2003 STATEWIDE RESIDENTIAL RETROFIT SINGLE-FAMILY HOME ENERGY EFFICIENCY REBATE PROGRAM EVALUATION

Study ID# PGE0204

December 29, 2004

Prepared for California's Investor-Owned Utilities:

Pacific Gas and Electric Company
San Diego Gas and Electric Company
Southern California Edison Company
Southern California Gas Company

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Measurement and Evaluation
Customer Energy Management Policy, Planning & Support Section
Pacific Gas and Electric Company
San Francisco, California

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As part of its Customer Energy Management Programs, Pacific Gas and Electric Company (PG&E) has engaged consultants to conduct a series of studies designed to increase the certainty of and confidence in the energy savings delivered by the programs. This report describes one of those studies. It represents the findings and views of the consultant employed to conduct the study and not of PG&E itself.

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FINAL REPORT

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ES. EXECUTIVE SUMMARY

The Single-Family Energy Efficiency Rebate program, a statewide energy efficiency program, is administered by the four California investor-owned utilities (IOUs), including Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), Southern California Gas Company (SCG), and San Diego Gas and Electric Company (SDG&E). The Single-Family program provides rebates for energy efficient products in four distinct markets—HVAC, home improvement, appliances, and pool pumps.

The overall goals for the Single-Family program evaluation were to (1) conduct verification activities to validate statewide accomplishments as reported by the IOUs in their 2003 program claims, and (2) assess the program's ability to provide helpful information, services and prescriptive rebates to move the market toward energy-efficient measures. Because the evaluation budget for 2003 was significantly less than the 2002 budget (about half), this evaluation focused on research recommendations that arose from the 2002 evaluation. More specifically, the 2002 evaluation raised some concerns over the extent to which the Single-Family Rebate program may be influencing the market for three key measures: programmable thermostats, high performance windows, and central air conditioning. Furthermore, in 2003 the program rolled out a point-of-sale rebate for programmable thermostats (an instant rebate at the cash register of participating retailers, such as Home Depot). While programmable thermostats proved an effective strategy in increasing sales, the point-of-sale rebate raised concerns about the influence of the program on Energy Star-qualified programmable thermostat sales.

These three measures (programmable thermostats, high performance windows, and central air conditioning) contributed to over half of the statewide program's energy savings in 2003. Therefore, in addition to meeting the overall evaluation objectives of verifying the program accomplishments and conducting a process assessment for all measures, another primary research objective for this evaluation was to assess the program's influence on programmable thermostats, high performance windows, and central air conditioning. It is important to stress that the results of the program's influence on these three measures is not representative of the program's overall impact on the single-family market. These measures (as stated above) were selected for an in-depth analysis because the 2002 evaluation raised concerns about the program's influence on participants' decisions to adopt these measures.

This study, prepared by an independent third party evaluation team consisting of Quantum Consulting (QC) and KEMA-XENERGY, Inc, provides information about existing equipment for the residential population, evaluation findings and program guidance.

This executive summary of the Statewide Single-Family Energy Efficiency Rebate program summarizes the results of the verification study and process assessment for the overall program; summarizes the program influence assessment and measure-specific assessments for programmable thermostats, high performance windows, and central air conditioning; and provides program design and future evaluation research recommendations.

VERIFICATION OF PROGRAM ACCOMPLISHMENTS

- For the 2003 program year, the Statewide Single-Family Energy Efficiency Rebate program claimed savings of 52 GWh, 5.6 million therms and 43 MW, achieving 95% of its kWh target, 100% of its Therm target, and 92% of its kW target. These measure accomplishments, reported by the IOUs in their final report, matched very well with the program tracking data.
- Comparing the 2002 and 2003 program years, the measures that provided the largest contributions towards program accomplishments were the same: thermostats, air conditioners, windows, clothes washers, dish washers and pool pumps. However, the point-of-sale rebate for thermostats in 2003 lead to a significant increase in the contribution made by programmable thermostats. Thermostats contributed 28% of the kWh and 40% of the therm savings in 2003, compared to 22% and 28% in 2002.
- Hard-to-Reach (HTR) targets were met for three of the four IOUs. The accomplishments reported in the program tracking data also matched very well with what was reported in the Final Fourth Quarter Report narrative for each IOU.
- The per unit savings values in the Fourth Quarter filings were found to be accurate.
- The Measure Installation Verification survey found that 97.6% of 1,274 surveyed participants recalled receiving a rebate through the Single-Family Rebate Program. Furthermore, 98.2% of those who recalled receiving a rebate still have their measure installed.
- The On-site Equipment Verification found that all 90 rebated measures audited were installed in the participants' home and all but 4 of these measures were verified as being program qualifying.

PROCESS ASSESSEMENT

- Retailers continue to be a key market actor in moving the energy-efficient appliance market.
  - Appliance purchasing participants tend to learn about rebates through retailers.
  - Nearly three of four appliance purchasing participants got an application at a retailer.
  - 89% recalled speaking with a retail salesperson.
  - Two out of three recalled in-store advertising.
  - Nearly all retailers interviewed were aware of the program.
- Contractors figure prominently into making participants aware of program-qualifying heating and cooling measures.
  - Nearly half of the heating and cooling measure participants become aware of the program through a contractor.
  - Similarly, nearly half of the heating and cooling measure participants obtained their application from their contractor.

  - Over 80% of the contractors interviewed were aware of the program.
  - Over half of the contractors interviewed said they actively promote rebates.
  - 70% of HVAC contractors fill out rebate applications on behalf of their customers, compared to only 30% of window contractors, even though both found application forms to be reasonable in length and level of detail.
- Online applications gained popularity among program participants; 24% of participants said they downloaded an application (compared with 20% in 2002).
- Overall, participants were quite satisfied with the program, even more satisfied than in 2002.
  - Participant satisfaction with rebate turnaround time increased, reflecting IOU efforts to streamline application processing.
  - Bill savings continued to receive the lowest satisfaction score.
- Retailers and contractors were also very satisfied with the program, but offered some suggestion for improving the program. Increasing program funding, broadening rebate options, and increasing marketing efforts and customer awareness were the most common responses.
- Retailers were asked the relative merits of POS rebates vs. mail-in rebates and whether they thought an expansion of the POS rebate was a good idea. Most preferred POS rebates, but offered a number of pros and cons for each approach:
  - The most significant benefits of the POS approach are that customers receive their rebates instantly and avoid the hassle of filling out a rebate form.
  - The greatest drawbacks of the POS approach are that retailers must rely on the utilities for payment, smaller retail establishments are not equipped to handle POS rebates.
  - Two-thirds of the retailers interviewed supported expanding POS rebates to additional measures, such as clothes washers, whole house fans, room air conditioners, and pool pumps. Retailers currently participating in the POS rebate for thermostats, believed sales for other program-qualifying equipment could increase by a quarter if it were expanded to these measures.

PROGRAM INFLUENCE

Programmable Thermostats

There is significant evidence that the program is having a limited influence on participant's decision to install Energy Star-qualified programmable thermostats. In 2003, there were three mechanisms for obtaining a rebate for programmable thermostats: (1) Do-It-Yourself (DIY) Home Improvement Rebate Applications, where customers submit a rebate application with a receipt for the purchase of a qualifying programmable thermostat from participating retailer; (2) Contractor-Installed Cooling and Heating Rebate Application; where customers submit a rebate application with a contractor invoice after the contractor installs the qualifying programmable thermostat.; and (3) Point of Sale (POS) Rebate, where customers receive an instant discount at the cash register when they purchase a qualifying programmable thermostat from a

participating retailer. The program's influence varies by delivery mechanism, and is summarized below.

- For **contractor installations**, the contractor appears to have significantly more influence on the customer's purchase decision than the rebate. However, interviews with contractors also indicate that the program is having limited influence over what contractors recommend and install.
  - 61% of participants that used a contractor said their contractor was very influential in their purchase, compared to only 23% that reported the rebate was very influential.
  - As a general practice, nearly all contractors (95%) replace the thermostat when installing a new CAC, and most of those are Energy Star-qualifying (78%).
  - In a comparison of contractors that actively promote the rebate and those that are inactive, there is not a significant difference in their installation rates for Energy Star-qualified programmable thermostats (84% vs. 68%), implying that the rebate is not significantly affecting what the contractors are installing.
  - Contractors report that their sales of Energy Star-qualified programmable thermostats would decrease by only 9% on average if the program was discontinued.
  - 63% of the participants claim they would have purchased an Energy Star-qualified programmable thermostat in the absence of the program. Another 26% claim that they would have purchased a regular programmable thermostat (not Energy Star qualifying.
  - The incremental benefit of installing a regular programmable thermostat over an Energy Star-qualified unit is likely to be significantly lower than the program's gross per unit energy savings estimate. Further reducing the net benefits from the program among contractor-installed units is the fact that 26% of these participants previously owned a programmable thermostat. Furthermore, 32% of these participants use their new programmable thermostat manually, also likely not producing the potential energy savings benefits.
- For **DIY installations**, participant survey results indicate that the program is having limited influence over their purchase decision.
  - These participants report that the rebate was somewhat influential half the time, and not at all influential a quarter of the time.
  - 69% claim they would have purchased an Energy Star-qualified programmable thermostat in the absence of the program.
  - Another 15% claim that they would have purchased a regular programmable thermostat (not Energy Star qualifying); and only 12% claim they would not have made a purchase in the absence of the program. No DIY participants claim they would have purchased a manual unit.
  - Further reducing the net benefits from the program among DIY installed units is the fact that 17% of these participants previously owned a programmable thermostat, and 12% use their new programmable thermostat manually.
- **Point-of-sale** participants do not look significantly different than DIY participants.

- POS results are based on a small sample of 25 customers that had also submitted a mail-in application for a rebate (that was rejected), but claim to have been unaware of the mail-in rebate at the time of their purchase (hopefully limiting any influence the mail-in process may have had on their purchase decision).
- 43% claim the rebate was very influential, however, 62% claim they would have purchased an Energy Star-qualified programmable thermostat in the absence of the program.
- The program's influence is likely getting POS participants to upgrade their purchase from a non-Energy Star unit, to one that is Energy Star-qualifying. However, the incremental benefit of installing a regular programmable thermostat over an Energy Star-qualified unit is likely to be significantly lower than the program's gross per unit energy savings estimate.

- Retailer results (based on a very small sample that is not representative of the population of retailer sales) do indicate that the program may be having a positive effect on participating retailers, and so indirectly on consumers.
  - Retailers report that only 54% of the units they sell are programmable, and only 35% are Energy Star labeled, indicating that the purchase of a program-qualifying unit is not a standard practice, as it is among contractors.
  - Retailers also report that discontinuing the program would have a significant effect on their sales of Energy Star-qualified programmable thermostats, decreasing sales by as much as a third.

Central Air Conditioning

The program's influence on the CAC market is seen more directly on the actions taken by contractors that actively promote the program than on consumers. Although most participants claim that they would have purchased high efficiency equipment in absence of the program, and that the rebate had low to moderate influence, the program does appear to be influencing the market. Therefore, the program is influencing participants indirectly through the contractors, consistent with their viewpoint that the rebate itself is not influential. Participants' indirect influence, and lack of attribution to the rebate, is consistent with both participant and contractors' claims that:

- Contractors are recommending and explaining the benefits of high efficiency equipment to over three quarters of participants.
- Contractors are very influential on the participants' decision (only 22% of participants said their contractor was not influential).
- Contractors are not using the rebate as a selling point (only 15% use the rebate as a main selling point) and contractors are filling out the application on behalf of the participants (70% of the time). Therefore the participants may not feel the rebate was influential in their decision because they are not explicitly exposed to it; however, it may be driving the contractors' recommendation.
- Participants are not very knowledgeable about SEER and/or Energy Star ratings for HVAC equipment (only about a third are knowledgeable).

- Most participants (55%) do not request high efficiency equipment from their contractor.

As mentioned, the direct influence of the program appears to be on the actions of the contractors. There is evidence of the program's influence on contractors, particularly when comparing contractors that actively promote the program with those that do not, as follows:

- Contractors that actively promote the rebate have installation rates for program qualifying equipment that are twice that of inactive contractors (and much higher among Tier II and III equipment).
- Most contractors (72%) that actively promote the rebate report that they have seen significantly or moderately higher increases in sales of Tier II and III equipment over the year, compared to only 8 to 15% of inactive contractors.
- Contractors that actively promote the rebate, claim their sales would be significantly reduced without the rebate, by as much as a third for Tier III equipment.

High Performance Dual Pane Windows

The findings from both participant and contractor surveys seem to indicate that rebates for high-performance dual-pane windows are not having any significant influence on whether or not customers purchase these types of windows. The participant survey findings that suggest that the high-performance window rebates are not very influential include:

- Ninety percent of participants said that they would have purchased high performance windows absent the rebate, only 6% said that they would have purchased standard dual pane, and no customers said that they would have done nothing.
- Forty-three percent of participants said that they were not at all influenced by the rebate, and only 10% said that they were very influenced.
- Fifty-two percent of participants had already decided on purchasing high performance windows before knowing about the rebate.

Findings from the windows contractor survey also suggest that the rebates have limited influence in increasing sales of high-performance dual-pane window sales. These findings include:

- Window contractors who were unaware of the rebate program still claimed that high-performance windows accounted for 78% of their total installations. This was very close to the high-performance installation rate (80%) for window contractors who were aware of the rebate program.
- Both aware and unaware contractors almost always recommend high performance windows.
- Window contractors only estimated a 12-13% decrease in their past and future sales absent a rebate.

MEASURE ASSESSMENTS

Programmable Thermostats

- According to contractors, 44% of their residential customers already have some sort of programmable thermostat in their homes, and 21% of their customers have Energy Star-qualified thermostats. Contractors are more likely to replace a participating customer's existing programmable thermostat (26%) than a DIY (17%) or POS (12%) customer on their own.
- "Doing Upgrades" was the primary reason for replacing the thermostat for all three categories of participants (about half the time). DIY (23%) and POS (32%) participants were far more likely to replace a thermostat in order to save energy, than those who relied on contractors (8%).
- HVAC contractors indicated that the installation of Energy Star-qualified programmable thermostats has become standard practice, about 74% of all thermostat installations. However, contractors found that only half of their customers request programmable thermostats at least very often, and only about a third are asking for Energy Star-qualified thermostats.
- The majority of DIY participants (53%) claim to use their air conditioner/furnace less after installing their new thermostat, compared with 38% of contractor installs and 40% of POS installs.
- A fair proportion of participants (12-32%) manually adjust their thermostats, and very few customers are using the factory settings (11-14%), which is one of the benefits of an Energy Star-qualified thermostat.
- 52% of the contractor installs use the programmable features, compared to 76% of DIY and 60% of POS participants.
- Contractors tend to program the unit for their customers and show them how to use it, according to both contractors and participants. However, about half of the participants that have a contractor install their thermostat do not use the programmable features, compared to far fewer of the DIY (24%) and POS (40%) participants.

Central Air Conditioning

- When asked why they replaced their air conditioner, over two-thirds of the participants said that the motivating factor was the replacement of old, broken, or poorly-performing air conditioners.
- HVAC contractors estimated that less than a third of their customers were knowledgeable about either SEER or Energy Star ratings for CACs.
- HVAC contractors are very influential in the customer's decision whether to purchase an energy-efficient CAC.
- HVAC contractors report that nearly two-thirds of the CACs they install are rebate eligible. However, the Tier III share is relatively small – 16 percent.
- There is a strong correlation between HVAC contractor promotion of rebates and contractor belief that general market sales of high-efficiency CACs have been increasing.

High Performance Dual Pane Windows

- Most participants (94%) had single pane windows before replacing them with program-qualifying dual-pane windows.
- About half of the participants claim that saving energy was a main reason they replaced their windows. Other important reasons for replacement were aging, drafty windows, the desire for improved look and design, and noise reduction.
- Contractors were very influential in participants' decisions to install high performance windows (80% rated contractors very or somewhat influential).
- Contractors (both aware and unaware of the rebate) said they installed high-performance dual pane windows about 80% of the time, and almost always recommend them.
- Contractors main selling points focused on reduced energy use and lower utility bills (28%), but very few mentioned rebates (7%).

RECOMMENDATIONS

- Reassess the cost-effectiveness of the programmable thermostat rebate in light of participant survey results, which indicate that the program is having limited influence over the participants' purchase decision. Approximately two-thirds of the participants claim they would have purchased an Energy Star-qualified programmable thermostat in the absence of the program.
  - In particular, consider removing programmable thermostats from the heating and cooling rebate applications, as both participant and contractor findings strongly suggest the program has little influence on this market segment.
  - Retailer findings suggest that the program may have some influence upstream, affecting retailer sales. Although POS participants indicate the program is not very influential, these results are based on a small sample that may not be representative of all POS participants.
  - To maintain equity/fairness towards all retailers and residential customers, a mail-in application may need to be kept. This could create administrative issues regarding ensuring customers are not double-dipping (applying for a mail-in rebate for a unit that received a POS rebate), and contractor installed units could continue to be submitted.
- The program's gross per unit energy savings estimate for programmable thermostats should be reassessed. A recent SCE study suggests programmable thermostats do not yield the energy savings that has been deemed for this measure. Some consideration should also be given to using a non-Energy Star programmable thermostat as the baseline against which the gross per unit saving is calculated.
  - 90% or more of the participants claim they would have purchased some form of a programmable thermostat in the absence of the program.
  - As many as a quarter of the participants already owned a programmable thermostat.
  - As many as a third of participants use their thermostat manually.

- If the POS element for programmable thermostats is retained, the IOUs should find a way to track a representative sample of POS participants so the program's influence can be assessed more accurately. Furthermore, the affects on retailer sales could also be assessed by collecting market share tracking data on thermostat sales from participant and nonparticipating retailers (and looking at participant retailers before and after promotion periods to establish a participating retailer baseline, which might be higher than a nonparticipating retailer.)
- Consider eliminating the window rebates, as neither participant nor contractor results indicate that rebates for high-performance dual-pane windows are influencing customers to purchase these types of windows.
- Retain the Central Air Conditioning rebates, as there is strong evidence of the program's influence on contractors, particularly when comparing contractors that actively promote the program with those that do not.
- Consider moving the CAC rebate upstream, since the CAC program appears to be directly influencing the actions of HVAC contractors, but not customers. Furthermore, 70% of HVAC contractors report filling out the application on behalf of the customer.

1. INTRODUCTION

1.1 BACKGROUND

The Single-Family Energy Efficiency Rebate program, a statewide energy efficiency program, is administered by the four California investor-owned utilities (IOUs), including Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), Southern California Gas Company (SCG), and San Diego Gas and Electric Company (SDG&E). The Single-Family program provides rebates for energy efficient products in four distinct markets—HVAC, home improvement, appliances, and pool pumps.

The overall goals for the Single-Family program evaluation were to (1) conduct verification activities to validate statewide accomplishments as reported by the IOUs in their 2003 program claims, and (2) assess the program's ability to provide helpful information, services and prescriptive rebates to move the market toward energy-efficient measures. Because the evaluation budget for 2003 was significantly less than the 2002 budget (about half), this evaluation focused a large portion of its resources on research recommendations that arose from the 2002 evaluation. More specifically, the 2002 evaluation raised some concerns over the extent to which the Single-Family Rebate program may be influencing the market for three key measures: programmable thermostats, high performance windows, and central air conditioning. HVAC contractors interviewed as part of the 2002 evaluation indicated that they often specify programmable thermostats (p-stats) when a customer purchases HVAC equipment. In addition, these contractors suggested that the A/C market was moving towards 12 SEER packaged units and 13 SEER split systems, and that rebates may not be necessary for these A/C specifications. Window contractors indicated that almost all replacement windows that they specify qualify for the program. Furthermore, in 2003 the program rolled out a point-of-sale rebate for programmable thermostats (an instant rebate at the cash register of participating retailers, such as Home Depot). While programmable thermostats proved an effective strategy in increasing sales, the point-of-sale rebate raised concerns about the influence of the program on Energy Star-qualified programmable thermostat sales.

