15 minutes. Please be assured that the information you provide in the interview will remain confidential with XENERGY. We will not identify or attribute any of your comments or company information.

First, we would like to learn a little about your business.

1.1 Which of the following best describes your firm?
- Electrical contractor 1
- Energy service company 2
- Lighting management company 3
- Other: ____________________ 4

1.2 Does your company provide lighting services other than equipment installation, such as...
- Lighting design and layout 1
- Other: ____________________ 2

1.3 [IN-TERRITORY ONLY] Does your company have more than one location in California?
- Yes 1
- No 2

IF YES, THEN ASK [And for all other respondents]

1.3.1 Is this location...
- Your headquarters 1
- or a branch 2

1.3.2 [IF BRANCH, ASK HOW MANY OTHER BRANCHES AND IN WHAT STATES]

____

1.4 How many years has your company been in business?
- ENTER NUMBER OF YEARS .... ________

1.5 About how many full time equivalent workers of all types do you employ at this location?
- ENTER NUMBER OF FTEs .... ________

1.6 And approximately what were the total sales of all products and services for your company in 1998 at this location?

Actual Total.. ________

[**If reluctant or refuses, ask which range they would fall in.]**

< $500,000.. 1
$500,000 - $5 million 2
>$5 million 3
Don't know/Proprietary 4

1.7 About what percentage of your company's total sales at this location came from products or services related to commercial lighting equipment?

ENTER PERCENTAGE .... _______%

1.8 And does your company specify or install... *[circle all that apply]*

a) 4-foot fluorescent lamps.. 1
b) Electronic ballasts 2
c) 4-foot fluorescent fixtures 3
d) Compact fluorescent lamps... 4
e) HID lamps or fixtures.. 5

Market Characteristics Section

Now we would like to ask a few questions about the characteristics of the market you serve at this location.

2.1 In rough terms, what percent of your lighting projects are provided to each of the following?

a) Other contractors .... ______%
b) Direct to end users .... ______%
c) Developers.. ______%
d) Other: _______________________ .... ______%
.... total should add to ___100 %

2.2 Roughly what percent of your lighting projects are retrofits or expansions as compared with new construction?

a) Retrofits and expansions .... ______%
b) New construction .... ______%
c) Other: _______________________............................... ______%
.... total should add to ___100 %

XENERGY

2.3 What percent of your lighting business at this location serves commercial versus residential and industrial customers?

a) Commercial ....______%
b) Residential..______%
c) Industrial ....______%
d) Other: ______________________ ....______%
.... total should add to ___100 %

2.4 What percentage of your purchases of compact fluorescent lamps comes from each of the following.

a) Wholesalers, distributors and manufacturer's reps ....______%
b) Directly from manufacturers..______%
c) Retail outlets, such as Home Depot ....______%
d) Other: ______________________ ....______%
.... total should add to ___100 %

Now we would like to ask a couple of questions about the market for fluorescent lamps and ballasts

2.5 Could you please describe what you believe were the most important trends in the fluorescent lighting equipment market over the past 3 years?

2.5.1 And what types of changes in the lighting equipment market do you anticipate over the next 3 years, if any?

2.6 And what are the most important factors you consider when deciding *which* lighting technology to specify or install for your customers?

2.6.1 And what types of lamps and ballasts do you typically specify or install for four-foot *fluorescent fixtures?*

2.7 Do you actively promote T8 lamps, electronic ballasts, or compact fluorescent lamps? [mark Yes for any]

Yes.. 1
No.. 2

2.7.1 Probe: Why or Why Not?

IF 2.7=YES, THEN ASK 2.7.2 ELSE GO TO 2.8a

2.7.2 And, in general, how do you promote T8s, electronic ballasts, or compact fluorescent lamps? [GENERAL EFFICIENT LIGHTING TECHNOLGIES]

2.8a In what percent of cases do you recommend or specify T8 lamps instead of or as an option to T12 lamps?

ENTER PERCENTAGE...______%

2.8b In what percent of cases do you recommend or specify compact fluorescent lamps instead of or as an option to incandescent lamps?

ENTER PERCENTAGE...______%

[IF 2.8b = 0% SKIP TO 2.9]

2.8.1 In what percent of cases, if any, would you say customers object to your specification of compact fluorescent lamps?