These three measures (programmable thermostats, high performance windows, and central air conditioning) contributed to over half of the program's energy savings in 2003. Therefore, in addition to meeting the overall evaluation objectives of verifying the program accomplishments and conducting a process assessment for all measures, another primary research objective for this evaluation was to assess the program's influence on programmable thermostats, high performance windows, and central air conditioning. It is important to stress that the results of the program's influence on these three measures is not representative of the program's overall impact on the single-family market. These measures (as stated above) were selected for an in-depth analysis because the 2002 evaluation raised concerns about the program's influence on participants' decisions to adopt these measures.

This study, prepared by an independent third party evaluation team consisting of Quantum Consulting (QC) and KEMA-XENERGY, Inc, provides information about existing equipment for the residential population, evaluation findings and program guidance.

1.2 PROJECT OBJECTIVES

As mentioned above, the 2003 study's principal objectives are to:

1. Conduct verification activities to validate statewide accomplishments as reported by the IOUs in their 2003 program claims, including HTR accomplishments, for all measures.
2. Perform process assessment for all measures, to evaluate the program's ability to provide helpful information, services and prescriptive rebates to move the market toward energy-efficient measures. As part of this, the evaluation builds upon the findings and recommendations reported in the 2002 report.
3. Perform a measure-specific assessment, focused on program influence and free ridership, for programmable thermostats, high performance windows, and central air conditioning.

More specifically, this research addresses the following:

Program Activity-related Questions

- What measures drew the most customers, rebate dollars and energy savings?
- Are the accomplishments reported by the IOUs accurate?
- Were the measures reported as being rebated actually installed and program-qualifying?

Process-Related Questions

- How did participants become aware of the program?
- How aware of the program were market actors?
- Which program delivery mechanisms reached customers?
- Did market actors promote rebated products to customers?
- Were customers and market actors satisfied with the program?
- What are market actors' opinions of the POS versus mail-in rebates?

Program Influence Questions for Measures of Concern (Thermostats, CACs and Windows)

- Did the rebate influence the customer's decision to purchase?
- What would the customer have done in the absence of the program?
- When did a customer become aware of the rebate relative to purchasing a product?

1.3 OVERVIEW OF RESEARCH ACTIVITIES

The study's primary objectives were supported through the collection of program tracking data, telephone surveys, and on-site audits.

There are four areas of primary research that were conducted in support of the Study:

- **Verification** involved a program tracking system review, phone and on-site verification of the equipment installed, and on-site verification of key characteristics (e.g., efficiency) of the equipment installed.
- **Process Assessment** examined customer satisfaction, program delivery and supplier behavior such as retailer and contractor stocking and specification practices and program influence on supplier behaviors.
- **Program Influence (for measures of concern)**. The program's influence in encouraging end users to replace their existing thermostats, air conditioners and windows with program-qualifying measures was assessed through participants' self-reported program influence and an analysis of sales trends and installation rates of contractors and retailers.
- **Measure Assessments**. In addition to determining program influence on markets for Energy-Star programmable thermostats, high-performance dual pane windows and energy efficient air conditioners, measure-specific assessments provided information on existing equipment reasons for replacement, and use of program-qualifying equipment.
  - *Programmable thermostats*. This objective of this assessment was to investigate existing equipment in participants' homes and to determine whether participants saved energy with their new programmable thermostats as compared to their old standard thermostats. We also analyzed participants' existing thermostat equipment and HVAC contractors' standard practices with regard to thermostat installations to determine whether participants were typically replacing standard thermostats. We also explored participant thermostat usage behavior and contractor and retailer practices with regard to educating customers on thermostat usage. We also assessed contractor behavior with regard to programming the thermostats for their customers.
  - *High-performance dual pane windows*. This assessment examines what type of windows customers had before purchasing high performance windows, reasons for replacement, contractor selling points, contractor influence on participants' purchase decisions, customer knowledge of high efficiency windows, and sales trends and installation rates among contractors.
  - *Energy efficient central air conditioners*. This assessment of central air conditioning (CAC) determined the influence of the contractor on participants' purchase decisions, condition of existing equipment, reasons for CAC replacement, contractor selling points, customer knowledge of high efficiency equipment, and trends in CAC sales and installations.

The 2003 Study concentrates the participant survey and market actor interviews on in-depth behavior analysis and process evaluation for three key program measures (programmable

thermostats, air conditioners and windows) and one program delivery mechanism (retailers), as well as customer satisfaction, program awareness and measure verification across all measures.

The report consists of six chapters:

Chapter 1 (Introduction) states study objectives, summarizes research activities and data collection efforts.

Chapter 2 (Program Activity) summarizes 2002 program background, IOU program marketing, goals and accomplishments and reports verification findings.

Chapter 3 (Process Assessment) uses both participant survey findings and results from the market actor surveys to shed light on process issues and program effects. This chapter also draws on historical data to offer a longitudinal look at some key indicators (such as sources of program awareness) over time by comparing to 2002 findings. The chapter examines the level of program awareness among market actors and how participating customers became aware of the program. It explores the in-store purchase experience by looking at participants' exposure to energy-efficient products, drawing on participant survey results and market actor responses about promotion and salesmanship. Satisfaction with various elements of the program from the perspective of participants, HVAC contractors, window contractors, and retailers is also considered. Finally, the chapter discusses how retailers weigh the relative merits of POS vs. mail-in rebates and whether they think the program should expand POS rebates to other products. Appendix E contains data tables that support these chapter findings.

Chapter 4 (Programmable Thermostat Assessment) combines participant survey findings and market actor results to assess the influence of the program on participants' programmable thermostat purchases. This chapter examines whether POS purchasers were aware of the cash register discount and whether it encouraged them to purchase a program-qualifying programmable thermostat. Interviews with HVAC contractors examined contractors' specification practices, specifically whether they typically install programmable thermostats when a customer purchases HVAC equipment. The chapter also looked at whether participating customers use their thermostats in ways that fully capture their energy savings potential in order to assess the reasonableness of IOUs claims about the amount of energy saved by Energy Star-qualified programmable thermostats.

Chapter 5 (Air Conditioner Assessment) combines participant survey findings and market actor results to assess the influence of the program on participants' energy efficient air conditioner purchases. In addition, the chapter examines whether customers had an air conditioner previous to purchase and why they replaced their CAC. The chapter explores the timing of a customer's awareness of the rebate, as customers that decided to purchase before becoming aware of the rebate are more likely to be free riders. Contractor sales trends and installation rates are also examined.

Chapter 6 (Window Assessment) combines participant survey findings and market actor results to assess the influence of the program on participants' high performance dual pane window purchases. In addition, the chapter examines why participants replaced their windows and explores the timing of a participating customer's awareness of the windows rebate, because customers that decided to purchase before becoming aware of the rebate are less likely to be influenced by the program. Contractor sales trends and installation rates are also examined.

Numerous appendices offer additional information. Appendix A contains the participant survey instrument. Appendix B provides market actor survey instruments. Appendix C contains results of program manager interviews that offer an overview of key 2003 program issues, in order to inform 2003 evaluation activities. Appendix D offers a quantitative assessment of free ridership ranges for programmable thermostats and high performance windows. Detailed data tables of participant survey responses are found in Appendices E-I. Appendix E is the process assessment. Appendix F presents detailed programmable thermostat results. Appendix G focuses on air conditioning tables, while Appendix H provides windows data tables. Appendix I contains participant demographics.

1.4 DATA COLLECTION ACTIVITIES

Four areas of primary research were conducted in support of the Study:

- participant survey
- verification telephone surveys and on-site audits
- market actor interviews
- program staff interviews

Participant Survey

742 participants – PG&E, SDG&E, SCE and SCG customers that received a rebate for a program-qualifying energy efficiency measure – were interviewed about their program experience as well as their energy efficiency behavior. Completes were stratified by measure, IOU and HTR segment. Results were weighted to represent the number of participants by IOU and measure.

- **IOU Distribution**. The sample was allocated across the four IOUs, roughly proportional to participation. PG&E is slightly under represented with respect to participation so as not to place too much of the available resource in one service territory. For the 742 surveys, 254 are allocated to PG&E, 181 to SCE, 156 SDG&E and 151 to SCG.
- **Hard-to-reach distribution.** Participant responses are segmented by "hard-to-reach" customers targeted by the program. We did not directly set quotas for HTR segments, but we ensured representativeness by tracking rural location, building type, income levels, homeownership and language. We monitored survey completes to ensure adequate sample for each of these segments, allowing for HTR customer segment analyses.

  Measure Distribution. Exhibit 1-1 presents the measure distribution achieved for the 742-point in-depth participant telephone survey. These 742 points are proportional to the number of participants (not energy savings). Some measures with relatively low participation were over-represented to obtain a minimum sample size of at least 20 points. Furthermore, two of the three key measures evaluated (CACs and windows) were also over-represented to obtain a minimum sample size of at least 100 points, and a significant number of programmable thermostat participants were interviewed, in order to examine program influence.

Exhibit 1-1 shows the disposition of survey respondents, stratified by measure and IOU segment, for program participants.

Exhibit 1-1
Residential Participant Survey Disposition

Technology	PGE	SCE	SDGE	SCG	Total
Air Conditioners	32	46	24	0	102
Attic Insulation (square feet)	6	0	3	37	46
Clothes Washer - Energy Star	33	0	19	21	73
Dishwasher - Energy Star	21	0	12	14	47
Furnace - Gas	14	0	2	4	20
Pool Pumps	8	50	16	0	74
Programmable Thermostats	59	38	45	54	196
Wall Insulation (square feet)	4	0	3	14	21
Water Heater	6	0	8	7	21
Whole House Evaporative Cooler	2	18	0	0	20
Whole House Fan	11	6	3	0	20
Windows - High Perf. Dual Pane	58	23	21	0	102
Total	254	181	156	151	742

Participant Segmentation

We report respondent data for both the general population and participants across 17 segments. This high level of detail regarding consumer response to survey questions allows us to examine differences among the utilities and hard-to-reach customer segments (as defined by the CPUC). These detailed data tables are displayed in the appendices, where survey results are presented for:

- **All customers**.
- **Hard-to-reach customers**. Survey respondents and IOU CIS data were used to classify each respondent into one or more of the HTR segments. The residential HTR definitions provided by the CPUC are:
  - *Urban/rural*. We used IOU geographic identifiers to segment respondents in rural and urban classifications.
  - *English/other language*. Results were segmented by respondents who self-reported that they spoke a non-English language in their home.
  - *Moderate income versus other income*. We were conservative in segmenting moderate income customers using self-reported data. Customers with moderate incomes represent one HTR segment targeted by the Single-Family Rebate program. Moderate incomes are defined by the CPUC as "income levels less than 400% of Federal Poverty Guidelines," and greater than 150%. The 2003 annual poverty

guidelines are $36,000 for 1 person, $48,000 for two, $61,000 for 3, $74,000 for 4, $86,000 for 5, $99,000 for a 6-person household.[1]

  - *Renter/owner*. This information comes from customer's self-reported homeownership.
  - *Multi-family/mobile home versus single-family dwelling*. Housing type comes from customer's self-reported information.
  - *Any HTR*: this segment includes respondents who live in rural areas, speak a language other than English, live in a multi-family or mobile home, earn moderate incomes, or rent.
  - *Non-HTR*. This segment captures English-speaking, single-family homeowners that earn more than a moderate income.

- **IOU**. Participant surveys are segmented by all four IOUs (PG&E, SCE, SCG and SDG&E).
- **Technology Group**. Participant surveys are grouped into three categories of energy efficiency measures. (1) Home improvement measures include pool pumps, insulation, water heater, dual pane windows and programmable thermostats. (2) Cooling and heating measures include whole house evaporative coolers, central air conditioning, room air conditioner, whole house fan, heat pumps, and furnaces. (3) The Appliances group is comprised of clothes washers and dishwashers.
- **Delivery mechanism**. Programmable thermostat results (presented in chapter 4) were segmented by the three mechanisms for obtaining a rebate for programmable thermostats: Do-It Yourself (DIY) Home Improvement Rebate Applications, Contractor-Installed Cooling and Heating Rebate Application; and Point-of-Sale (POS) Discount in order to assess how these three groups of customers used their thermostats and the program's influence on their purchase.

Point-of-Sale Telephone Surveys

Point-of-sale (POS) rebates were introduced at participating retailers as a pilot in late 2002, followed by full-scale implementation in 2003. Customers that purchased a program-qualifying programmable thermostat at participating stores, such as Home Depot and Lowe's, received an instant discount at the cash register. The majority (65%)of program-qualifying units (approximately 44,000 units were purchased) were rebated through the point-of-sale channel.

Identifying and interviewing these POS participants was a challenge because tracking data is not available for POS participants. However, we did have access to the names of people who submitted a mail-in application for a rebate for a programmable thermostat, but were rejected because they also received a POS rebate (as indicated on their submitted store receipt). We felt this group was not representative of the overall POS population because these customers also submitted a mail-in application, in particular with respect to how the program influenced their

[1] Federal Register, Vol. 68, No. 26, February 7, 2003, pp. 6456- 6458., http://www.dhhs.state.nh.us/NR/rdonlyres/ewukhfvr4xo7ygre6wuyrryy2u6ev452ajprbywevr5hmycm6dvfp2p3ytkp4rxukwlkcauz7eabojswrrj3vxgfq7g/fpg-2003-monthly.pdf

decision (as it could be the knowledge of the mail-in rebate as opposed to the POS rebate that influenced the customer).

Nonetheless, we surveyed 292 POS participants that also submitted a mail-in application (for verification purposes), and were able to identify 25 that claimed to become aware of the mail-in rebate *after* they had already purchased the thermostat and received the POS rebate. We used only these 25 responses to characterize the POS population, because we believed this group to be more representative than the other 267 customers that were aware of the mail-in rebate *prior to* purchasing their thermostat. (Therefore, the program's influence for these 25 participants lies with the POS rebate, and not the mail-in rebate).

Verification and Onsite Surveys

For the verification task, survey data was collected for a random sample of 1,065 participants drawn from the utility tracking database, covering 1,274 measures. These surveys were conducted as a part of the participant telephone survey above. Thirty-one additional participants were surveyed for the verification analysis, but did not recall receiving a rebate, and did not respond to the full participant survey. Furthermore, an additional 292 surveys were conducted for POS thermostat participants, as discussed above. Participants were asked if they installed the same measures that the tracking database stated.

On-sites were completed for a sample of 76 participants, covering 90 measures, shown in Exhibit 1-2. The 76 on-sites focused on measures that were large contributors to the program's overall energy savings accomplishments, and have characteristics that are more difficult to capture over the telephone (e.g., CAC efficiency). For this group of participants, make and model information was collected on site to verify the data in the program tracking system and verify if the equipment was program qualifying, based on the Single-Family Rebate Program Qualifying Products List.

Exhibit 1-2
Detailed Participant Verification Survey and On-site Sample Disposition

	Participant Survey		Onsite Survey	
Technology	Measures	Sites	Measures	Sites
Air Conditioners	168	104	18	14
Attic Insulation (square feet)	57	47	0	0
Clothes Washer - Energy Star	84	77	11	10
Dishwasher - Energy Star	69	50	12	12
Furnace - Gas	62	20	0	0
Pool Pumps	76	75	12	12
Programmable Thermostats	549	501	25	16
Wall Insulation (square feet)	32	22	0	0
Water Heater	26	24	0	0
Whole House Evaporative Cooler	21	20	0	0
Whole House Fan	20	20	0	0
Windows - High Perf. Dual Pane	110	105	12	12
Total	1274	1065	90	76

Market Actor Surveys

The 2004 evaluation surveyed three groups of market actors: HVAC contractors, window contractors, and retailers (mostly appliance and hardware stores). The surveys covered the following topic areas:

- Customer knowledge of energy efficiency,
- Customer demand for energy efficient products (mostly CACs, windows, and programmable thermostats),
- What the most effective sales pitches are for selling energy-efficient products,
- The frequency that market actors recommend energy-efficient products,
- The frequency that market actors install and sell energy-efficient products,
- Market barriers to offering energy-efficient products,
- Standard practices for installing and setting programmable thermostats and training customers how to use them,
- The effect of the program rebates on sales of energy-efficient products,
- The relative advantages and disadvantages of point-of-sale rebates vs. mail-in rebates,
- Market actor assessment of program processes, and
- Lasting effects of program participation on market actors.

The following subsections describe the samples for each of these market actor groups:

HVAC Contractors. Forty-two HVAC contractors were surveyed for this evaluation. Companies that offer HVAC services to residential customers are, on average, fairly small. For example, in the process of developing the sampling plan it was discovered that over 80% of the HVAC contractors in the SDG&E service territory had fewer than ten employees. Therefore the distribution of completed surveys shown in Exhibit 1-3 represents an oversample of the larger contractors on the basis of a pure population count. However, since large contractors generally handle more rebates[2], these contractors were oversampled to better represent the total amount of rebate dollars allocated.

[2] For example, when PG&E customers receiving rebates in 2002 identified who their HVAC contractors were, about 2 percent of the identified contractors accounted for over 25% of the total HVAC rebates distributed.

Exhibit 1-3
Distribution of Completed Surveys for HVAC Contractors

Utility	# of Small HVAC Contractors (< 10 employees)	# of Large HVAC Contractors (>= 10 employees)	Total
PG&E	10	5	**15**
SCE	10	5	**15**
SDG&E	9	3	**12**
Total	**29**	**13**	**42**

Exhibit 1-4
Average Size of Surveyed HVAC Contractors

Contractor Group	Average # of Employees
Small	4
Large	21
All Contractors	9
N = 42	

To better understand program influence, results from the HVAC contractor surveys were sometimes broken down between "active" and "inactive" contractors. Active contractors are those who rated their activity in promoting program rebates as "1" or "2" on a scale of 1 to 5 where 1 equals "very active" and 5 equals "not very active." Inactive rebate promoters are contractors who rated their rebate promotion activity as "4" or "5." In tables where results are broken out this way, contractors who rated their rebate promotion activity as "3" are not represented. One other possible way to gauge program influence was to differentiate between contractors who were aware of the rebate program and those that were not. However, the number of contractors that were unaware of the rebate program was so small (5 out of 42) that any results from the "unaware" class would have doubtful statistical validity.

Window contractors. Forty window contractors were surveyed for this evaluation. Like the HVAC contractors, contractors that install replacement windows are generally small (Exhibit 1-5). The average size of the "large" window contractors in the completed sample was only 17 employees (Exhibit 1-6). Of the 24 small contractors who provided exact employee counts, 14 of these had four or fewer employees. These window contractors were not only small, but they were also very dependent on the residential market. The sale and replacement of residential windows accounted for almost two-thirds of the revenues of the surveyed contractors (Exhibit 1-7).

Exhibit 1-5
Distribution of Completed Surveys
for Window Contractors

Utility	# of Small Window Contractors (< 10 employees)	# of Large Window Contractors (>= 10 employees)	Total
PG&E	10	5	**15**
SCE	10	5	**15**
SDG&E	6	4	**10**
Total	**26**	**14**	**40**

Exhibit 1-6
Average Size of Surveyed Window Contractors

Contractor Group	Average # of Employees
Small	4
Large	17
All Contractors	8
N = 37	

Exhibit 1-7
Importance of Residential Window Replacement
in Revenues of Surveyed Contractors

	Average % of Revenues
About what % of your revenues come from the sale and installation of replacement windows in residential homes?	62%
N = 36	

In studying the window contractor survey results it was also useful to segment the information based on whether or not it had come from contractors who had been very influenced by the rebate program. Therefore data tables were produced for the same "active" and "inactive" breakdown as was used for HVAC contractors. Results were also segmented as to whether or

not the contractors were aware of the rebate program. While only 5 of the 42 HVAC contractors were unaware of the rebate program, 7 of the 40 window contractors were unaware of the program, allowing slightly more robust comparisons.

Retailers. Twenty-one retailers were surveyed for this evaluation. As Exhibit 1-8 shows, the sample was divided between large hardware and appliance stores (which included both national and large California chains), small independent and franchise (e.g., Ace, True Value) hardware stores, and small independent appliances stores.

Exhibit 1-8
Distribution of Completed Surveys for Retailers
by Store Type

Utility	Small Independent/Franchise Hardware Stores	Small Independent Appliance Stores	National Big Box, Large California Chain Hardware & Appliance Stores	Total
PG&E	2	3	**6**	**21**
SCE/ SCG	4	2		
SDG&E	2	2		
Total	**8**	**7**		

The sample included a mixture of stores that were participating in the rebate program and those that were not. The participating stores included some that were offering both the mail-in rebates and the point-of-sale rebates, others that were offering just the mail-in rebates, and one that offered only point-of-sale rebates. As was the case with the HVAC and window contractors, results were also broken down by the level of rebate promotion activity.

Exhibit 1-9
Distribution of Completed Surveys for Retailers
by Program Participation Status

Non-Participant in Rebate Program	Participant Mail-In Rebates Only	Participant Point-of-Sale Rebates Only	Participant – Mail-In and Point-of-Sale Rebates	Total
6	9	1	5	**21**

Program Staff Interviews

Five interviews with key program staff at SCE, SCG, SDG&E and PG&E were conducted in May 2004 in support of the 2003 Single-Family Rebate Program evaluation. The interviews were designed to:

- Clarify our understanding of the 2003 program.
- Explore areas for program improvement.
- Discuss program plans for 2004/2005.
- Obtain feedback on and sample data in support of trade ally research activities.

Appendix C contains results of those program manager interviews.

2. PROGRAM ACTIVITY

2.1 PROGRAM BACKGROUND

The $25 million statewide Single-Family Energy Efficiency Rebate program, funded by electric and gas Public Goods Charges, is unique in that it is a portfolio of diverse group of home improvement products, heating and cooling equipment, appliances, and residential pool equipment. The 2003 Single-Family Rebate program continued strategies from the 2002 program, providing rebates to residential customers for appliances, HVAC, and other home improvement measures to help offset the incremental cost for high efficiency equipment. The 2003 program continued to build successful working relationships the utilities had built with retailers and contractors. The utilities interacted with major retailers by providing training, marketing support and rebate applications.

Point-of-sale rebates for programmable thermostats were offered in 2003, enabling customers to bypass a mail-in rebate in favor of an instant rebate at the cash register at participating stores, such as Home Depot. Programmable thermostat volume increased in 2003, and led all measures in terms of energy savings, accounting for 32% of statewide kWh and 39% of therm savings, while only expending 6% of rebate dollars.

IOU Program Marketing

The Single-Family Rebate program consists of four distinct product markets – HVAC, home improvement, appliances, and pool pumps. The IOUs used a multi-pronged approach to promote to these markets, and communicating program information involved:

- Consumer information and educational materials;
- Direct customer support through toll-free customer service and utility Web sites;
- Coordinated marketing and outreach through retail and field support; and
- Leveraging other utility and non-utility programs.

The IOUs worked with local retailers, distributors and manufacturers to maximize effectiveness with consumers. In addition, IOUs leveraged the Energy Star Change Campaign, the Flex Your Power Campaign, and other promotional campaign efforts to ensure reinforcement of the energy efficiency and energy savings message.

Program information was disseminated through bill inserts, energy events for consumers, trade ally communications, and through IOU staff.

The program provided field support to appliance, lighting, home improvement, and large box wholesale stores. The field support included training retailer staff on rebate promotions, and ensuring marketing materials are posted in the stores. The IOUs also coordinated with retailers to provide point of purchase marketing materials and seasonal advertising promotions.

2.2 PROGRAM PERFORMANCE TARGETS AND ACCOMPLISHMENTS

Energy Savings

For the 2003 program year, the Single-Family Energy Efficiency Rebate program set performance targets for the program in terms of energy and demand savings. As shown in Exhibit 2-1, statewide, the program met 95% of its kWh target, 92% of its kW target, and 100% of its Therm target. SCG significantly exceeded all of its savings targets, achieving nearly double its kWh and therms targets. SCE also met its goals.

Exhibit 2-1
Summary of 2003 Residential Single-Family Energy Efficiency Targets and Accomplishments[3]

Utility	CPUC Target	Result	% Target Reached
PG&E			
Energy Savings, kWh	20,725,319	17,177,013	83%
Demand Reduction, kW	26,763	24,487	91%
Therms Reduction	4,196,416	3,161,349	75%
SCE			
Energy Savings, kWh	22,940,026	23,738,041	103%
Demand Reduction, kW	15,240	15,184	100%
Therms Reduction	-	-	-
SDG&E			
Energy Savings, kWh	8,332,654	5,900,612	71%
Demand Reduction, kW	4,038	2,588	64%
Therms Reduction	476,998	736,000	154%
SCG			
Energy Savings, kWh	2,675,121	5,220,977	195%
Demand Reduction, kW	758	989	130%
Therms Reduction	952,328	1,751,350	184%
Statewide			
Energy Savings, kWh	54,673,120	52,036,643	95%
Demand Reduction, kW	46,799	43,248	92%
Therms Reduction	5,625,742	5,648,699	100%

[3] PG&E, SDG&E, SCG and SCE, *Fourth Quarter Report for the 2003 Statewide Residential Single-Family Rebates Program*.

Program Budget

The IOUs expended most of their program funds in 2003, as shown in Exhibit 2-2.

Exhibit 2-2
2003 Residential Single-Family Program Budgets and Expenditures[4]

Utility	Program Budget	Program Expenditures	% of Budget Spent
PG&E	$18,494,328	$19,816,603	107%
SCE	$7,321,000	$7,320,319	100%
SDG&E	$3,950,000	$3,988,483	101%
SCG	$4,142,000	$4,031,711	97%
Statewide	$33,907,328	$35,157,116	104%

HTR Goals

In addition, three of the four utilities exceeded their HTR targets. Only SDG&E, with the most challenging HTR goal (60% of program participants were expected to be HTR), did not meet its target.

Exhibit 2-3
2003 Residential Single-Family Program Hard-to-Reach Goals and Accomplishments[5]

% Applications from HTR Customers		
Utility	Target	Result
PG&E	35%	38%
SCE	34%	38%
SDG&E	60%	58%
SCG	23%	24%

[4] PG&E, SDG&E, SCG and SCE, *Fourth Quarter Report for the 2003 Statewide Residential Single-Family Rebates Program*.

[5] PG&E, SDG&E, SCG and SCE, *Fourth Quarter Report for the 2003 Statewide Residential Single-Family Rebates Program*.

Accomplishments by Technology

Exhibit 2-4 shows program participation by technology in terms of number of units, rebate dollars and energy savings. Four measures – pool pumps, programmable thermostats, dual pane high efficiency windows and air conditioners/heat pumps/room AC – make up 81% of kWh savings statewide. Programmable thermostats was the leading measure in terms of kWh (32%) and therm (39%) savings, but only accounted for 6% of rebate dollars. On the gas side, programmable thermostats and clothes washers made up about two-thirds of all therms statewide.

SCE led the IOUs in total kWh savings with 46% of statewide kWh, while PG&E led the therms savings with 61% of therms savings. Pool pump motors and programmable thermostats accounted for the majority of kWh savings in SCE territory. As in 2002, clothes washers and programmable thermostats helped PG&E lead the program in therms savings. Pool pumps did not take off in PG&E territory as they did in Southern California; pool pumps were a leader in kWh savings for SCE and SDG&E.

Exhibit 2-4
2003 Single-Family Rebate Program Participation by Technology[6]

Utility	Technology	Customers			Rebate	
		Unique Sites	Applications	Pct of Program	Dollars	Pct of Program
PG&E	Air Conditioners/Heat Pumps/Room AC	10,069	10,394	4.68%	$2,696,918	12.04%
	Attic Insulation	2,067	2,193	0.99%	$444,741	1.99%
	Clothes Washer - Energy Star	37,209	38,840	17.49%	$2,912,325	13.00%
	Dishwasher - Energy Star	26,665	30,497	13.73%	$1,525,750	6.81%
	Furnace - Gas	2,125	3,910	1.76%	$792,900	3.54%
	Pool Pumps	2,476	2,684	1.21%	$431,447	1.93%
	Programmable Thermostats	2,225	9,576	4.31%	$393,638	1.76%
	Wall Insulation	454	1,061	0.48%	$144,739	0.65%
	Water Heater - Gas	2,085	2,583	1.16%	$113,400	0.51%
	Water Heater - Electric	88	103	0.05%	$4,120	0.02%
	Whole House Evaporative Cooler	259	289	0.13%	$88,900	0.40%
	Whole House Fan	2,014	2,337	1.05%	$228,182	1.02%
	Windows - High Perf. Dual Pane	9,540	11,620	5.23%	$1,054,302	4.71%
	TOTAL	97,276	116,087	52.27%	10,831,362	48.36%
SCE	Air Conditioners/Heat Pumps/Room AC	8,190	8,281	3.73%	$2,734,150	12.21%
	Attic Insulation	10	10	0.00%	$2,388	0.01%
	Pool Pumps	5,718	5,727	2.58%	$743,450	3.32%
	Programmable Thermostats	9,356	9,423	4.24%	$680,689	3.04%
	Wall Insulation	1	1	0.00%	$48	0.00%
	Water Heater - Electric	120	121	0.05%	$4,920	0.02%
	Whole House Evaporative Cooler	1,478	1,498	0.67%	$468,183	2.09%
	Whole House Fan	1,549	1,552	0.70%	$177,836	0.79%
	Windows - High Perf. Dual Pane	7,772	7,928	3.57%	$747,536	3.34%
	TOTAL	34,194	34,541	15.55%	5,559,200	24.82%
SCG	Attic Insulation	1,881	1,902	0.86%	$402,709	1.80%
	Clothes Washer - Energy Star	17,399	17,465	7.86%	$1,310,275	5.85%
	Dishwasher - Energy Star	13,078	14,221	6.40%	$711,850	3.18%
	Furnace - Gas	1,209	1,339	0.60%	$248,000	1.11%
	Programmable Thermostats	1,120	2,213	1.00%	$162,360	0.72%
	Wall Insulation	239	987	0.44%	$157,325	0.70%
	Water Heater - Gas	1,893	2,274	1.02%	$99,150	0.44%
	TOTAL	36,819	40,401	18.19%	3,091,669	13.80%
SDG&E	Air Conditioners/Heat Pumps/Room AC	2,649	2,711	1.22%	$836,975	3.74%
	Attic Insulation	514	551	0.25%	$95,770	0.43%
	Clothes Washer - Energy Star	9,551	9,696	4.37%	$727,425	3.25%
	Dishwasher - Energy Star	8,331	9,136	4.11%	$457,300	2.04%
	Furnace - Gas	222	610	0.27%	$107,400	0.48%
	Pool Pumps	1,102	1,202	0.54%	$152,404	0.68%
	Programmable Thermostats	436	1,908	0.86%	$113,367	0.51%
	Wall Insulation	76	277	0.12%	$35,543	0.16%
	Water Heater - Gas	1,112	1,329	0.60%	$57,540	0.26%
	Water Heater - Electric	26	33	0.01%	$1,320	0.01%
	Whole House Evaporative Cooler	7	8	0.00%	$2,400	0.01%
	Whole House Fan	203	269	0.12%	$27,225	0.12%
	Windows - High Perf. Dual Pane	2,639	3,333	1.50%	$298,465	1.33%
	TOTAL	26,868	31,063	13.99%	2,913,135	13.01%
STATEWIDE	Air Conditioners/Heat Pumps/Room AC	20,908	21,386	9.63%	6,268,043	27.99%
	Attic Insulation	4,472	4,656	2.10%	945,608	4.22%
	Clothes Washer - Energy Star	64,159	66,001	29.72%	4,950,025	22.10%
	Dishwasher - Energy Star	48,074	53,854	24.25%	2,694,900	12.03%
	Furnace - Gas	3,556	5,859	2.64%	1,148,300	5.13%
	Pool Pumps	9,296	9,613	4.33%	1,327,301	5.93%
	Programmable Thermostats	13,137	23,120	10.41%	1,350,055	6.03%
	Wall Insulation	770	2,326	1.05%	337,655	1.51%
	Water Heater - Gas	5,090	6,186	2.79%	270,090	1.21%
	Water Heater - Electric	234	257	0.12%	10,360	0.05%
	Whole House Evaporative Cooler	1,744	1,795	0.81%	559,483	2.50%
	Whole House Fan	3,766	4,158	1.87%	433,243	1.93%
	Windows - High Perf. Dual Pane	19,951	22,881	10.30%	2,100,303	9.38%
	TOTAL	195,157	222,092	100.00%	22,395,365	100.00%

[6] PG&E, SDG&E, SCG and SCE, *Fourth Quarter Report for the 2003 Statewide Residential Single-Family Rebates Program*.

Exhibit 2-4 (continued)
2003 Single-Family Rebate Program Energy Savings by Technology

Utility	Technology	Energy Savings kWh	Pct of Program	Energy Savings Therms	Pct of Program
PG&E	Air Conditioners/Heat Pumps/Room AC	3,282,200	6.25%	-	0.00%
	Attic Insulation	343,651	0.65%	132,173	2.34%
	Clothes Washer - Energy Star	1,242,528	2.37%	838,706	14.85%
	Dishwasher - Energy Star	1,269,424	2.42%	390,592	6.92%
	Furnace - Gas	-	0.00%	166,043	2.94%
	Pool Pumps	1,657,223	3.16%	-	0.00%
	Programmable Thermostats	4,261,103	8.12%	1,182,817	20.95%
	Wall Insulation	112,355	0.21%	43,213	0.77%
	Water Heater - Gas	-	0.00%	32,458	0.57%
	Water Heater - Electric	15,309	0.03%	-	0.00%
	Whole House Evaporative Cooler	322,835	0.61%	-	0.00%
	Whole House Fan	954,379	1.82%	-	0.00%
	Windows - High Perf. Dual Pane	3,716,050	7.08%	375,359	6.65%
	TOTAL	17,177,057	32.72%	3,161,362	55.99%
SCE	Air Conditioners/Heat Pumps/Room AC	3,492,734	6.65%		
	Attic Insulation	431	0.00%		
	Pool Pumps	7,623,591	14.52%		
	Programmable Thermostats	8,887,389	16.93%		
	Wall Insulation	13	0.00%		
	Water Heater - Electric	30,761	0.06%		
	Whole House Evaporative Cooler	1,888,482	3.60%		
	Whole House Fan	365,248	0.70%		
	Windows - High Perf. Dual Pane	1,919,000	3.66%		
	TOTAL	24,207,649	46.11%	-	0.00%
SCG	Attic Insulation	1,119,735	2.13%	238,953	4.23%
	Clothes Washer - Energy Star	559,072	1.06%	377,374	6.68%
	Dishwasher - Energy Star	605,873	1.15%	186,423	3.30%
	Furnace - Gas	-	0.00%	34,026	0.60%
	Programmable Thermostats	2,695,070	5.13%	773,063	13.69%
	Wall Insulation	242,233	0.46%	115,043	2.04%
	Water Heater - Gas	-	0.00%	26,738	0.47%
	TOTAL	5,221,984	9.95%	1,751,620	31.02%
SDG&E	Air Conditioners/Heat Pumps/Room AC	965,621	1.84%	-	0.00%
	Attic Insulation	28,255	0.05%	39,795	0.70%
	Clothes Washer - Energy Star	310,368	0.59%	209,498	3.71%
	Dishwasher - Energy Star	380,474	0.72%	117,069	2.07%
	Furnace - Gas	-	0.00%	10,282	0.18%
	Pool Pumps	1,440,225	2.74%	-	0.00%
	Programmable Thermostats	1,608,707	3.06%	329,870	5.84%
	Wall Insulation	444	0.00%	10,563	0.19%
	Water Heater - Gas	-	0.00%	16,696	0.30%
	Water Heater - Electric	3,701	0.01%	-	0.00%
	Whole House Evaporative Cooler	8,694	0.02%	-	0.00%
	Whole House Fan	103,774	0.20%	-	0.00%
	Windows - High Perf. Dual Pane	1,038,722	1.98%	-	0.00%
	TOTAL	5,888,984	11.22%	733,775	12.99%
STATEWIDE	Air Conditioners/Heat Pumps/Room AC	7,740,555	14.75%	-	0.00%
	Attic Insulation	1,492,072	2.84%	410,922	7.28%
	Clothes Washer - Energy Star	2,111,968	4.02%	1,425,578	25.25%
	Dishwasher - Energy Star	2,255,771	4.30%	694,083	12.29%
	Furnace - Gas	-	0.00%	210,352	3.73%
	Pool Pumps	10,721,040	20.42%	-	0.00%
	Programmable Thermostats	17,452,270	33.25%	2,285,750	40.48%
	Wall Insulation	355,045	0.68%	168,820	2.99%
	Water Heater - Gas	-	0.00%	75,893	1.34%
	Water Heater - Electric	49,771	0.09%	-	0.00%
	Whole House Evaporative Cooler	2,220,011	4.23%	-	0.00%
	Whole House Fan	1,423,401	2.71%	-	0.00%
	Windows - High Perf. Dual Pane	6,673,771	12.71%	375,359	6.65%
	TOTAL	52,495,674	100.00%	5,646,757	100.00%

2.3 VERIFICATION RESULTS

The objective of this task was to verify the program accomplishments that each IOU claimed in its Final Fourth Quarter Report for the 2003 Statewide Residential Single-Family Rebates Program. Six separate verification tasks were conducted to verify various aspects of the program accomplishments, as follows:

1. **Application Verification** - Verify that applications were correctly entered into the program tracking systems, for a sample of applications. Also verify that the rebated equipment was program qualifying by comparing the vendor invoices attached to the applications with the Single-Family Rebate Program Qualifying Products List for 2003.

2. **Measure Accomplishments Verification** - Verify that the total number of units rebated through the program by measure type, as reported in the Final Fourth Quarter CPUC workbook in the Program Activities Worksheet, Table - A, column S, match the program tracking systems.

3. **HTR Accomplishments Verification** - Verify that the percent of participants that received incentives in HTR segments (based on geographic location and income) as reported in the Final Fourth Quarter CPUC Report narrative, match the program tracking systems.

4. **Per Unit Savings Verification** - Verify that the per unit savings (kW, kWh and therm) and net-to-gross values, by measure type, as reported in the Final Fourth Quarter CPUC workbook in the Program Activities Worksheet, Table – A (columns D, F, G and J), match the program implementation plans.

5. **Measure Installation Verification** – Conduct telephone surveys to verify that the rebated equipment was installed and matches the program tracking system, for a sample of participants.

6. **On-Site Equipment Verification** – Conduct on-site audits to verify that the rebated equipment actually installed match the program tracking system, and collect measure specific information to verify that the equipment installed was program qualifying, for a sample of participants.

Approach

In order to verify these accomplishments, the QC Team (Quantum Consulting and KEMA-XENERGY) first obtained the following information from each IOU:

- a sample of participant applications and vendor invoices
- the program tracking system
- definitions and data sources used to classify participants as hard-to-reach (geographic location and income)
- the final fourth-quarter CPUC workbook and narrative

Application Verification

For each IOU we verified that a sample of invoices (50 to 75 applications) was entered correctly into the program tracking system (particularly application number, customer name, address, city, measure type, measure counts and incentives paid). A total of 189 applications, covering 248 measures, were analyzed. We also verified that the specific measures that were rebated were in fact program qualifying models as listed in the Single-Family Rebate Program Qualifying Products List for 2003.

Measure Accomplishments Verification

Once the application information was verified, the number of measures rebated by measure type were calculated, by aggregating the program tracking system for each IOU. This was then compared to the final CPUC workbook in the Program Activities Worksheet, Table - A, column S, to determine if these values matched.