ENTER PERCENTAGE...______%

2.8.2 And in these cases, do you try to work with the customer to overcome their objections...

In all cases 1
In some cases... 2
In none of these cases... 3
DK/NA 4

2.8.3 And would you say you are recommending CFLs more or less than you were three years ago?

More 1
Less.. 2
About the same 3

2.8.3.1 And why is that?

2.9 In terms of maintaining your firm's competitive position, how important is offering T8 lamps, electronic ballasts, or compact fluorescent lamps in your installations? Would you say ...

Very important 1
Somewhat important 2
Not very important 3
Not at all important 4

Now we would like to ask some questions about your company's installation of efficient lighting equipment

2.10a Of all your downlight or sconce sales, what percent were compact fluorescent in 1998? And how about in 1996?

1) ENTER PERCENT...1998 ______%
2) ENTER PERCENT...1996 ______%

2.10b Of all your linear fluorescent sales, what percent were T8 in 1998? And how about in 1996?

1) ENTER PERCENT...1998 ______%
2) ENTER PERCENT...1996 ______%

2.10c Of all your linear fluorescent ballast sales, what percent were electronic in 1998? And how about in 1996?

1) ENTER PERCENT...1998 ______%
2) ENTER PERCENT...1996 ______%

Barriers / Perceptions Section

Now we would like to ask a few questions about issues associated with specifying lighting equipment

3.1a Thinking back to 1996, what was the main obstacle to specifying compact fluorescent lamps? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

3.1b Thinking back to 1996, were there any other obstacles to specifying compact fluorescent lamps? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

	3.2a **Most Important** *[Circle only one]*	3.2b **Other** *[Circle all that apply]*
Wouldn't buy because...		
Uncertainty over savings	10	10
Payback longer than company policy allows	11	11
Technology Problems (general)	12	12
Does not fit in existing incand. fixture	13	13
Color rendition is poor	14	14
Flicker problems	15	15
Noise / buzzing problems	16	16
Not bright enough	17	17
Customer has not enough information	18	18
Incremental value too low to justify cost	19	19
Other:	20	20

IF PRICE IS ONLY OBSTACLE MENTIONED, THEN ASK:

In addition to the price of compact fluorescent lamps, were there any other obstacles to increased sales back in '96?
[RECORD RESPONSE IN 3.1b]

3.3 Let's go through each of the obstacles you mentioned, to what extent, if any, have these barriers been reduced since 1996? [MAKE SURE A RESPONSE IS OBTAINED FOR EACH ITEM PROVIDED IN 3.2a+b CLEARLY LABEL BARRIER TO WHICH RESPONSE CORRESPONDS]

IF BARRIER REDUCED, THEN ASK

3.4 Do you think that utility energy efficiency programs contributed to reducing this barrier to using CFLs? If so, how? [CLEARLY LABEL BARRIERS TO WHICH RESPONSES CORRESPOND. MAKE SURE TO EXPLICITLY NOTE ANY DIRECT MENTIONS OF BEMS OR SMARTER ENERGY]

3.5 What do you believe is the most important remaining barrier to using compact fluorescent lamps?

3.6 Are there any other remaining barriers? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

3.6a

	Other *[Circle all that apply]*
Wouldn't stock because...	
Uncertainty over savings	1
Payback longer than company policy allows	2
Technology Problems (general)	3
Does not fit in existing incand. fixture	4
Color rendition is poor	5
Flicker problems	6
Noise / buzzing problems	7
Not bright enough	8
Customer has not enough information	9
Incremental value too low to justify cost	10
Other:	11

3.7 We've noticed that T8 lamps and electronic ballasts are becoming standard for large commercial customers, while smaller customers aren't using them as much. Have you found this to be true? Why / Why not?

3.8 Now I'd like to read a series of statements and I'd like you to tell me how well each statement describes your customers' beliefs about energy efficient investments or practices. We'll use a 1-to-10 scale, where 1 means you don't agree at all with the statement, and 10 means you agree completely with the statement. The first/next one is …

Score

a._____ When considering a new energy efficiency investment, customers are concerned that the actual savings on their bill will be less than estimated

b._____ Customers believe there is too much time and hassle involved in selecting a contractor who knows a lot about energy efficiency

c._____ Customers feel uncertain about the reliability of information provided by non-utility firms proposing energy efficient investments for their business

d._____ Lack of financing is a barrier to customers' making energy efficiency investments that they want to make

[FOR OUT-OF-TERRITORY THANK AND END SURVEY]

Express Efficiency Program

4.1 Are you familiar with PG&E's 1998 Express Efficiency rebate program for efficient lighting equipment? It used to be called 'Retrofit Express'.

Yes.. 1
No.. 2

IF NO, SKIP TO 4.4

4.2 From whom did you first hear about PG&E's Express rebate program?

Trade Organization... 1
Business colleague 2
PG&E Representative 3
Mail advertisement... 4
Lighting Equipment Distributor.. 5
Other:________________________________.............................. 6

4.3 In what percent of the high-efficiency lighting projects that your firm installed in 1998 was a PG&E rebate obtained by the customer? And how about in 1996?

1) ENTER PERCENTAGE...1998 ______%
2) ENTER PERCENTAGE...1996 ______%

4.4 If lighting rebate programs were to terminate today, do you think you would change your specification or equipment selection practices for CFLs?

Yes.. 1
No.. 2
Don't know.. 3

4.4.1 And why is that?

4.5 If lighting rebate programs were to terminate today, do you think you would change the level of effort you put into promoting and selling CFLs?

Yes.. 1
No.. 2
Don't know.. 3

4.5.1 And why is that?

4.6 Finally, how do you think your sales of CFLs would change, if the PG&E rebate program stopped today?

Decrease 1
Stay about the same... 2
Increase.. 3

4.6.1 And why is that?

4.7 Now, I'd like to know how much of an effect you think the Express Efficiency Program has had on the market for CFLs since 1992. On a scale from 1 to 5, where 1 means little effect at all and 5 means a major effect, do you think the program has...

a) Increased awareness of CFLs.. ______
b) Improved access to information on CFLs....................... ______
c) Improved you and your customers opinions about the quality & performance of CFLs .... ______
d) Reduced the price of CFLs (excluding the rebate itself) . ______

Smarter Energy/BEMS Section

5.1 Prior to this conversation, were you aware of PG&E's SmarterEnergy website? Located at www.pge.com/smarterenergy

Yes.. 1
No.. 2

IF NO, THEN: The SmarterEnergy website is the place where PG&E puts all of its rebate and energy efficiency program information. It provides product information, articles, and some vendor information as well. You can look it up at <www.pge.com/smarterenergy>.

5.1.1 Do you remember it now?

Yes.. 1
No.. 2

IF YES, THEN ASK. ELSE SKIP TO 5.2.

5.1.2 Have you ever looked at the website?
- Yes.. 1
- No 2

5.1.3 Do you think the information about the programs, efficient equipment, and vendors is useful?
- Yes.. 1
- No 2

5.1.3.1 And why is that?

5.1.3.2 And to what extent do you think the Smarter Energy website will increase customer awareness and consideration to purchase efficient lighting equipment?

5.2 Are you aware that PG&E offers energy audits to small and medium sized businesses?
- Yes.. 1
- No 2

IF 5.2 = YES, THEN ASK

5.2.1 In the past 3 years, has your firm obtained any business installing energy saving measures for customers based on recommendations they received from PG&E? [IF NECESSARY, PROVIDE EXAMPLES: OCCUPANCY SENSORS, TIMECLOCKS, PHOTOCELLS, ELECTRONIC BALLASTS, T8 LAMPS, CFLS, etc.]
- Yes.. 1
- No 2

5.2.2 Which of the following best characterizes the effect, if any, of PG&E's energy audit program on increasing your business? Would you say the effect of PG&E's energy audits on the percent of energy-efficiency related business your firm does with small and medium sized commercial customers is:
- Very significant 1
- Somewhat significant 2
- Completely insignificant 3

5.2.2.1 And why is that?

5.2.2.2 And to what extent do you think PG&E's energy audits have increased customer awareness and consideration to purchase efficient lighting equipment?

5.3 Finally, do you have any concluding thoughts on how you think energy efficiency programs could be improved to more effectively promote the specification and use of efficient lighting equipment?

Thank you very much for your assistance in this important project
[END]

Check the listings of eligible lighting products at:

http://www.pge.com/customer_services/business/energy/express/html/lighting_query.html

C.5 LIGHTING DISTRIBUTOR SURVEY

EXPRESS EFFICIENCY MARKET EFFECTS STUDY
IN-DEPTH INTERVIEW GUIDE
COMMERCIAL LIGHTING DISTRIBUTORS

Name *Title*	*Phone*
Company	*Fax*
Street Address	*email*
City, State, ZIP	*Interviewer*
D&B Sales	*Call dates*
D&B Employees	*Complete Date*

Lead-in

Hello, my name is __________ and I am calling on behalf of Pacific Gas & Electric. We are contacting lighting companies as part of a study of the commercial lighting market.