HTR Accomplishments Verification

Next, using the definitions provided by the IOUs, we determined if a given participant fell into the rural and/or low to moderate income HTR segments. We then calculated the number of accounts that received incentives in any of these HTR segments. We then compared the percent of the total accounts that were classified HTR to the final CPUC report narrative, to determine if the values matched.

Per Unit Savings Verification

Then the per unit savings values (kW, kWh and therm) and net-to-gross values, by measure type, as reported in the Final Fourth Quarter CPUC workbook in the Program Activities Worksheet, Table – A (columns D, F, G and J), were evaluated against the Program Implementation Plan (PIP).

Measure Installation Verification

Next, survey data was collected for a sample of 1,065 participants, covering 1,274 measures. Participants were asked if they installed the same measures that the tracking database stated.

On-Site Equipment Verification

Finally, on-sites were completed for a sample of 76 participants, covering 90 measures. For this group of participants, make and model information was collected on site to verify the data in the program tracking system and verify if the equipment was program qualifying, based on the Single-Family Rebate Program Qualifying Products List.

Findings

Application Verification

For each IOU we verified that a sample of invoices (50 to 75 applications) was entered correctly into the program tracking system and also that they were listed in the Single-Family Rebate Program Qualifying Products List 2003.

PG&E: QC randomly selected 55 of PG&E's applications for verification, which were associated with 74 measures and corresponding vendor invoices. The application code, customer name, address, city, measure description, quantity and incentive reported on these invoices were compared to those entered into PG&E's tracking database. All invoices were found to be correctly entered into the tracking database. The rebated measures were then matched up to the list of qualifying products. Two of these measures did not have enough information on the application to verify the measure: a dual pane window and a clothes washer. One furnace measure was found that did not qualify for the program. The furnace is an 80 AFUE model, which does not qualify for the program.

SCE: Because SCE conducted their own independent verification of the application process, we leveraged this effort. Ridge and Associates, the independent reviewer, recommended for the Final reporting that net kWh per unit savings be reduced by 2.7% and net kW per unit savings be reduced by 1.6%, which was verified as discussed below.

SDG&E: QC randomly selected 61 of SDG&E's applications for verification, which were associated with 79 measures and corresponding vendor invoices. The application number, contact person, address, city, measure description, quantity and incentive documented on the applications were compared to the values entered into SDG&E's tracking database. All applications were found to be correctly entered into the tracking database. When matched up to the list of qualifying products, most rebated measures were found to be in the program qualifying list. The exceptions were: three of the window rebate recipients did not provide any paperwork that specified U-factors and SHGC for the windows purchased, one insulation application did not provide proof of the r-value of the purchased insulation, and one dishwasher application did not provide a model number for the dishwasher. Finally, one of the clothes washer model numbers was not found on the program qualifying list. All of the cases listed above, except for the clothes washer, may be program qualifying, as it was not possible to verify this based on the paperwork provided with the applications.

SCG: QC randomly selected 73 of SCG's applications for verification, which were associated with 95 measures and corresponding vendor invoices. The application number, contact person, address, city, measure description, quantity and incentive documented on the applications were compared to the values entered into SCG's tracking database. All invoices were found to be correctly entered into the tracking data. When matched up to the list of qualifying products, two clothes washer measures did not have enough information to verify the measure. Also, one thermostat measure was found that does not qualify for the program.

Measure Accomplishments Verification

To verify measure accomplishments we calculated the number of measures rebated, by measure type, in each IOU's program tracking data. We then compared this to the final CPUC workbook in the Program Activities Worksheet, Table - A, column S, to determine if these values matched.

Exhibit 2-5 below summarizes the findings of the measure accomplishments verification tasks. Presented are the number of measures, by measure type, (1) found in their program tracking database and (2) reported by each IOU in their Final Fourth Quarter CPUC workbook in the Program Activities Worksheet, Table - A, column S.

Exhibit 2-5
Comparison of Measure Accomplishments, by IOU
Tracking Database vs. Final Fourth Quarter Report

Measure Description	SCE		SCG		PG&E		SDG&E	
	Database	Reported	Database	Reported	Database	Reported	Database	Reported
Whole House Evaporative Cooler	1,567	1,567			297	297	8	8
Air Conditioner	7,816	7,816			7,690	7,690	2,234	2,215
Attic Insulation (square feet)	15,918	15,918	2,684,868	2,682,993	2,970,190	2,970,190	638,769	635,751
Clothes Washer			17,471	17471	38,829	38,829	9,699	9,699
Dishwasher			14,237	14,235	30,514	30,514	9,146	9,146
Gas Furnace - 80% AFUE			376	376	1	1	185	185
Gas Furnace - 90% AFUE			1,052	1,052	3,969	3,969	446	446
Gas Water Heater >=.60 EF			2,311	2,310	2,605	2,605	1,340	1,340
Heat Pump	164	164			275	275	125	142
Dual Pane Windows (square feet)	1,522,194	1,522,195			2,108,756	2,108,756	596,892	596,892
Pool Pump/Motor - Single Speed	5,652	5,652			1,986	1,986	1,143	1,143
Pool Pump/Motor - Two Speed	265	265			703	703	62	62
Room Air Conditioner	814	814			2,732	2,732	476	476
Thermostat	34,116	34,116	8,118	8,118	19,689	19,689	5,669	5,709
Wall Insulation (square feet)	322	322	1,048,834	1,048,218	971,088	971,088	237,378	236,408
Whole-House Fan	1,811	1,811			2,352	2,352	275	275
Electric Water Heater	123	123			103	103	33	33
Total	1,590,762	1,590,763	3,777,267	3,774,773	6,161,779	6,161,779	1,503,880	1,499,930
Percent Difference		0.00%		0.07%		0.00%		0.26%

PG&E & SCE: The reported quantity of every measure sold through the program in both PG&E's and SCE's fourth quarter filings matched the actual quantity in their tracking databases.

SCG & SDG&E: The quantity of measures sold through the program reported by SCG and SDG&E in their fourth quarter filings were slightly lower than the quantity observed in their tracking databases. However, the difference between the actual quantity and the reported quantity for each utility were less than one percent.

HTR Accomplishments Verification

Using the definitions provided by the IOUs, we determined if a given participant fell into the rural and/or moderate income HTR segments. It should be noted that SCE also included renters as HTR customers while the other utilities did not. We then calculated the number of accounts that received incentives in any of the HTR segments. We then compared the percent of the total accounts that were classified HTR to the final CPUC report narrative, to determine if the values matched.

Exhibit 2-6 below summarizes the findings of the HTR accomplishments verification tasks. Presented are the percentages of participants that received incentives in HTR segments (based

on geographic location and/or income level) that were (1) found in their program tracking database and (2) reported by each IOU in their Final Fourth Quarter CPUC narrative.

Exhibit 2-6
Comparison of HTR Goal and Accomplishment, by IOU
Tracking Database vs. Final Fourth Quarter Report

Hard-to-Reach	SCE	SCG	PG&E	SDG&E
Goal	34%	23%	35%	60%
Database	38%	25%	37%	58%
Reported	38%	24%	38%	58%

SCE: The percent of applications SCE reported as HTR matched the percent found in the database.

SCG: SCG slightly under-reported their HTR accomplishments relative to what was found in the database. SCG reported that 24% of the participants that received incentives were in HTR areas or HTR income levels, compared to 25% found in the database.

PG&E: PG&E slightly over-reported their HTR accomplishments relative to what was found in the database. PG&E reported that 38% of the participants that received incentives were in HTR areas, compared to 37% found in the database. This value still exceeds their HTR goal of 35%. It should be noted that these percents represent number of applications from rural areas but not from low-income levels. If PG&E had included moderate income customers as HTR, their HTR percent would be 62%.

SDG&E: The percent of participants that received incentives in HTR areas or HTR income levels reported by SDG&E in their fourth quarter filing matched what was found in their tracking database.

SCE, SCG, and PGE reached their HTR goals of 34% 23%, and 35% respectively. SDG&E, which had the highest amount of HTR participants, did not reach their HTR goal of 60%.

Per Unit Savings Verification

The per unit savings values provided in the final fourth quarter filings were evaluated against the Program Implementation Plan (PIP).

PG&E: The per-unit savings values reported in PG&E's final fourth quarter filings were found to match the PIP filing.

SCE: The net kWh per unit savings values found in the final fourth quarter report for SCE were 0.973 times the PIP values. The net kW per unit savings values in the final fourth quarter report were 0.984 times the PIP values. As discussed above, this is consistent with the evaluation by Ridge and Associates. One other change that was made after the initial PIP filing was an updated savings value for the

single speed pool pump measure per decision 03-04-055, and this change was noted in SCE's third quarter report. The value in the PIP was stated as 555 net kWh/unit, and was increased to 1,300 net kWh/unit in the final fourth quarter report, and the value of .29 net kW/unit in the PIP was increased to .39 net kW/unit in the final fourth quarter report.

SDG&E: SDG&E also updated their single speed pool pump savings values, per decision 03-04-055. The value of 1,335 net kWh/unit given in the PIP was reduced to 1,261 net kWh/unit in the final fourth quarter report, and the value of .39 net kW/unit in the PIP was reduced to .25 net kW/unit in the final fourth quarter report. Other than this change, the per-unit savings values reported in SDG&E's final fourth quarter filings were found to match the PIP filing.

SCG: The per-unit savings values reported in SCG's final fourth quarter filings were found to match the PIP filing.

Measure Installation Verification

A survey was conducted to verify that the IOU's customers installed the measures specified in the IOU's database. The survey asked a sample of 1,065 participants if they recall receiving a rebate for the measures that we gathered from their record in the IOU's tracking database. Exhibit 2-7 shows that, out of 1,274 measures asked about in the survey, only fifteen measures were not verified by the respondents. And an additional fifteen respondents were unable to answer the question.

Exhibit 2-7
Survey Results of Participants
In Response to the Rebated Measure In the Tracking Database

Remember Receiving a Rebate for Given Measure Through SFR Program?	1st Measure		2nd Measure		3rd Measure		4th Measure		Total	
	N	Pct.	N	Pct.	N	Pct.	N	Pct.	N	Pct.
Yes	1040	98%	171	98%	26	96%	7	100%	1244	98%
No	12	1%	3	2%	0	0%	0	0%	15	1%
Don't Know	13	1%	1	1%	1	4%	0	0%	15	1%
Total	1065	100%	175	100%	27	100%	7	100%	1274	100%

Those that recalled receiving a rebate, for the measure that we specified, were then asked if that measure was currently installed. Exhibit 2-8 shows that 17 respondents said that their rebated measure was not currently installed. Seven of these respondents never installed the measure and ten removed the measure. An additional six respondents were unsure if the measure was still installed.

Exhibit 2-8
Survey Results of Participants
Retention of the Rebated Measure In the Tracking Database

Is the Measure Still Installed?	1st Measure		2nd Measure		3rd Measure		4th Measure		Total	
	N	Pct.	N	Pct.	N	Pct.	N	Ptc.	N	Pct.
Yes - Installed	1017	98%	171	100%	26	100%	7	100%	1221	98%
No - WAS installed but REMOVED	10	1%	0	0%	0	0%	0	0%	10	1%
No - NEVER INSTALLED	7	1%	0	0%	0	0%	0	0%	7	1%
Don't know	6	1%	0	0%	0	0%	0	0%	6	0%
Total	1040	100%	171	100%	26	100%	7	100%	1244	100%

On-Site Equipment Verification

Exhibit 2-9 shows the distribution of the 90 measures that were audited, the number of measures found installed in the participants household, and if the equipment was found to be program qualifying or not. All measures were found to be installed, but 2% of the measures audited were not found in the Single-Family Rebate Program Qualifying Products List (only 2 measures). It is possible that these measures may be program qualifying, but were not listed or the model number could have been transcribed incorrectly.

One of the two measures not found on the Program Qualifying Products List was a central air conditioner that did not have an Energy Star label. The model number for this measure could not be found in the manufacturer's product literature, and may have been transcribed incorrectly. The second measure not found in the list was a clothes washer without an energy star label.

Furthermore, there were another 2 measures for which make and model information was not available in the program tracking data, nor were the auditors able to determine this information on site. These two measures were a programmable thermostat and a dishwasher. On programmable thermostats, the model number is often located on the back of the equipment, possibly out of site from the auditor.

Exhibit 2-9
Results of On-Site Audits
Number of Measures Found to be Program Qualifying

Measure Description	Number of Measures Audited	Does Quantity Installed Match?		Is Measure Program Qualifying?		
		Yes	No	Yes	No	UTD*
Air Conditioner	18	18	0	17	1	0
Programmable Thermostat	25	25	0	24	0	1
Pool Pump	12	12	0	12	0	0
Clothes Washer	11	11	0	10	1	0
Dishwasher	12	12	0	11	0	1
Dual Pane Windows	12	12	0	12	0	0
Total	90	90	0	86	2	2

*Unable to Determine Model Number in the Field

Conclusion

Overall, it was found that the measure accomplishments reported by the IOUs in their final report (specifically, in the CPUC workbook in the Program Activities Worksheet, Table - A, column S) matched very well with the program tracking data. This was also the case with the hard-to-reach (HTR) accomplishments. The program tracking data was very similar to what was reported in the Final Fourth Quarter Report narrative. Almost all of the per unit savings values were found to be accurate in the Fourth Quarter filings. All applications were correctly entered into the tracking database. But we were not able to verify that nine rebated measures were program qualifying, and three measures did not qualify for the program. The Measure Installation Verification survey found that 97.6% of surveyed participants recall receiving a rebate through the Single-Family Rebate Program. It was also found that 98.2% of surveyed participants still have their rebated measure installed. The On-site Equipment Verification found that all measures rebated were found to be installed in the home and, for the most part, the found measures were indeed program qualifying.

3. PROCESS ASSESSMENT

This chapter uses both participant survey findings and results from the market actor surveys to shed light on process issues and program effects. This chapter also draws on historical data to offer a longitudinal look at some key indicators of program effectiveness (such as sources of program awareness) over time by comparing to 2002 findings.

This chapter is divided into four major sections that present survey findings.

- **Program Awareness Levels and Sources** examines how aware participants and market actors are of the program. It also explores the major causes of this awareness including various program promotional and delivery mechanisms.
- **The In-Store Purchase Experience** explores consumers' experience with retailers, especially their exposure to energy-efficient products. It also looks at promotion and salesmanship from the retailer perspective.
- **Program Satisfaction** examines satisfaction with various elements of the program from the perspective of participants, HVAC contractors, window contractors, and retailers.
- **Possible Expansion of Point-of-Sale (POS) Rebates** discusses how retailers weigh the relative merits of POS vs. mail in rebates and whether they think the program should expand POS rebates to other products.

To address these research objectives, 742 telephone interviews were completed with residential customers who participated in the 2003 Single-Family Residential rebate program. This participant sample was drawn from SCE, SCG, SDG&E and PG&E's program tracking databases. In addition telephone interviews were conducted with 42 HVAC contractors, 40 window contractors, and 21 retailers. On-site surveys were also conducted with another twelve retailers. Detailed information on the sample design and survey disposition can be found in Chapter 1. Detailed hard-to-reach segmentation (homeownership, language, income, etc) are reported in data tables in Appendix E.

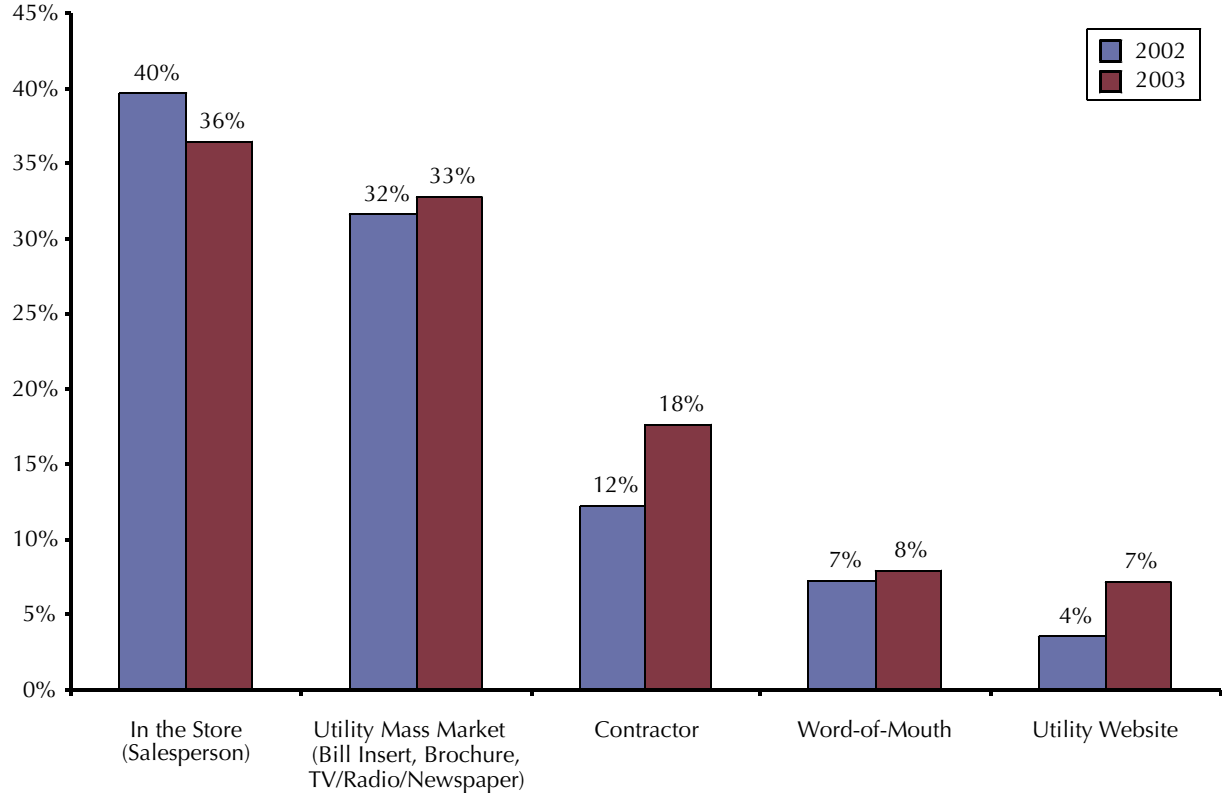
The chapter highlights findings from a series of data tables presented in Appendix E (Participant Survey Data Tables - Process). Footnotes point readers to those data tables in the appendix. This reporting structure offers higher-level findings and gives readers the opportunity to examine results in detail in the appendices.

3.1 PROGRAM AWARENESS LEVELS AND SOURCES[7]

Participant Awareness

As in 2002, retailers played the biggest role in making participants aware of rebates. Exhibit 3-1 shows a comparison of major sources of program awareness between program years 2002 and 2003. In program year 2003, 36% of participants learned about the rebate program in a store. One in three (33%) became aware through utility mass marketing (bill inserts, mailings, TV/radio/newspaper advertisements).