[SCREENING QUESTIONS]

S.1 Does your company ...

Manufacture commercial lighting equipment 1
Install commercial lighting equipment.. 2
Sell commercial lighting equipment 3
Design or layout commercial lighting... 4

IF S.1 NOT EQUAL TO 3, THEN TERMINATE

S.2 Does your company do more than $100,000 in commercial lighting business a year?

Yes.. 1
No.. 2
Don't Know.. 3

IF S.2 = 1 OR 3, THEN PROCEED

S.3 And does your firm do a quarter or more of your lighting business with small and medium-sized commercial customers [defined as customers who have less than 50 full-time equivalent employees]?

Yes.. 1
No.. 2
Don't know... 3

IF NO, THEN TERMINATE

May I speak with the individual who is in charge of your commercial lighting business.

IF THE CONTACT IS NOT AVAILABLE, ASK FOR NAME AND BEST TIME TO CALL BACK. FAX RESPONSE MATRICES.

ONCE CONTACT IS ON THE LINE, REPEAT LEAD IN IF NECESSARY, THEN: We are conducting a study on the commercial lighting market. We would like to ask you a few questions about trends in selling lighting equipment and your perceptions of changes in the market. The whole interview should take about 15 minutes. Please be assured that the information you provide in the interview will remain confidential with XENERGY. We will not identify or attribute any of your comments or company information.

First of all, we would like to learn a little about your business...

1.1 Which of the following best describes your commercial lighting distribution business?

- Catalog/mail order firm 1
- General industrial supplier 2
  - RECORD NAMES OF MFR________________________
- Electrical equipment supplier 3
- Lighting supplier only 4
- Manufacturer representative 5
  - IF MFR REP, RECORD NAME OF MFR________________

1.2 Does your company provide lighting services other than equipment sales, such as...

- Lighting design and layout .... ________
- Installation .... ________
- Other:______________________________ .... ________
- No .... ________

1.3 [IN-TERRITORY ONLY] Does your company have more than one location in California?

- Yes 1
- No 2

IF YES, THEN ASK [And for all other respondents]

1.3.1 Is this location...

- Your headquarters 1
- or a branch 2

1.3.2 [IF BRANCH, ASK HOW MANY OTHER BRANCHES AND IN WHAT STATES]

____

1.4 How many years has your company been in business?

ENTER NUMBER OF YEARS.................................... ________

1.5 About how many full time equivalent workers of all types do you employ at this location?

ENTER NUMBER OF FTEs.. ________

1.6 And approximately what were the total sales of all products and services for your company in 1998 at this location?

ACTUAL.. ________

[If reluctant or refuses ask if they could choose which range they would fall in.]

< $1 million 1
$1 - $10 million 2
>$10 million 3
Don't know/Proprietary 4

1.7 About what percentage of your company's total sales <u>at this location</u> came from commercial lighting products or lighting-related services?

ENTER PERCENTAGE .... _______%

Now we would like to review the products your company handles...

2.1 Does your company sell? *[circle all that apply]*

4-foot fluorescent lamps.. 1
Electronic ballasts 2
4-foot fluorescent fixtures 3
Compact fluorescent lamps 4
HID lamps or fixtures.. 5

2.2 What year did you begin carrying the following product types in quantities sufficient to ensure timely delivery?

ENTER YEAR. .... **Year**
T-8 lamps... a. ______
T-5 lamps... b. ______
Electronic ballasts .... c. ______
Compact fluorescent lamps .... d. ______

2.3 What percentage of your total sales are accounted for by...

T8 lamps .... ______%
T8 fixtures .... ______%
Compact fluorescent lamps .... ______%
Compact Fluorescent fixtures.. ______%
Electronic ballasts .... ______%
T5 lamps... ______%
All other.. ______%

2.4 Who do you sell your product to?

Contractors .... ______%
Direct to end users.. ______%
Other distributors.. ______%
Retail Stores .... ______%
Other: ________________________________.................. ______%

2.5 Could you please describe what you believe were the most important trends in the lighting equipment market over the past 3 years?

2.5.1 And what types of changes in the lighting equipment market do you anticipate over the next 3 years, if any?

2.6 And what are the most important factors you consider when deciding *which* lighting technology to specify for your customers?