Exhibit 3-1
Major Sources of Participant Awareness
2002-2003 Comparison



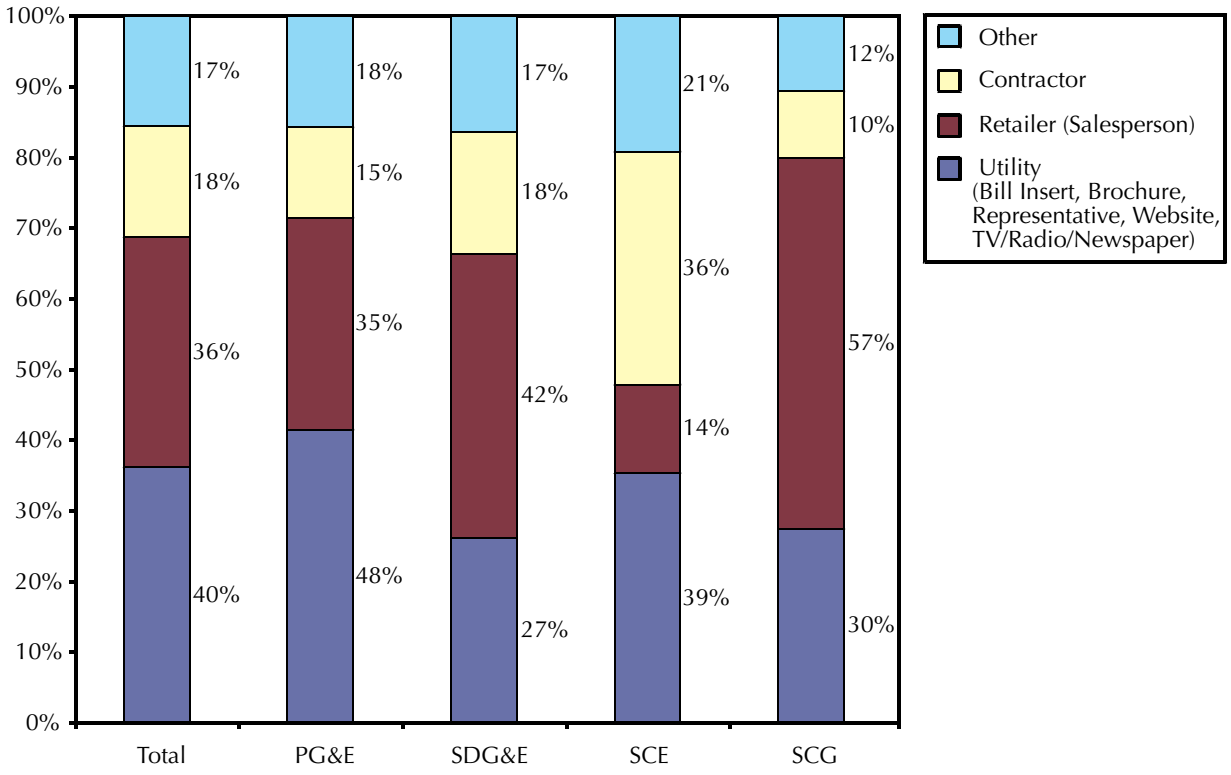
As shown above, 18% learned of rebates through contractors (versus 12% in 2002); however, the role of contractors varies depending on the type of measures. Contractors figure prominently into making participants purchasing heating and cooling measures aware of the program (44%), whereas nearly 60% of appliance purchasing participants learned about rebates through a salesperson in a store.

[7] Appendix Exhibit E-1 (Sources of Awareness)

More participants learned about the program through the utility website in 2003 than in 2002 (7% versus 4%), demonstrating that websites are becoming a more common option for finding energy efficient information, although the number is still very low.

Exhibit 3-2 shows sources of awareness by utility. Overall 40% of participants became aware of the program through utility sources (i.e. brochures, bill inserts, IOU websites, TV/radio/newspaper advertisements, and IOU representatives). However, this varied by IOU (48% of PG&E participants, 39% SCE, 30% SCG, 27% SDG&E).

Exhibit 3-2
Sources of Awareness by Utility



*Note: Values sum to more than 100% because multiple responses were allowed

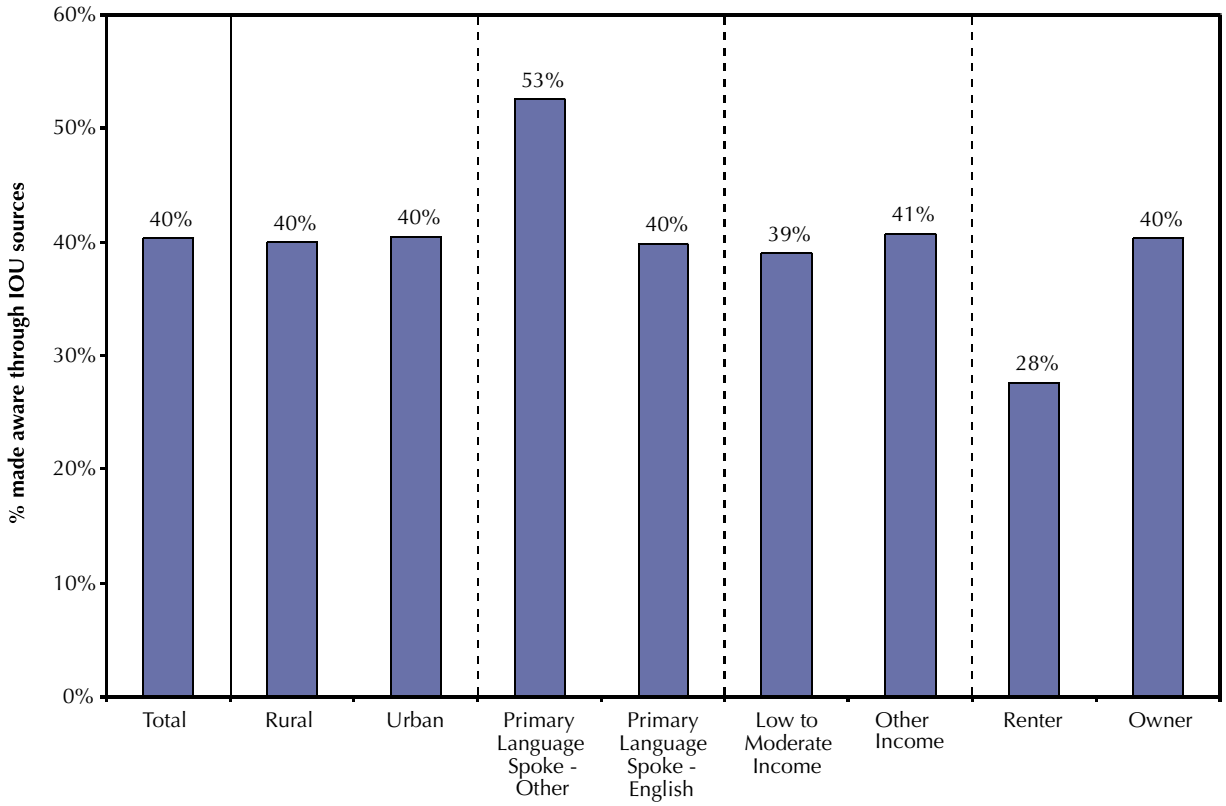
Thirty-six percent of participants learned about the program through retailers, while 18% became aware through contractors. Contractors in SCE territory (36%) played a much larger role than retailers (14%) in making participants aware of the program, as might be expected since SCE does not rebate retail-oriented appliance measures such as clothes washers. Conversely, contractors (10%) played the smallest role in SCG's service territory, which focused more on appliance measures. Instead, retailers (57%) were the key player in making participants aware of the rebates.

Hard-to-Reach Participant Awareness

The CPUC directed utilities to serve hard-to-reach customers (rural customers, customers who speak languages other than English, low income customers, and renters) due to concerns that

the utilities are not reaching these underserved communities. Exhibit 3-3 shows IOU sources of awareness (i.e. brochures, bill inserts, IOU websites, TV/radio/newspaper advertisements, and IOU representatives) across various HTR segments.

Exhibit 3-3
IOU Sources of Awareness
Hard-to-Reach Segments

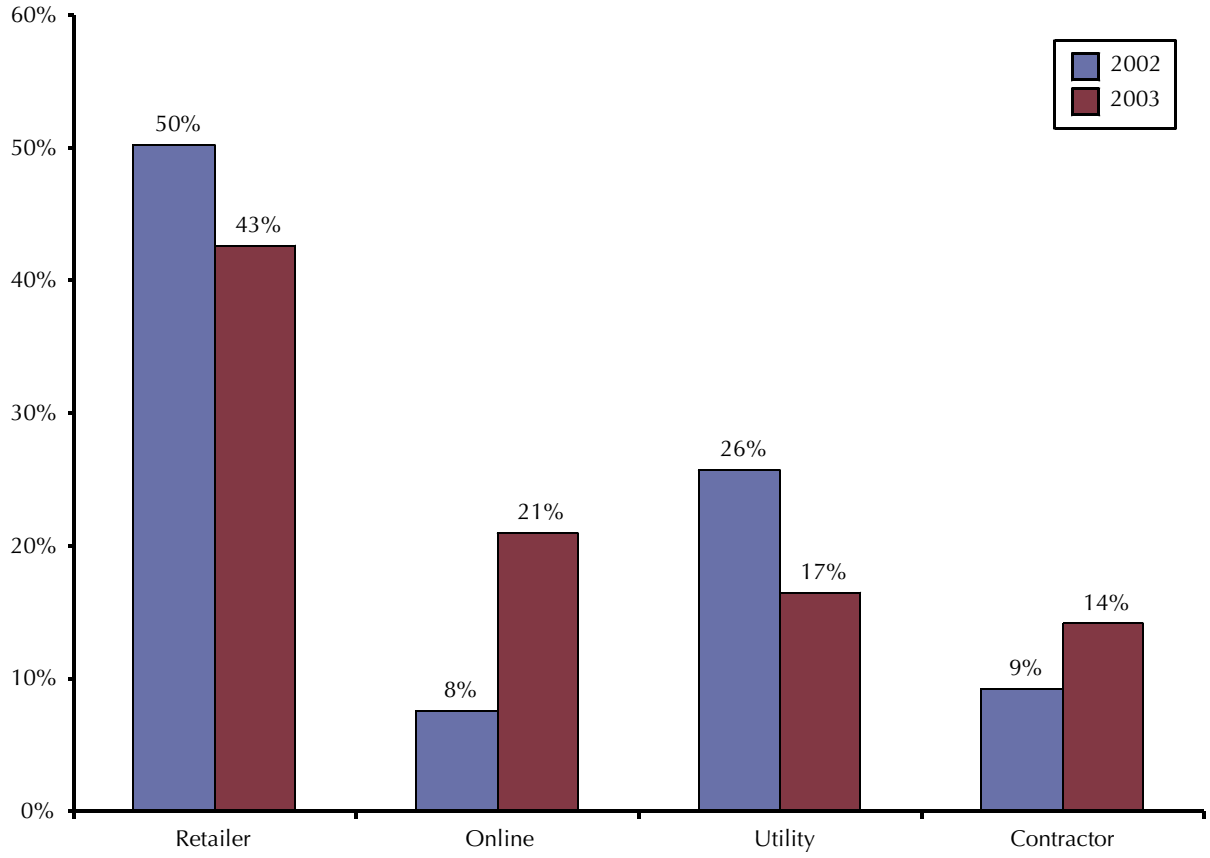


By and large, the IOUs have been successful in reaching HTR customers. About one in two (53%) other language speakers became aware of the program through the IOUs. The IOUs have effectively targeted rural (40%) and low-income (39%) customers, compared with 40% of all participants surveyed. However, there is room for improvement in reaching renters; only 28% of renters became aware of the Single-Family Rebate program through the IOUs, compared to 40% of owners. However, it might not be necessary to focus on renters since they are much less likely than owners to purchase appliances and therefore less likely to participate in the program.

Where Participants Get Applications[8]

Exhibit 3-4 shows the four primary ways that participants obtain rebate applications. Overall, 43% of participants received a rebate application from a retail store—a smaller percentage than in 2002 (50%), which may be a result of the addition of a point-of-sale rebate for thermostats. Retailers played the most prominent role in SDG&E (52%) and SCG (57%) territory, whereas relatively few customers in the SCE territory (11%) obtained an application through a retailer. Only 14% of participants got a rebate application from a contractor, while 21% got an application online. Twice as many participants reported that they got their applications online in 2003 than 2002 (21% versus 9%). However, many customers who reported that they got their application from the utility in 2002 might have gotten the application through the utility website. Combining the online and utility responses, 34% of participants received a rebate through the utility/online in 2002 versus 38% in 2003. These values are fairly similar.

Exhibit 3-4
Where Participants Get Rebate Applications
2002-2003 Comparison



[8] Appendix Exhibit E-2 (Rebate Application)

Retailers play a dominant role for appliances; nearly three of four appliance participants (70%) got an application at a retailer. By contrast, about one in ten customers who purchased a rebated home improvement (13%) or HVAC (8%) measure picked up an application at a retailer. Instead, home improvement participants tended to get applications online (30%) and HVAC participants tended to get applications from a contractor (43%). As discussed below, 70% of HVAC contractors, but only 30% of window contractors, fill out the rebate application forms on their customers' behalf.

Online Rebate Applications[9]

Most participants (82%) have Internet access at home. Almost half of the participant population (48%) is aware that rebate applications are available online. Twenty-four percent of participants said that they downloaded a rebate application. SCE participants in particular took advantage of the opportunity to download an application (44%).

Market Actor Awareness

Overall, there was a high level of awareness of the rebate program among the various classes of market actors, shown in Exhibit 3-5. The one exception was the small independent and franchise (e.g., Ace, True Value) hardware stores where over a third were unaware of the program. One explanation for the low awareness among this group is the fact that the only program-qualifying product that most of these stores sell is the programmable thermostat.[10]

Exhibit 3-5
Market Actor Awareness of the Program

Aware of Rebate Program?	Yes	No
HVAC Contractors	88%	12%
Windows Contractors	83%	17%
Big Box, Large Chain Hardware and Appliance Stores	100%	0%
Small, Independent Appliance Stores	100%	0%
Small, Independent and Franchise Hardware Stores	63%	37%
HVAC contractors N = 42, window contractors N = 40, big box N = 6. small appliance N = 7, small hardware N = 8		

[9] Appendix Exhibit E-3 (Internet at Home), Appendix Exhibit E-4 (Online Aware), Appendix Exhibit E-5 (Download Application)

[10] These stores do sell compact fluorescent lamps (CFLs) but these products are not for eligible for rebates under the California Single-Family Home Energy Efficiency Rebate program.

Contractor Promotion of Rebates

Although the large majority of HVAC contractors are aware of the California Single-Family Home Energy Efficiency Rebate program, only about half of them actively promote the rebates, even though they may promote high efficiency equipment. Large HVAC contractors were more active in promoting rebates than small contractors.

Windows contractors claim to promote rebates more actively than HVAC contractors, as shown in Exhibit 3-6 below. Almost two-thirds of the window contractors said that they were active in promoting the rebates and almost half said that they were "very active."

Exhibit 3-6
HVAC Contractor Activity
in Promoting Program Rebates

	Very Active =1	2	3	4	Not Very Active = 5	Don't Know
How actively promote rebates?						
HVAC contractor	38%	12%	5%	12%	21%	12%
Windows contractor	48%	15%	9%	6%	21%	0%
N = 37 HVAC contractors, 33 windows contractors						

Exhibit 3-7 below summarizes the reasons why HVAC contractors are not more active in promoting rebates. These reasons can be roughly grouped into three categories:

- rebates are too much hassle
- rebate are insufficient to cover incremental cost or to please low-price shoppers
- rebates don't fit or are not needed for contractor's target market

When asked why they were not more actively promoting the rebates, a few of the smaller contractors said that they did not have the staff resources to deal with the rebates. Rebates paperwork may generate an administrative burden that smaller contractors may want to minimize. By contrast, a large majority of HVAC contractors end up filling out rebate applications on their customer's behalf.

Window contractors' motivations for not promoting rebates are different than those of HVAC contractors. Unlike the HVAC contractors, the window contractors do not believe that the rebates are inadequate or that the rebates are a hassle. Their stated reasons for non-promotion have more to do with them not being able to market the rebate, selling unqualified products, or fears that rebate monies will run out.

Exhibit 3-7
Reasons Why HVAC Contractors are
Not More Active in Promoting Rebates

Why not more active in promoting the rebates?	% of Total Survey Responses
Rebates are too much trouble/ Don't want to deal with paperwork	13%
Rebates insufficient to cover higher upfront equipment costs	13%
Don't have time to promote rebates	13%
Rebates not needed to generate extra sales	13%
Rebates don't fit my market	13%
Customers still want lowest-price model	6%
Rebate program is not responsive to phone calls	6%
Customers will find out about rebates on their own	6%
Haven't been actively selling air conditioners recently	6%
Don't know	13%
Total	100%
N = 16	

Exhibit 3-8
Reasons Why HVAC Contractors are
Not More Active in Promoting Rebates

Why not more active in promoting the rebates?	% of Total Survey Responses
We do minimal rebate promotion but don't have time for much more	25%
Concern about rebate fund availability	17%
Windows we sell don't qualify for rebates	17%
Don't do much marketing anyway	8%
Don't think program has broad enough appeal/ is marketable	8%
Think utility is responsible for promotion	8%
Our prices are low to begin with	8%
Customers are unfamiliar with the rebate program	8%
Total	100%
N = 12	

Retailer Promotion of Rebates

Of the three market actor groups that were surveyed, the retailer group claimed to be the most active in promoting the program rebates (Exhibit 3-9), although its sample size was also the smallest. Exhibit 3-10 shows that access to the rebates was the top reason why retailers joined the rebate program. Only three of the 14 respondents said that they were not active in promoting the rebates. One regional manager for a big box store said that her stores did not promote the rebates that much anymore because "rebate levels are often changing" and because "interest in energy-efficient technologies is not as strong as it was during the California energy crisis."

Exhibit 3-9
Retailer Activity
in Promoting Program Rebates

	Very Active =1	2	3	4	Not Very Active = 5	Don't Know
How actively promote rebates?	57%	21%	0%	21%	0%	0%
N= 14						

Exhibit 3-10
Retailer Reasons
for Joining Rebate Program

What were your primary reasons for getting involved with this program?	% of Total Survey Responses
Financial incentives, discounted products	46%
Increase sales, energy conservation sells	31%
To meet consumer demand, consumers were asking for EE products	8%
Merchandising support, POP displays/signage	4%
Co-operative advertising	4%
Increase traffic to/in store	4%
Because competitors were participating, gain market share	4%
Total	100%
Respondents N = 14, Responses N = 26	

3.2 THE IN-STORE PURCHASE EXPERIENCE

In-Store Advertising[11]

In-store advertising is an important marketing strategy. Two out of three (66%) respondents that shopped in a retail store recalled seeing literature, promotions or displays in a store that provided information about the advantages or features of the equipment they purchased, as indicated by Exhibit 3-11 below.

Among programmable thermostat purchasers that received a point-of-sale rebate, only a third (32%) of point-of-sale purchasers recall seeing in-store advertising materials.[12] Of the aware point-of-sale purchasers that recalled in-store advertising, 75% felt it was influential on their purchase.[13]

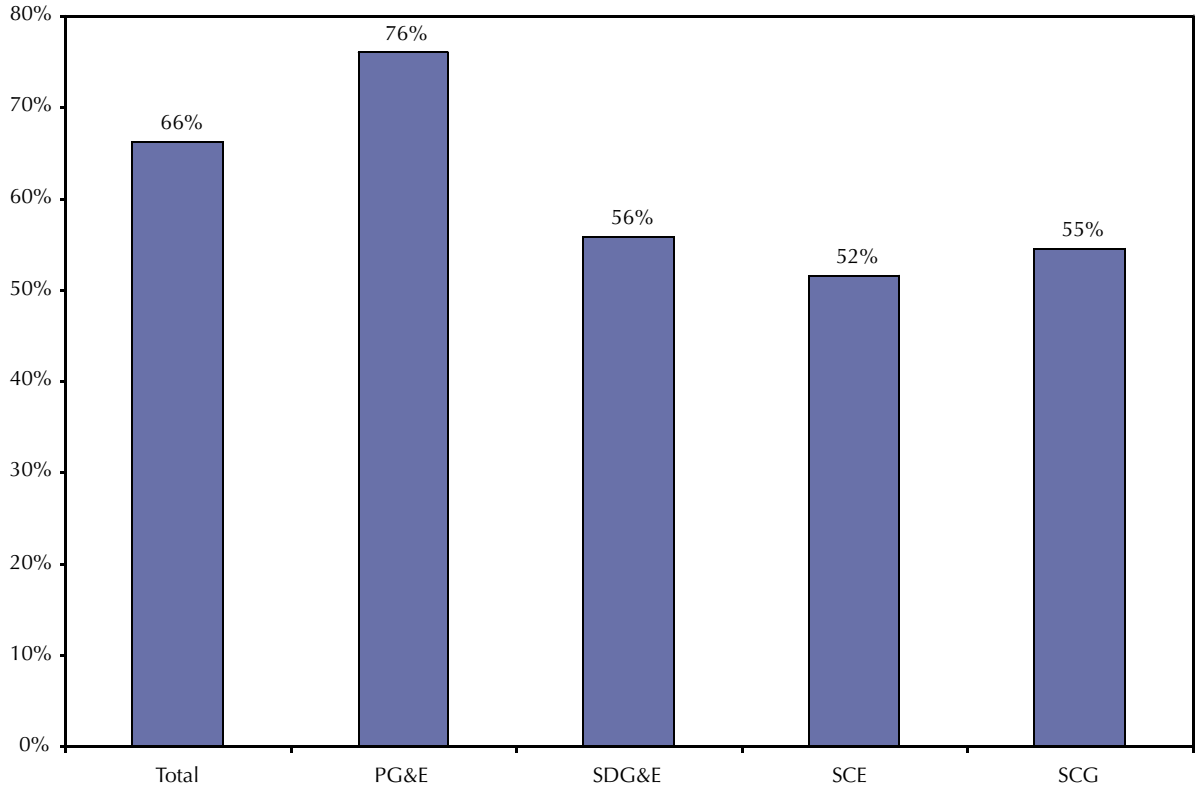
Overall, participants recalled seeing brochures and posters (53%), product displays (40%) and information about utility rebates (13%) in retail stores. The influence of these materials did not change much from 2002. Consumers again gave in-store advertising a mean influence rating of 6.9 (with 1 meaning "not at all influential" and 10 meaning "extremely influential"), suggesting that many consumers do not enter a store with their minds already made up about a purchase, but are open to learning about product information at the point of purchase. The retail environment offers a real opportunity to capture shoppers' mind space.