2.6.1 And what types of lamps and ballasts do you typically specify for four-foot *fluorescent fixtures* in new construction?

2.6.2 How about for retrofits?

2.7 Do you actively promote T8 lamps, electronic ballasts, or compact fluorescent lamps? [circle Yes for any]

Yes.. 1
No.. 2

2.7.1 Probe: Why or Why Not?

IF 2.7=YES, THEN ASK 2.7.2 ELSE GO TO 2.8a

2.7.2 And, in general, how do you promote T8s, electronic ballasts, or compact fluorescent lamps? [GENERAL EFFICIENT LIGHTING TECHNOLOGIES]

2.8a In what percent of cases do you recommend or specify T8 lamps instead of or as an option to T12 lamps?

ENTER PERCENTAGE .... ______%

2.8b In what percent of cases do you recommend or specify compact fluorescent lamps instead of or as an option to incandescent lamps?

ENTER PERCENTAGE .... ______%

[IF 2.8b = 0% SKIP TO 2.9]

2.8.1 In what percent of cases, if any, would you say customers object to your specification of compact fluorescent lamps?

ENTER PERCENTAGE .... ______%

2.8.2 And in these cases, do you try to work with the customer to overcome their objections...

In all cases 1
In some cases.. 2
In none of these cases 3
DK/NA 4

2.8.3 And would you say you are recommending CFLs more or less than you were three years ago?

More 1
Less... 2
About the same 3

2.8.3.1 And why is that?

2.9 In terms of maintaining your firm's competitive position, how important is offering T8 lamps, electronic ballasts, or compact fluorescent lamps in your installations? Would you say ...

Very important 1
Somewhat important 2
Not very important 3
Not at all important 4

Now we would like to ask some questions about your company's sales of efficient lighting equipment

2.10a Of all your downlight or sconce sales, what percent were compact fluorescent in 1998? And how about in 1996?

ENTER PERCENT .... 1998 ______%
ENTER PERCENT .... 1996 ______%

2.10b Of all your linear fluorescent sales, what percent were T8 in 1998? And how about in 1996?

ENTER PERCENT .... 1998 ______%
ENTER PERCENT .... 1996 ______%

2.10c Of all your linear fluorescent ballast sales, what percent were electronic in 1998? And how about in 1996?

ENTER PERCENT .... 1998 ______%
ENTER PERCENT .... 1996 ______%

Now I'd like to ask a few questions about changes in the market for energy efficient technologies.

3.1a Thinking back to 1996, what was the main obstacle to using or specifying compact fluorescent lamps? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

3.1b Thinking back to 1996, were there any other obstacles to selling or specifying compact fluorescent lamps? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

	3.2a	3.2b
	Most Important *[Circle only one]*	**Other** *[Circle all that apply]*
Wouldn't buy because...		
Uncertainty over savings	10	10
Payback longer than company policy allows	11	11
Technology Problems (general)	12	12
Does not fit in existing incand. fixture	13	13
Color rendition is poor	14	14
Flicker problems	15	15
Noise / buzzing problems	16	16
Not bright enough	17	17
Customer has not enough information	18	18
Incremental value too low to justify cost	19	19
Other:	20	20

IF PRICE IS ONLY OBSTACLE MENTIONED, THEN ASK:

In addition to the price of compact fluorescent lamps, were there any other obstacles to increased sales back in '96?
[RECORD RESPONSE IN 3.1b]

ASK 3.3 and 3.4 IN SEQUENCE FOR EACH BARRIER NAMED.

3.3 Let's go through each of the obstacles you mentioned, to what extent, if any, have these barriers been reduced since 1996? [MAKE SURE A RESPONSE IS OBTAINED FOR EACH ITEM PROVIDED IN 3.2a+b CLEARLY LABEL BARRIER TO WHICH RESPONSE CORRESPONDS]

IF BARRIER REDUCED, THEN ASK

3.4 Do you think that utility energy efficiency programs contributed to reducing this barrier to using CFLs? If so, how? [CLEARLY LABEL BARRIERS TO WHICH RESPONSES CORRESPOND. MAKE SURE TO EXPLICITLY NOTE ANY DIRECT MENTIONS OF BEMS OR SMARTER ENERGY]

3.5 What do you believe is the most important remaining barrier to using compact fluorescent lamps?

3.6 Are there any other remaining barriers? [ENTER RESPONSES VERBATIM. LIST BELOW IS PRELIMINARY FOR POST-CODING]

	3.5a **Most Important** *[Circle only one]*	3.5b **Other** *[Circle all that apply]*
Wouldn't buy because...		
Uncertainty over savings	10	10
Payback longer than company policy allows	11	11
Technology Problems (general)	12	12
Does not fit in existing incand. fixture	13	13
Color rendition is poor	14	14
Flicker problems	15	15
Noise / buzzing problems	16	16
Not bright enough	17	17
Customer has not enough information	18	18
Incremental value too low to justify cost	19	19
Other:	20	20

[FOR OUT-OF-TERRITORY THANK AND END SURVEY]

[FOR IN-TERRITORY PARTICIPANTS, SKIP TO QUESTION 4.2]

Express Efficiency Program

4.1 Are you familiar with PG&E's 1998 Express Efficiency rebate program for efficient lighting equipment? It used to be called 'Retrofit Express'.

Yes........ 1
No........ 2

IF NO, SKIP TO 5.1

4.2 From whom did you first hear about PG&E's Express rebate program?

Trade Organization........ 1
Business colleague........ 2
PG&E Representative........ 3
Mail advertisement........ 4
Other:________________........ 6

4.3 If lighting rebate programs were to terminate today, do you think your CFL sales would change?

Yes........ 1
No........ 2
Don't know........ 3

4.3.1 And why is that?

4.4 How would you change the level of effort you put into promoting and selling CFLs if the program ended today?

Yes........ 1
No........ 2
Don't know........ 3

4.4.1 And why is that?

4.5 Finally, how do you think your sales of CFLs would change, if the PG&E rebate program stopped today?

Decrease 1
Stay about the same.. 2
Increase.. 3

4.5.1 And why is that?

4.6 Now, I'd like to know how much of an effect you think the Express Efficiency Program has had on the market for CFLs since 1992. On a scale from 1 to 5, where 1 means little effect at all and 5 means a major effect, do you think the program has…

a) Increased awareness of CFLs... ______
b) Improved access to information on CFLs........................ ______
c) Improved you and your customers opinions about the quality & performance of CFLs .... ______
d) Reduced the price of CFLs (excluding the rebate itself) . ______

Smarter Energy/BEMS Section

5.1 Prior to this conversation, were you aware of PG&E's SmarterEnergy website? Located at www.pge.com/smarterenergy

Yes.. 1
No 2

IF NO, THEN: The SmarterEnergy website is the place where PG&E puts all of its rebate and energy efficiency program information. It provides product information, articles, and some vendor information as well. You can look it up at <www.pge.com/smarterenergy>.

5.1.1 Do you remember it now?

Yes.. 1
No 2

IF YES, THEN ASK

5.1.2 Have you ever looked at the website?

Yes.. 1
No... 2

5.1.3 Do you think the information about the programs, efficient equipment, and vendors is useful?

Yes.. 1
No... 2

5.1.3.1 And why is that?

5.1.3.2 And to what extent do you think the Smarter Energy website will increase customer awareness and consideration to purchase efficient lighting equipment?

5.2 Are you aware that PG&E offers energy audits to small and medium sized businesses?

Yes.. 1
No... 2

IF 5.2 = YES, THEN ASK

5.2.1 In the past 3 years, has your firm obtained any business installing energy saving measures for customers based on recommendations they received from PG&E? [IF NECESSARY, PROVIDE EXAMPLES: OCCUPANCY SENSORS, TIMECLOCKS, PHOTOCELLS, ELECTRONIC BALLASTS, T8 LAMPS, CFLS, etc.]

Yes.. 1
No... 2

5.2.2 Which of the following best characterizes the effect, if any, of PG&E's energy audit program on your business? Would you say the effect of PG&E's energy audits on the percent of energy-efficiency related business your firm does with small and medium sized commercial customers is:

Very significant... 1
Somewhat significant.. 2
Completely insignificant... 3

5.2.2.1 And why is that?

5.2.2.2 And to what extent do you think PG&E's energy audits have increased customer awareness and consideration to purchase efficient lighting equipment?

5.3 Finally, do you have any concluding thoughts on how you think energy efficiency programs could be improved to more effectively promote the specification and use of efficient lighting equipment?

Thank you very much for your assistance in this important project
[END]

Check the listings of eligible lighting products at:

http://www.pge.com/customer_services/business/energy/express/html/lighting_query.html