[11] Appendix Exhibit E-6 (Shop at Retailer), Appendix Exhibit E-7 (Saw Literature), Appendix Exhibit E-8 (Type of Literature), Appendix Exhibit E-9 (Influence of Literature)

[12] Appendix Exhibit E-10 (In-Store Advertising).

[13] Appendix Exhibit E-11 (Influence of In-Store Advertising).

Exhibit 3-11
Percent of Participants Who Saw Promotional Materials at Retail Stores
Among Those That Shopped at a Retail Store



Retailer promotions were less prominent at stores in SCE territory, consistent with contractors playing a bigger role in SCE participant awareness than retailers, and likely due to SCE not rebating appliances. Although fewer SCE participants learned about the program through a retailer, one in four (26%) SCE participants recalled seeing utility rebate information at the store they visited—more than any other IOU.

Telephone surveys of retailers who sold programmable thermostats found that those who were participating in the rebate program were much more likely to promote programmable thermostats than those who were not participating (Exhibit 3-12). Although the telephone sample size was fairly small, this pattern was confirmed by on-site inspections of a dozen retailers.

Exhibit 3-12
Retailer Promotion of Programmable Thermostats

Are programmable thermostats actively promoted in your store?	All Retailers (Average %)	Participating Retailers (Average %)	Nonparticipating Retailers (Average %)
Yes	60%	80%	20%
No	40%	20%	80%
All N = 10, Participant N = 5, Nonparticipant N = 5			

Salespeople[14]

Most (89%) purchasers who shopped in a retail store recalled speaking with a salesperson when shopping for equipment. Salespeople continue to be an important part of program marketing. Nearly all customers who purchased appliances (97%) spoke with a salesperson, compared with two-thirds of those who purchased home improvement measures (67%) or heating and cooling measures (64%).

Energy efficiency is a common theme in consumer interactions with salespeople. Eighty-three percent of purchasers who had contact with a salesperson reported that the salespeople informed them of the benefits of high efficiency products, suggesting that retailers are training their personnel to promote energy efficient products. This interaction proved fairly influential for participants, who rated the salesperson a 6.2, on average (with a 1 meaning "not at all influential" and 10 meaning "extremely influential").

Salesperson interactions were less prevalent among SCE (59%) participants (similar to promotional materials in retail stores) but no less influential on purchase decision (6.4 average influence rating). By contrast, salesperson interactions in the SDG&E territory were very common (95%) and the salesperson almost always mentioned energy efficiency (93%), but were rated as less influential (5.9 average influence rating) than other IOUs. In sum, both salespeople and in-store advertising are important influences in consumers' purchase experiences, and the IOUs should continue to leverage them.

Retailers were asked how often they have a chance to use a sales pitch with customers who are buying programmable thermostats. Exhibit 3-13 shows that over half of the retailers reported that they were able to interact with the customers in this way. Retailers that were participating in the retail program were more likely to use the sales pitch than the non-participants. One manager whose retail chain was very active in the rebate program said that selling

[14] Appendix Exhibit E-12 (Talk with Salesperson), Appendix Exhibit E-13 (Salesperson EE), Appendix Exhibit E-14 (Salesperson Influence)

programmable thermostats was a standard part of their salesperson training. In contrast, the manager of one non-participating retailer – a small franchise hardware store – made the following generalization to explain why salesmanship was not necessary:

> "There are typically two types of people that come into our store to buy a thermostat: those in there to replace a broken thermostat and handymen who are there to upgrade their thermostat. The people who want to replace the broken thermostat usually get the same kind and the handymen already know what they want and don't need the help of a sales rep."

Two-thirds of the retailers also said that they do not train customers how to use the programmable *thermostats.*

Exhibit 3-13
Retailer Salesmanship
of Programmable Thermostats

	Always	Very Often	Sometimes	Seldom	Never	Don't Know
How often does your sales staff have an opportunity to make sales pitches to customers?	18%	36%	18%	36%	0%	0%
N = 11						

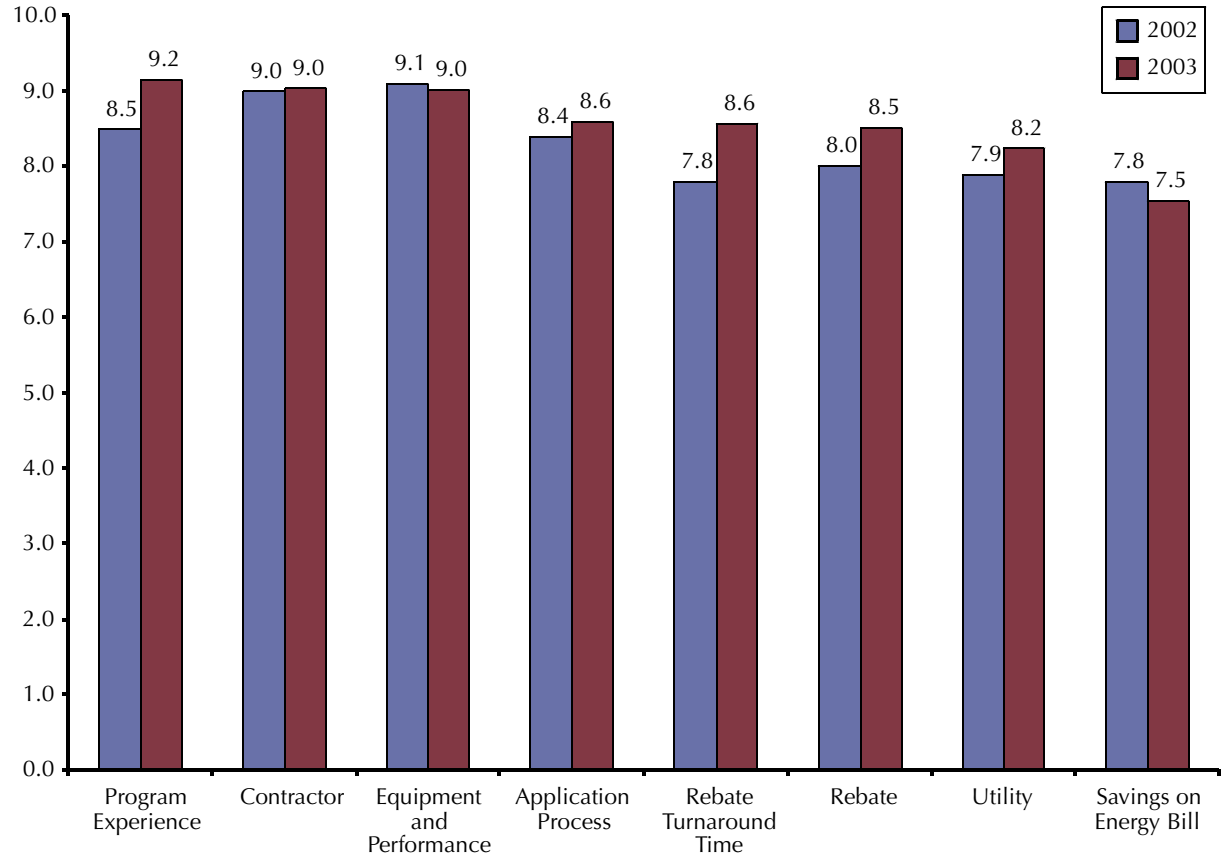
3.3 PROGRAM SATISFACTION[15]

Participant Satisfaction Results

On the whole, participants appear to be quite satisfied with the program. Participants were asked about their satisfaction with several aspects of the program. Exhibit 3-14 compares results from 2002 and 2003.

[15] Appendix Exhibit E-15 (Satisfaction with Contractor), Appendix Exhibit E-16 (Dissatisfaction with Contractor), Appendix Exhibit E-17 (Satisfaction with Program), Appendix Exhibit E-18 (Satisfaction with Rebate), Appendix Exhibit E-19 (Satisfaction with Application), Appendix Exhibit E-20 (Satisfaction with Rebate Turnaround), Appendix Exhibit E-21 (Satisfaction with Bill Savings), Appendix Exhibit E-22 (Satisfaction with Utility), Appendix Exhibit E-23 (Satisfaction with Equipment), Appendix Exhibit E-24 (Savings Expectation)

Exhibit 3-14
Participant Satisfaction
2002-2003 Comparison



Participant satisfaction with the overall program increased from an average rating of 8.5 in 2002 to 9.2 in 2003 (with a 1 meaning "extremely dissatisfied" and 10 meaning "extremely satisfied"). Satisfaction with both equipment and contractors remained high, while energy savings continued to receive the lowest satisfaction score (7.5 in 2003).

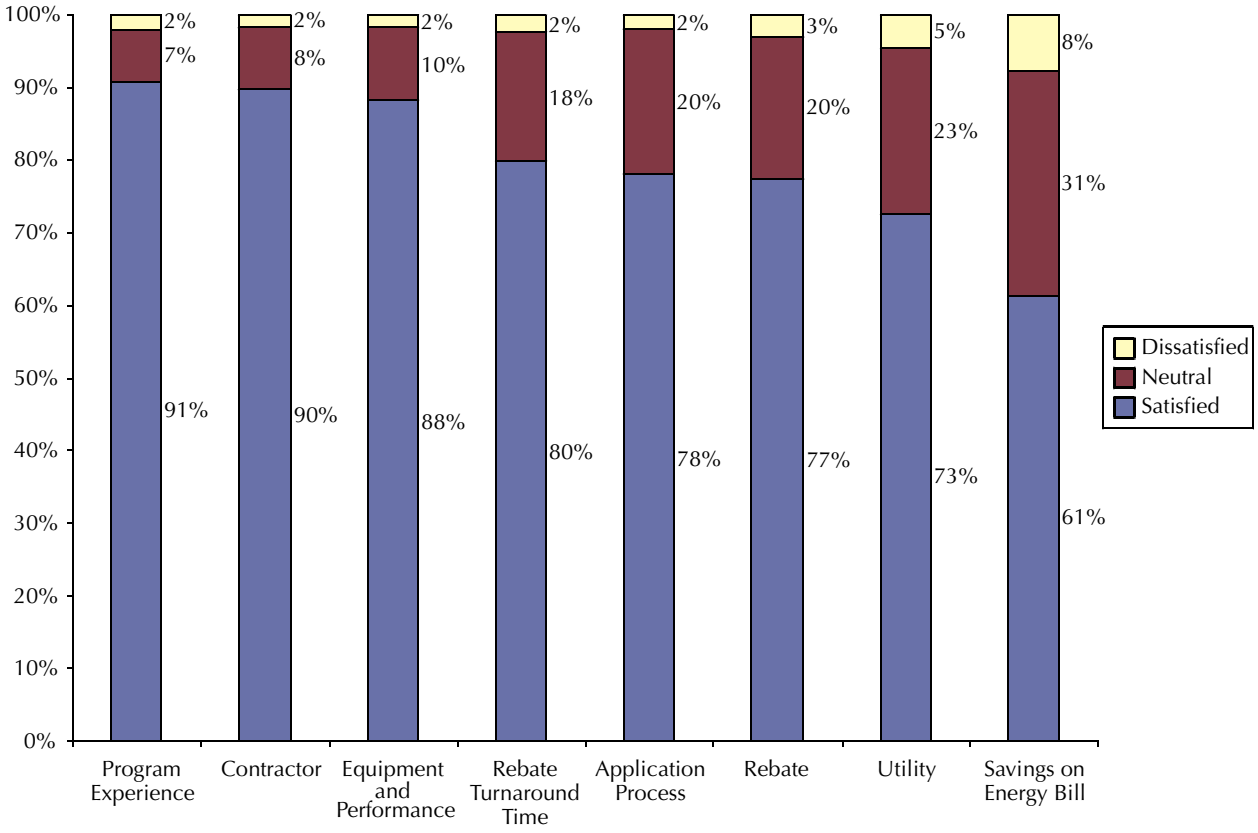
Satisfaction with rebate turnaround time increased from 2002 to 2003 (7.8 to 8.6), according to Exhibit 3-14. Delays in customer payment during the first half of the program year in 2002 may account for lower satisfaction ratings. These satisfaction gains reflect IOU efforts to reduce turnaround time.

Home improvement participants were less satisfied than HVAC participants across the board, especially in terms of satisfaction with rebate amount and savings on their energy bill. In addition, SCG participants were more satisfied than other IOUs in every category except savings on energy bills. SCG participants were especially satisfied with their IOU(9.2).

Almost half (47%) of the participants in 2003 believed that actual bill savings were the same as expected, but one in six (16%) felt bill savings were lower than expected. Less than one in ten (8%) participants said bill savings were higher than expected. SCE customers (13%) and HVAC participants (13%) were more likely to say that savings were higher than expected and both also gave a higher satisfaction rating for bill savings than other participants (7.8 and 8.3).

Satisfaction is presented in terms of percentage of satisfied customers in Exhibit 3-15. "Satisfied" customers ranked their satisfaction 8 to 10 on a 10-point satisfaction scale, "neutral" refers to those customers who rated their satisfaction between 4 and 7, while "dissatisfied" customers' ratings fell between 1 and 3. Some dissatisfaction with bill savings was evident, while customers were most satisfied with their overall program experience and contractors. Less than 10% of customers were dissatisfied with any aspect of the program.

Exhibit 3-15
Percent of Satisfied Participants



Contractor' Experience with Rebate Applications

Although the California Single-Family Home Energy Efficiency Rebate Program pays rebates to residential customers rather than contractors, the 2002 evaluation found that some of them fill out rebate applications on behalf of their customers. Exhibit 3-16 below offers a sense of how widespread this practice of contractors filling out the rebate applications was. Most HVAC contractors (70%) fill out the rebate applications on their customers' behalf (Exhibit 3-16). Larger contractors were more likely do rebate paperwork than small contractors (82% versus 65%). Unlike the HVAC contractors, only 30% of window contractors fill out rebate applications on behalf of their customers.

Exhibit 3-16
Contractors Filling Out Rebate Applications
On Behalf of Their Customers

Filled out rebate applications on behalf of customers?	Yes	No
HVAC contractors	70%	30%
Window contractors	30%	67%
N = 37 HVAC contractors, 33 windows contractors		

Contractors' impressions of the application process were largely favorable, as Exhibit 3-17 shows. HVAC contractors who filled out the applications for their customers found the forms to be reasonable in length and level of detail. Only five of the 26 HVAC contractors that filled out rebate paperwork had applications rejected—all were CAC applications. However, only one of these rejections was attributed to ineligible equipment. The contractors blamed the rest of the rejections on typos, incomplete information, and other errors in filling out the application forms.

Exhibit 3-17 shows that only two window contractors had rebates rejected by the program. Both rejections were due to ineligible window models. Almost none of the window contractors identified any barriers to the promotion of rebates.

Exhibit 3-17
Contractor Rebate Application Experiences

Rebate Application Experience	Yes	No	Don't Know
Application forms reasonable in length & level of detail?			
HVAC contractor	96%	4%	0%
Window contractor	90%	0%	10%
Rebate applications were rejected by utility?			
HVAC contractor	19%	77%	4%
Window contractor	20%	80%	0%
N = 26 HVAC contractors, 10 windows contractors			

Contractor Assessment of Market Barriers

In past years, there have been problems with funds for rebates running out before the end of the program year. The 2002 evaluation indicated that these experiences might make contractors less willing to recommend rebates to their customers. However, the 2004 survey found that less than one-fifth of HVAC contractors believed that funding uncertainties to be barriers to recommending rebates, illustrated in Exhibit 3-18. In 2003, the program made a number of improvements to the utility websites to make it easier for contractors to determine which equipment is eligible for rebates. These efforts appear to be paying off since the 2004 survey found that only a small minority of HVAC contractors are finding it difficult to determine equipment eligibility.

Exhibit 3-18
Contractor Assessment of Possible Barriers to Rebate Use

	Yes	No	Don't Know	N
Reluctant to recommend rebates because of fear that no $ will be available?				
HVAC contractors	17%	80%	3%	37
Windows contractors	0%	100%	0%	37
Difficult to find out what EE equipment is eligible for rebates?				
HVAC contractors	11%	89%	0%	8
Windows contractors	3%	91%	6%	33

Contractor Satisfaction

Contractors that participated in the program were also asked to rate their satisfaction with various program attributes. Exhibit 3-19 shows that over half of the HVAC contractors were satisfied with the utility websites, utility marketing efforts, and the responsiveness of the utility staff. Generally very few expressed dissatisfaction with these program elements. The one possible exception was utility marketing where almost a third of the respondents were dissatisfied. Window contractors, on the other hand, were generally less happy with the rebate program than their HVAC counterparts. Fewer than 40% were satisfied with the utility websites, utility marketing efforts, and utility staff responsiveness. About a quarter were dissatisfied with the marketing efforts and the utility staff.

Exhibit 3-19
Contractor Satisfaction

Satisfaction with	Very Satisfied =1	2	3	4	Very Dissatisfied = 5	Don't Know	Don't Use Websites
Utility website promotion and explanation of rebates							
HVAC contractor	38%	24%	11%	0%	3%	14%	11%
Window contractor	24%	6%	18%	12%	3%	36%	
Way utilities market rebates							
HVAC contractor	41%	11%	11%	22%	8%	8%	
Window contractor	21%	18%	24%	21%	3%	12%	
Responsiveness of utility staff							
HVAC contractor	46%	19%	14%	3%	8%	11%	
Window contractor	21%	15%	6%	6%	18%	33%	
N = 37 HVAC contractors, 33 windows contractors							

Contractor Suggestions for Program Enhancements

HVAC. The survey asked the HVAC contractors how the California Single-Family Home Energy Efficiency Rebate program could be improved. Exhibit 3-20 shows a wide variety of suggestions for improvement. Increasing program funding and broadening rebate options were the most common responses.

Exhibit 3-20
HVAC Contractor
Recommendations for Program Improvement

Suggestions for Program Improvement	% of Total Suggestions
Program Resources	
Increase program funding levels	13%
Increase program staff	8%
Keep program going	4%
Rebate Levels and Structures	
More rebates tiers/ Use sliding rebate scale to accommodate lower SEER CACs that still have above-average efficiency	13%
Generally increase rebate levels	8%
Align rebate levels more with incremental costs	4%
Unspecified dissatisfaction with rebates	4%
Process Issues	
Process/pay rebates more quickly	8%
Make it easier to reach program staff via telephone	8%
Reduce technical language like SEER ratings	4%
Make applications forms easier to fill out	4%
Marketing, Targeting	
Make rebate information more available to contractors	4%
Advertise rebate program on TV	4%
Target end users more, contractors less	4%
Program Enhancements	
Educate customers about equipment maintenance	4%
Introduce a duct-sealing program	4%
Total	100%
Respondents N= 19, Suggestions N = 24	

Window Contractor Suggestions

Window contractors were also asked for recommendations on how the program might be improved. Exhibit 3-21 shows that the most popular recommendations are for higher rebate levels and increased program marketing efforts.

Exhibit 3-21
Window Contractor
Recommendations for Program Improvement

Suggestions for Program Improvement	% of Total Suggestions
Program Resources	
Have guaranteed pool of money for rebates submitted by certain date	11%
Increase program funding levels	7%
Keep program going	4%
Rebate Levels and Structures	
Increase rebate levels	18%
Rebates are no longer needed for dual-pane vinyl windows since these have become standard practice	4%
Process Issues	
Reduce paperwork	7%
Make it quicker and easier to get program info./ Utility website is too cumbersome	7%
Insure that more consistent program info. is given out to participants/ Customers getting conflicting info.	7%
Utility program staff should become familiar with wider variety of windows products	4%
Utility program staff should be better about returning calls	4%
Marketing, Targeting	
Increase program marketing and consumer awareness	18%
Program oversells the benefits of dual pane windows	4%
Program Enhancements	
Expand program eligibility beyond whole window installation to cover glass only replacements	4%
Expand eligibility to include all windows with NFRC label, not just Energy Star	4%
Total	100%
Respondent N = 23, Suggestion N = 28	

Retailer Satisfaction Results

The retailers were asked how satisfied they were with the program in general as well as the utility staff in particular. Of all the market actor groups, the retailers were the most satisfied with the program (Exhibit 3-22). Almost two thirds of the respondents said that they were "very satisfied." The retailers provided a wide range of suggestions for improvements in program processes (Exhibit 3-23). More than one respondent suggested that rebate availability be more consistent and predictable, that retailers receive more advanced notice when rebate funds run out, and that rebate applications forms be made more available.

Exhibit 3-22
Retailer Satisfaction
with Program Attributes

Satisfaction with ...	Very Satisfied =1	2	3	4	Very Dissatisfied = 5	Don't Know
Program in general	64%	29%	0%	0%	0%	7%
Utility staff	64%	7%	7%	0%	0%	21%
N = 14						

Exhibit 3-23
Retailer Suggestions
for Program Improvements

Suggestions for Program Improvement	% of Total Suggestions
Program Resources	
Increase size of annual incentive budget	7%
Rebate Levels and Structures	
Shift incentive dollars from dishwashers and RACs to clothes washers and refrigerators	7%
Process Issues	
Make rebate forms more available to retailers	14%
Make rebate availability more consistent and predictable	14%
Give retailers more advanced notice when rebate funds run out	14%
Make it easier for manufacturers and dealers to know which models qualify for the rebates	7%
Marketing, Targeting	
More promotion of rebates	7%
More customer education	7%
Program Enhancements	
Expand POS rebate to whole house fans	7%
Guarantee that program will run for multiple years so that all customers will have a chance to get a rebate	7%
Program staff should visit stores to see how well retailers are doing at promoting EE products and suggest improvements	7%
Total	100%
Respondent N = 14, # Suggestions N = 14	

3.4 POSSIBLE EXPANSION OF POINT-OF-SALE REBATES

The California Single-Family Home Energy Efficiency Rebate program has considered expanding the Point-of-Sale (POS) rebate—currently only available for programmable thermostats—to other types of energy-efficient equipment such as clothes washers, whole house fans, room air conditioners, and pool pumps. For this reason, retailers were asked the relative merits of POS rebates vs. mail-in rebates and whether they thought an expansion of the POS rebate was a good idea.

Exhibit 3-24 shows that retailers generally prefer the POS rebate although there is a lot of variation among the retailer categories. All the retailers who offer the program's POS rebates prefer the POS rebates, even though most of them (5 of 6) also offer mail-in rebates through the program. In contrast, two-thirds of the participants who handle mail-in rebates only – mostly small appliance stores – prefer the mail-in rebates. Exhibit 3-25 cites the various reasons that retailers give for preferring one rebate type over another.

Exhibit 3-24
Rebate Preferences of Retailers

Rebate Preferences of Retailers	Prefer POS Rebates	Prefer Mail-In Rebates	No Preference	Don't Know/ Refused
Participant –Point-of-Sale Rebates and Mail-In	100%	0%	0%	0%
Participant – Mail-In Rebates Only	22%	67%	11%	0%
Nonparticipant in program	50%	40%	0%	10%
All Respondents	**52%**	**38%**	**5%**	**5%**
POS participant N = 6, Mail-in rebate only N = 9, Nonparticipant N = 6, All Respondents N = 21				

Exhibit 3-25
Reasons Why Retailers
Prefer Certain Rebate Types

Reasons Why Retailers Prefer POS Rebate	Reasons Why Retailers Prefer Mail-In Rebate
• POS rebates give the customer instant gratification. With mail-in rebates the customers can wait as long as 8 weeks to get paid. • POS rebates don't force customers through the hassle of filling out a rebate form. • Customers often lose the mail-in rebate forms or forget to fill them out. • Some customers have had unpleasant experiences with mail-in rebates outside the program. • POS rebates are easier for retailers to market – e.g., as "instant rebates." • Mail-in rebates are less attractive as a sales hook because many customers find them a hassle.	• Mail-in rebates are much easier for retailers to handle. All they have to worry about is having enough rebate application forms available. • With mail-in rebates retailers do not have to worry about getting paid back by the utilities. • POS rebates can generate controversy – e.g., customer might complain that they did not get the full price reduction. • POS rebates takes money away from salesperson commissions • Their store is not equipped to handle POS rebates. • POS rebates are too difficult to track. • Mail-in rebates account for most of our business and therefore they are what we are used to dealing with.

Retailers were also asked to rate the rebate type on their effectiveness in driving sales. Exhibit 3-26 shows that retailers rate the POS rebate as more effective. Interestingly some of the retailers who preferred the mail-in rebate still rated the POS rebate as more effective in selling products. For these retailers, the extra hassle of handling the POS rebates and waiting to be paid back simply exceeded the benefits of the extra sales that the POS rebate might generate. A number of retailers also pointed out that the effectiveness of any rebate – whether POS or mail-in – also depended a lot on its size. One retailer claimed that rebates had to be at least 20% of the equipment price to be attractive enough to encourage sales. Another retailer claimed that the absolute size of a rebate was much more important than relative size. Therefore a $100 rebate would be more effective than a $35 rebate, even if the $35 rebate accounted for a higher percentage of the equipment price.

Exhibit 3-26
How Retailers Rate the Effectiveness
of POS vs. Mail-In Rebates

Rebate Type	Average Rated Effectiveness for Promoting Sales (1 means "very effective" and 5 means "not effective at all")
POS	1.6
Mail-in	2.7
POS N = 16, Mail-In N = 21	

The retailers were also asked whether they thought that the program should expand the availability of the POS rebate to other products besides programmable thermostats. Nearly two-thirds of the retailers supported this expansion. However, a third of the retailers who currently handle only mail-in rebates did not support a wider availability of the POS rebates. They objected to the program expansion for some of the same reasons that they objected to POS rebates in general. These included an unwillingness to have to collect money from the utilities, inexperience with handling POS rebates, and fears that POS rebates would reduce sales commissions.

Participating retailers were asked how much POS rebates would typically increase sales over existing mail-in rebates (without specifying any particular product). The nine who responded predicted an average increase in sales of 44% (24% when an outlying estimate of 200% is removed). Nonparticipating retailers were asked how much a POS rebate would typically increase sales of an unspecified product. Only two of the six responded -- with an average estimate of a 19% increase in sales.

4. PROGRAMMABLE THERMOSTAT ASSESSMENT

Programmable thermostats were the program's biggest energy saver in 2003, representing 19,609,267 kWh saved, or 32% of the program's energy savings. However, several questions have arisen about programmable thermostats' contribution to the program's net benefits. First, the point-of-sale rebate (an instant rebate at the cash register of participating retailers, such as Home Depot), rolled out in 2003, is an effective strategy in increasing sales through the program, but raises issues of concern about the influence of the program on Energy Star-qualified programmable thermostat sales. Are POS purchasers aware of the cash register discount before their purchase decision? Does the knowledge of POS discount encourage them to purchase a program-qualifying programmable thermostat, or were they already in the store planning to purchase a program-qualifying unit? Second, contractors surveyed as part of the 2002 evaluation indicated that they often specify programmable thermostats (p-stats) when a customer purchases HVAC equipment. If so, do programmable thermostats already exist in most customer homes? What is the incremental advantage in moving from a programmable thermostat to an Energy Star model? Third, customers may be programming their thermostats in ways that do not fully capture their energy savings potential. Are the IOUs claims about the amount of energy saved by Energy Star-qualified programmable thermostats reasonable?

In 2003, there were three mechanisms for obtaining a rebate for programmable thermostats: Do-It Yourself (DIY) Home Improvement Rebate Applications, Contractor-Installed Cooling and Heating Rebate Application; and Do-It-Yourself (DIY) Point of Sale (POS) rebate. Exhibit 4-1 below summarizes the rebate process, when the rebate was available, the rebate activity and the data collection activities conducted for each of these three delivery mechanisms.

Exhibit 4-1
Delivery Mechanisms for PY03 Programmable Thermostat Rebate

Rebate Type	Rebate Process	Time Period of Rebate Option	# of Rebates Purchased/ Installed in 2003	Evaluation Surveys
DIY: Do-It Yourself Home Improvement Rebate	Customers submit a rebate application with a receipt for purchase of qualifying p-stat from participating retailer.	Q1 2003	7,000 (10%)	49 participating end users
Contractor-Installed Cooling and Heating Rebate Application	Customers submit invoices after contractors install qualifying p-stat.	Q1-Q4 2003	17,000 (25%)	196 participating end users and 42 HVAC contractors
POS: Do-It-Yourself Point of Sale Discount	Customers who purchase a qualifying programmable thermostat from a participating retailer receive an instant discount at the cash register.	Q2 2003 – present	44,000 (65%)	25 POS participants and 20 retailers

Point-of-sale rebates were introduced at participating retailers as a pilot in late 2002, followed by full-scale implementation in 2003. Customers that purchased a program-qualifying programmable thermostat at participating stores, such as Home Depot and Lowe's, received an instant discount at the cash register. Approximately 44,000 units were purchased in 2003.

Unfortunately due to the nature of POS, tracking data is not available for contacting the POS participants, but we did have access to the names of people who applied for a rebate for a programmable thermostat and who were rejected because their submitted store receipt indicated they had received the POS rebate. Because these customers also submitted an application, we felt this group was not representative of the overall POS population, in particular with respect to how the program influenced their decision (as it could be the knowledge of the mail-in rebate as opposed to the POS rebate that influenced the customer). We surveyed 292 POS participants that also submitted a rebate application, and were able to identify 25 that claimed to become aware of the mail-in rebate *after* they had already purchased the thermostat and received the POS rebate. We used only these 25 responses to characterize the POS population, because we believed this group to be more representative that the other 267 customers that were aware of the mail-in rebate *prior to* purchasing their thermostat.

The program is clearly dominated by POS purchasers and, as mentioned above, we only were able to survey 25 POS participants that we believed to be representative of the POS population. However, it is likely that the results of the DIY participants are representative of a large proportion of the POS population. Because there was no Home Improvement application for thermostats in the last three quarters of 2003, customers that would have applied for a mail-in application were likely to have participated in the POS element. There were 7,000 mail-in applications that occurred in the first quarter of 2003, compared to 44,000 POS rebates that occurred in the last three quarters of the year. Therefore, we might expect a large portion of the 44,000 POS participants would have participated in the mail-in application element if that were the only option, given the rate at which applications were submitted in the first quarter (which generally is a slow period for the program). This implies that the DIY participant results probably are representative of a significant proportion of the POS population. By examining the results that follow, and comparing the DIY and POS populations, there are many similarities in the characteristics of these two groups, further supporting this hypothesis.

We also surveyed 20 retailers about their attitudes towards POS rebates, including some that offer POS rebates for programmable thermostats.

In sum, this chapter presents results from 49 DIY participant surveys, 196 participants who hired a contractor to install a program-qualifying thermostat, 25 POS participants, 42 HVAC contractors, and 20 retailers.

The chapter has six sections:

- **Existing equipment and reasons for replacement**: This section examines how participants controlled temperature in their houses before purchasing a programmable thermostat and discusses some of the factors that drive thermostat replacement. Objectives of this analysis were to investigate existing equipment in participants' homes and to determine whether participants saved energy with their new programmable thermostats as compared to their old standard thermostats. We analyzed participants' existing thermostat equipment and HVAC contractors' standard practices with regard to

thermostat installations to determine whether participants were typically replacing standard thermostats. We also explored participant programmable thermostat usage behavior and contractor and retailer practices with regard to educating customers on programmable thermostat usage. We also assessed contractor behavior with regard to programming the thermostats for their customers.

- **Sales and installation trends**: This section examines sales and installation trends, as reported by contractors and retailers. Comparing the programmable thermostat sales and installation rates of contractors that actively promote the rebate and those that do not, helps us get a sense of the rebate's influence on contractors.
- **Thermostat usage and contractor installation practices:** The 2002 evaluation found that many programmable thermostat users do not use the programmable features of their thermostat, raising the possibility that some portion of programmable thermostats do not save energy versus standard thermostats. This section further investigates thermostat usage, and highlights differences across the participant groups.
- **Program influence**: This section analyzes the influence of the program market, looking specifically at the role of the rebate for participating customers and contractor responses.
- **Summary of findings**: This summarizes key findings from the chapter.

For the remainder of this chapter, results are presented for three groups of customers:

1. Participants whose thermostats were installed by contractors.
2. DIY participants that submitted an application.
3. POS participants. As noted, this included only POS participants who had their mail-in rebate applications rejected.

4.1 EXISTING EQUIPMENT AND REASONS FOR REPLACEMENT

Existing Equipment

Information was collected from both program participants, and retailers and contractors as to what thermostats were replaced by the rebated thermostats. Exhibit 4-2 shows the existing equipment in the homes of the three customer participant groups: do-it yourself participants, those who relied on a contractor to install the unit and point-of-sale purchasers.

Exhibit 4-2
Existing Temperature Control in House[16]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
PT5. Before purchasing an Energy Star programmable thermostat, what kind of thermostat did you use to control the temperature in your house?	Contractor Installation (%)	Do It Yourself Applications (%)	Point-of-sale (%)
Programmable thermostat	26%	17%	12%
Manual/standard thermostat	67%	83%	84%
No thermostat	6%	0%	0%
Other	1%	0%	0%
Don't know	1%	0%	4%
N	196	49	25

As might be expected, contractors are more likely to replace a participating customer's existing programmable thermostat (26%) than a DIY (17%) or POS (12%) customer on their own. Given the relatively low cost of a thermostat in comparison of the cost of a HVAC system replacement, it is not surprising that customers would upgrade to a newer unit. It may also be that the existing thermostat is not compatible with the new system, or that the thermostat was packaged or bundled with a new thermostat. As discussed later, 95% of the HVAC contractors claim they recommend a new programmable thermostat always or very often, regardless of what is already installed.

HVAC contractors were also asked what types of thermostats they see *in the homes they serve* (i.e., routine maintenance and repair situations, not just replacement of old HVAC equipment). According to contractors, nearly half of residential customers (44%) already have some sort of programmable thermostat in their homes (54% according to the 2004 California Residential Appliance Saturation Survey.). They observed that 21% of their customers have Energy Star-qualified thermostats. These rates are higher than the rate of replacement shown above, as might be expected. HVAC contractors may serve customers with a higher prevalence of programmable thermostats than the program participants because program participants likely have older thermostats on average than the general population. Some participants replace their thermostat along with an HVAC change-out. If program participants have older-than-average HVAC systems, they are also likely to have older-than-average thermostats.

[16] Appendix Exhibit F-1 (Existing Temperature Control in House).

Reasons for Replacement and Retailer Selling Points

It is important for program designers to better understand what factors are driving both the replacement of existing thermostats and the purchase/installation of programmable thermostats, especially Energy Star-qualified programmable thermostats. The participant survey asked residential customers what their main reasons were for replacing their existing thermostat, aside from the rebate. As Exhibit 4-3 shows, "Doing Upgrades" was the top reason for replacing the thermostat for all three categories of participants. The table also shows that DIY participants were far more likely replace a thermostat that is broken or having problems than customers who rely on a contractor (34% versus 13%). In addition, DIY customers installed programmable thermostats in order to save energy more often than those who relied on contractors (23% versus 8%). POS and DIY participants had similar reasons for purchasing a programmable thermostat: to save energy, to replace a malfunctioning thermostat, or to upgrade. But POS customers were less likely to have a malfunctioning thermostat, and more likely to save energy.

Exhibit 4-3
Participant Reasons for Replacement[17]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
PT20. Aside from getting the rebate, what was your main reason for replacing your thermostat?	Contractor Installation (%)	Do It Yourself Application (%)	Unaware Point-of-sale (%)
Your Old thermostat was broken	4%	23%	12%
Your Old thermostat had problems	9%	11%	8%
To Save energy	8%	23%	32%
You were doing home remodel	3%	0%	4%
Doing Upgrade/Extra features/Better tech	58%	43%	44%
Came with AC/heating system	15%	0%	0%
Other	3%	0%	0%
N	189	49	25

[17] Appendix Exhibit F-2 (Reasons for Purchase).

Exhibit 4-4 also shows that 93% of the people who had their rebated programmable thermostats installed by contractors also had a new CAC or furnace installed.

Exhibit 4-4
HVAC System Changeout[18]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
PT1. Did you purchase an air conditioner or furnace when you bought your thermostat?	Contractor Installation (%)	Do It Yourself Application (%)	Unaware Point-of-sale (%)
Yes	93	10	4
No	7	90	96
N	197	49	25

When asked what was the most common reason that residential customers gave when requesting programmable thermostats, the HVAC contractors cited the desire for energy savings as the number one reason, as shown below in Exhibit 4-5. The survey of retailers also found energy saving to be the main selling point that they use to convince customers to purchase programmable thermostats, as shown below in Exhibit 4-6. Both these surveys also found that "More Control" was the other big reason to request (or encourage the purchase of) a programmable thermostat. Interestingly the availability of a rebate was not an important influencer for either HVAC contractors or retailers.

[18] Appendix Exhibit F-3 (Air Conditioning Changeout).

Exhibit 4-5
Residential Customer Reasons
for Requesting Programmable Thermostats
as Reported by HVAC Contractors

Residential Customer Reasons for Requesting Programmable Thermostat	% of Total Survey Responses
Reduce energy costs, lower energy bills	41%
More control	31%
More comfort	15%
Want latest technology	5%
Wanted rebate	3%
Don't Know	5%
Total	100%
N = 39	

Exhibit 4-6
Main Selling Points Used by Retailers
to Promote Programmable Thermostats

Main Selling Points	% of Total Survey Responses
Reduce energy costs, lower energy bill	40%
More control	40%
Want latest technology	7%
Rebate	7%
Don't Know	7%
Total	100%
N = 12 (15 responses)	

4.2 SALES AND INSTALLATION TRENDS

This section examines sales and installation trends, as reported by contractors and retailers. Comparing the programmable thermostat sales and installation rates of contractors that actively promote the rebate and those that do not helps us get a sense of the rebate's influence on contractors.

Customer Requests for Programmable Thermostats

The contractors said that while half of the customers are requesting programmable thermostats at least very often, only about a third are asking for Energy Star-qualified thermostats, as shown in Exhibit 4-7.

Exhibit 4-7
Thermostats That Residential Customers Are Requesting According to HVAC Contractors

Thermostat Replacement Request	Always	Very often	Sometimes	Seldom	Never	Don't Know
Residential customer requests programmable thermostat?	18%	33%	30%	18%	3%	0%
Residential customer requests Energy Star programmable thermostat?	13%	21%	28%	33%	5%	0%
N = 39, 40						

Programmable Thermostat Installation Rates

Although not all customers are requesting programmable thermostats, two-thirds of the contractors report that they *always* replace the existing thermostat when installing a new central air conditioning system, according to Exhibit 4-8. As discussed in more detail below, this confirms the participant's claim that the contractors are very influential in their purchase decision. 61% of the participants using a contractor reported that the contractor was very influential in their decision.

Exhibit 4-8
HVAC Contractor Practices
Concerning Programmable Thermostats

	Always	Very often	Sometimes	Seldom	Never	Don't Know
Replace thermostat when installing new CAC?	66%	29%	5%	0%	0%	0%
N = 41						

HVAC contractors indicated that the installation of Energy Star-qualified programmable thermostats has become standard practice. Exhibit 4-9 shows contractors' estimates of their installation rates for both Energy Star-qualified programmable thermostats and programmable thermostats in general. Overall, Energy Star-qualified programmable thermostats account for about 74% of all thermostat installations. By comparing contractors that actively promote the rebate with those that do not, we do not see a significant difference in their installation practices.[19] This is an indication that the program is not significantly influencing what contractors are recommending and installing.

Exhibit 4-9
Programmable Thermostat
Installation Rates
According to HVAC Contractors

Equipment Installed	All HVAC Contractors (Average %)	Active Rebate Promoters	Inactive Rebate Promoters
Programmable thermostats (of all thermostat installations)	88%	93%	80%
Energy Star programmable thermostats (of all *programmable* thermostat installations)	84%	87%	73%
Implied Energy Star p-stats sales as % of all thermostat sales	78%	84%	68%

Note: "Active rebate promoters" are contractors who rated their rebate promotion activity as "1" or "2" on a scale of 1-5 where 1 equals "very active" and 5 equals "not very active." "Inactive rebate promoters are contractors who rated their rebate promotion activity as "4" or "5." Not represented here are respondents who rated their rebate promotion activity as "3."

[19] "Active rebate promoters" are contractors who rated their rebate promotion activity as "1" or "2" on a scale of 1-5 where 1 equals "very active" and 5 equals "not very active." "Inactive rebate promoters are contractors who rated their rebate promotion activity as "4" or "5." Not represented here are respondents who rated their rebate promotion activity as "3."

However, when asked what percentage of their installations were of thermostats capable of programming weekdays only and how many capable of programming both weekdays and weekends, contractors indicated that half of the installations were capable of weekday programming only (which do not qualify for Energy Star). This suggests that some of the contractors may not know what an Energy Star-qualified programmable thermostat is.

However, retailers claimed a much lower installation rate for Energy Star-qualified programmable thermostats compared to contractors. On average, Energy Star-qualified programmable thermostats account for only 35% of their currents sales, as shown in Exhibit 4-10 (however, this retailer data is unweighted and does not represent the population of retailer sales).

Exhibit 4-10
Programmable Thermostat
Installation Rates
According to Retailers*

Equipment Installed	All Retailers Selling Thermostats (Average %)
Programmable thermostats (of all thermostat sales)	54%
Energy Star programmable thermostats (of all *programmable* thermostat sales)	63%
Implied Energy Star p-stats sales as % of all thermostat sales	35%

*Results not weighted according to sales volume.

Sales Trends

HVAC contractors were also asked about sales trends (2004 vs. 2003) for programmable thermostats in the residential market. Exhibit 4-11 shows that 72% of active rebate promoters believed sales were higher, compared with 54% of inactive rebate promoters.

Exhibit 4-11
Sales Trends for
Programmable Thermostats
According to HVAC Contractors

	Contractor Category	Significantly Higher	Moderately Higher	About the Same	Moderately Lower	Significantly Lower	Don't Know
Programmable thermostat sales this year compared to last year?	**Active**	48%	24%	29%	0%	0%	0%
	Inactive	31%	23%	31%	0%	8%	8%
Active N =24, Inactive N = 13							

Retailers were asked about sales trends for Energy Star-qualified programmable thermostats in particular. The survey results, in Exhibit 4-12, show that over 40% believed that sales were higher in 2004 compared to 2003 and only 17% believed that sales were lower.

Exhibit 4-12
Sales Trends for Energy Star-qualified Programmable Thermostats
According to Retailers

ES p-stat Sales	Significantly Higher	Moderately Higher	About the Same	Moderately Lower	Significantly Lower	Don't Know/ Refused
2004 vs. 2003	8%	33%	25%	17%	0%	17%
N =12						

4.3 THERMOSTAT USAGE AND CONTRACTOR INSTALLATION PRACTICES

The 2002 evaluation found that many programmable thermostat participants do not use the programmable features of their thermostat, raising the possibility that some portion of programmable thermostats do not save energy versus their previous behavior with standard thermostats. This section further investigates thermostat usage and contractor practices that may affect thermostat usage, and highlights differences across the participant groups.

Thermostat Usage

Knowing who is setting programmable thermostats and how they are being set is useful for estimating the energy savings that might result from programmable thermostats.

Change in HVAC Usage. Participants were asked if they believe they are using their new air conditioner and/or furnace, more or less as a result of their new thermostat. Eighteen percent of contractor-installs claim to use their air conditioner/furnace more, compared to only 10% of the do-it-yourself participants or and 4% POS participants. The majority of DIY parts (53%) claim to use their air conditioner/furnace less, compared with 38% of contractor installs and 40% of POS installs.[20]

Use of Factory Settings. Energy Star-qualified programmable thermostats are programmed at the factory to maximize energy savings. Customers, however, do not keep those factory settings, raising questions as to whether Energy Star-qualified programmable thermostats are being operated to capture an average customers' full savings potential. Exhibit 4-13 shows that participants use their thermostats in different ways. The survey results show that few customers are using the factory settings (11-14%), which is one of the benefits of an Energy Star-qualified thermostat. Customers who used a contractor to install the unit are more likely to manually use the thermostat than do-it-yourself customers (32% vs. 12%), likely having no effect on the energy savings potential. Fifty two percent of the contractor installs use the programmable features, which is very similar to the 50% of the general population, based on the 2002 California Residential Appliance Saturation Survey results. By contrast, 76% of do-it-yourself and 60% of POS participants claim to program the unit.

Exhibit 4-13
Manual versus Programmable Use[21]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
PT90. Which statement best describes how you use your thermostat?	Contractor Installation (%)	Do It Yourself Application (%)	Point-of-sale (%)
I, or my contractor, programmed it to the settings I desire	52%	76%	60%
I use the factory settings, but frequently adjust the temp. manually	5%	0%	8%
I use the factory settings most of the time	9%	11%	4%
I turn off or adjust the temperature manually most of the time	32%	12%	20%
Don't know	1%	0%	8%
N	196	49	25

[20] Appendix Exhibit F-4 (Use of AC with New Thermostat).

[21] Appendix Exhibit F-5 (Manual versus Programmable Use)

Contractor-Programmed Settings. When HVAC contractors programmed the thermostats for their customers, very few of them used the same hourly settings (i.e., time when the heater or air conditioner would be programmed for higher heating or lower cooling settings). However, for weekdays -- which most of the contractors only provided time settings for -- there were some consistent patterns, especially for heating settings. Most had a morning heating setting -- usually 6-8 A.M. or 6-10 A.M. – and an afternoon/evening setting – usually beginning at 4 or 5 P.M. and ending at 10 or 11 P.M. Contractors set cooling temperature at 76 degrees, on average, and heating temperature at 71 degrees.

Comfort and Convenience of New Unit. Do-it-yourself participants believe their programmable thermostats offer greater convenience and more comfort than customers whose unit was installed by a contractor or POS participants.[22]

Customer Training

Of participants that used contractors, 64% said that their contractor programmed the unit for them and 81% said their contractor showed them how to program their new thermostat.[23] Customers who used a contractor to install the unit are more likely to manually adjust (turning the heater or air conditioner on or off, and/or manually changing the temperature settings) the thermostat (32%) than do-it-yourself customers (12%) or POS customers (20%). In addition, DIY participants (96%) were more likely to read the instructions than customers who used a contractor to install the unit (79%) or POS participants (80%).[24]

In addition, contractors were asked whether they train customers. Over three quarters of the contractors interviewed always provide some sort of customer training (as shown in Exhibit 4-14), which is consistent with participant responses. Furthermore, 53% of the contractors claim to always program the thermostat for their customers, again consistent with the participant survey findings. Retailers, on the other hand, seldom take the time to show customers how to set their programmable thermostats, as shown in Exhibit 4-15.

Exhibit 4-14
HVAC Contractor Practices Concerning Programmable Thermostats

	Always	Very often	Sometimes	Seldom	Never	Don't Know
Train customers how to use programmable thermostat when installing?	78%	10%	8%	0%	5%	0%
Program thermostat on customers' behalf?	53%	35%	5%	5%	3%	0%
N = 40						

[22] Appendix Exhibit F-6 (Comfort with New Thermostat), Appendix Exhibit F-7 (Convenience of New Thermostat).

[23] Appendix Exhibit F-8 (Contractor Programmed Unit), Appendix Exhibit F-9 (Contractor Trained Customer).

[24] Appendix Exhibit F-10 (Read Instructions).

Exhibit 4-15
Retailer Training of Customers To Program Thermostats

	Always	Very Often	Sometimes	Seldom	Never	Don't Know/ Refused
How often do people on your staff train customers how to use programmable thermostats?	17%	0%	0%	59%	8%	17%
N = 12						

4.4 PROGRAM INFLUENCE

This section analyzes the influence of the program market, looking specifically at the role of the rebate for participating customers and contractor responses.

Program Influence on Participants

This section explores the influence of the rebate on customer behavior by addressing three different research questions:

1. Did the rebate influence the customer's decision to purchase an Energy Star programmable thermostat?
2. What would the customer have purchased in the absence of the program? (e.g., standard thermostat, non-Energy Star programmable thermostat, Energy Star programmable thermostat, nothing at all)
3. When did a customer become aware of the rebate relative to purchasing the Energy Star qualified programmable thermostat?

After explaining the survey results with regard to each of these research questions, we show how the results are logically correlated with one another. In the conclusions section, we use these participant influence results along with the market actor influence results as multiple lines of evidence leading to broader program influence conclusions.

Self-Reported Influence of Rebate

We asked the various participant groups to state whether the program was "very", "somewhat", or "not at all" influential in their decision to purchase an Energy Star-qualified programmable thermostat. We acknowledge that this question alone may not be reliable to determine the program's influence on customer behavior. It is questionable whether customers can accurately assess the influence of the rebate after the fact. Typically customers on average will understate the rebate's influence, attributing more influence to their own knowledge and decision-making. However, this question, especially when combined with other influence

questions, provides an indication of overall influence and certainly helps to identify differences in the extent of the program's influence across the three participant groups.

Exhibit 4-16 shows the results for the three groups: do-it-yourself, point-of-sale and contractor installation.

Exhibit 4-16
Influence of Rebate in Purchase Decision[25]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
PT65. How influential was the rebate in your decision to purchase an Energy Star thermostat?	Contractor Installation (%)	Do It Yourself Application (%)	Point-of-Sale (%)
Not at all influential	35%	23%	16%
Somewhat influential	41%	50%	33%
Very influential	23%	27%	43%
Refused/don't know	1%	0%	8%
N	196	49	25

Across all programmable thermostat rebate recipients, upwards of two-thirds say they were influenced by the rebate to some degree, with an even split between "somewhat" and "very" influential. The three groups of participants exhibit significantly different levels of influence.

- **Contractor installations** were the **least influenced** by the rebate, likely because the contractor was the major influencing factor (Exhibit 4-17 below).
- **DIY** customers were **somewhat influenced the most**, which may imply that the customer was not influenced to purchase a thermostat, but influenced to purchase a type of thermostat, or to purchase earlier than they otherwise would have.
- The **POS** participants were the **most influenced;** however, the influence is not necessarily on the decision to purchase, but may be on the type of unit purchased, the timing of their purchase, or the location (i.e., choice of retailer) of their purchase.

Influence of Contractor

Exhibit 4-17 illustrates the influence of the contractor on participants that used a contractor to install a programmable thermostat.

[25] Appendix Exhibit F-11 (Influence of Rebate in Purchase Decision)

Exhibit 4-17
Influence of Contractor on Contractor-Installed Participants[26]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
PT75. How influential was your contractor in your decision to purchase an Energy Star thermostat?	Total (%)
Not at all influential	13%
Somewhat influential	25%
Very influential	61%
Refused	0%
Don't know	1%
N	186

For contractor installations, the contractors is much more influential (61% very influenced) than the rebate (23%). Additionally, contractors recommended Energy Star-qualified thermostats 73% of the time.

Likely Purchase In Absence of Rebate

This section considers what participants would have purchased—if anything—had a rebate not been available. When considering the program's influence, it is important to differentiate between:

- Influencing a customer to make a purchase (Energy Star-qualified programmable thermostat instead of nothing at all).
- Influencing a customer to purchase something different and significantly better (Energy Star-qualified programmable thermostat instead of standard thermostat),
- Influencing a customer to purchase something different and somewhat better (Energy Star-qualified programmable thermostat instead of non-Energy Star-qualified programmable thermostat), and
- Influencing a customer to purchase something different, but no better (a different brand/model of an Energy Star-qualified programmable thermostat).

Responding to a hypothetical question does not determine matter-of-factly what people would have done, but does offer an order of magnitude, and more importantly highlights differences across the participant groups.

[26] Appendix Exhibit F-12 (Influence of Contractor)

Exhibit 4-18 shows what participants said they would have done if the programmable thermostat rebate had not existed.

Exhibit 4-18
What Participants Would have Purchased in Absence of Rebate[27]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
PT50. What type of thermostat would you have purchased had the rebate not existed:	Contractor Installation (%)	Do It Yourself Application (%)	Point-of-sale (%)
Energy Star programmable now	63%	69%	48%
Energy Star programmable later	5%	5%	14%
Programmable, non Energy Star	26%	15%	33%
Manual	4%	0%	0%
None	2%	12%	5%
N	169	46	21

Overall, the majority of participants say they would have bought an Energy Star model at the same time, in the absence of the program.

- Contractor installs were the most likely to say they would have purchased some form of a programmable thermostat (94%).
- DIY participants were most likely to have not made a purchase at all (12%), but still very likely to have purchased an Energy Star-qualified thermostat (74%).
- POS customers were the group least likely to have purchased an Energy Star-qualified thermostat without a rebate (38%), but nearly half (48%) of POS customers claimed that they would have purchased an Energy Star model regardless, at the same time. Nearly all of the POS customers would have purchased a programmable thermostat, which implies that the POS rebate did not have a significant effect on their decision whether to purchase a programmable thermostat or not.

[27] Appendix Exhibit F-13 (What Participants Would have Purchased in Absence of Rebate)

Comparison of Participant Rebate Influence Results

A comparison was made between participants' self-reported purchase behavior in the absence of the rebate and influence of the rebate on their purchase decision. A strong correlation was found between those responses. A look at the relationship between influence and what customers would have done in the absence of the program shows that:

- 91% of participants that would have bought no thermostat without a rebate (less than 5% of the participant population, unweighted) were very influenced by the rebate to purchase an Energy Star-qualified thermostat.
- 38% of those that would otherwise have purchased a standard thermostat (less than 5% of the participant population, unweighted) were very influenced
- 18% of those that would have purchased an Energy Star-qualified thermostat regardless of rebate (approximately two-thirds of the participant population, unweighted) were very influenced by the rebate.

In sum, program influence declines substantially as the efficiency of the thermostat the customer would have purchased increases.

Timing of Rebate Awareness

Another way of examining influence is to look at the timing of when customers became aware of the rebate. The rebate program is less likely to influence customers who decided to purchase an Energy Star-qualified programmable thermostat *without being aware that a rebate exists*. Therefore, Exhibit 4-19 focuses on the differences between two customer segments—those aware of the rebate **before** internally deciding to purchase a program qualifying unit, and those who became aware of the rebate **after** deciding to purchase. Customers that decided to purchase before becoming aware of the rebate and who became aware of the rebate after the POS purchase are less likely to be influenced by the program.

Exhibit 4-19
Timing of Awareness

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
Awareness Path	Contractor Installation (%)	Do It Yourself Application (%)	Point-of-sale (%)
Aware Before Decide	44%	66%	1%
Decide Before Aware	56%	34%	0%
N	160	36	15

Overall, between one-third and one-half of participants (34 to 56%) claim to have already decided on their purchase before becoming aware of the program. These customers are less likely to be influenced by the program. Even though a customer may have made a decision to purchase an Energy Star-qualified programmable thermostats, however, the program may still have some influence over the customer. For example:

- For contractor installs that had already decided, the influence of the program may be getting customers to buy the model the contractor is recommending.
- For DIY customers that had already decided, the influence of the program may be getting customers to purchase the product earlier.
- For POS customers that had already decided, the influence of the program may be getting customers to purchase the product earlier, to buy at a different retailer offering the POS rebate, or buy a different Energy Star model.

Exhibit 4-20 examines how influential the program is, as a function of the timing of awareness. For each of the three delivery mechanisms, there is a logical correlation between the program's influence and the timing of rebate awareness.

Exhibit 4-20
Influence of Rebate and Likely Purchase in Absence of Rebate
Aware Point-of-Sale Participants

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED						
PT65. How influential was the rebate in your decision to purchase an Energy Star thermostat?	Contractor Installed		Do It Yourself		Point-of-Sale	
	Aware Before Decide	Decide Before Aware	Aware Before Decide	Decide Before Aware	Aware Before Decide	Decide Before Aware
Not at all influential	22%	46%	5%	53%	38%	29%
Somewhat influential	45%	33%	47%	42%	38%	29%
Very influential	30%	20%	48%	5%	25%	43%
Refused/don't know	2%	0%	0%	0%	0%	0%
N	67	87	22	14	8	7

For contractor installations, the contractor is more influential than the rebate (as discussed more below). This helps explain why the timing of awareness for this group does not change as significantly as the DIY customers. By contrast, the timing of rebate awareness strongly affects whether a DIY participant considers the program influential. Only 5% of DIY customers that decided to purchase before becoming aware of the program claimed the program influenced them, whereas 48% of DIY customers who learned about the rebate before purchasing a programmable thermostat claimed to be very influenced by the program.

POS customers are the least affected by timing of awareness possibly because many of these customers may become aware of the rebate while shopping. Therefore, the timing of their awareness may have less of an affect on their decision than for DIY customers, for example.

Exhibit 4-21 shows what participants would have bought by timing of rebate awareness and delivery mechanism.

Exhibit 4-21
Purchase in Absence of the Program and Timing of Awareness
- for the Three Delivery Mechanisms

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED						
	Contractor		DIY		Point-of-Sale	
PT50. What kind of thermostat would you have bought had the rebate not existed?	Aware First (%)	Decide First (%)	Aware First (%)	Decide First (%)	Aware First (%)	Decide First (%)
Energy Star programmable thermostat now	60%	63%	56%	95%	38%	80%
Energy Star programmable thermostat later	4%	6%	9%	0%	25%	0%
Non Energy Star programmable thermostat	33%	23%	16%	5%	38%	20%
Standard/manual thermostat	0%	7%	0%	0%	0%	0%
No thermostat	3%	0%	19%	0%	0%	0%
N	65	79	20	13	8	5

The majority of participants—regardless of path type and delivery mechanism—claimed they would have bought an Energy Star-qualified programmable thermostat whether a rebate existed or not.

The contractor installations do not vary much by timing of awareness, again suggesting that it is the contractor and not the program influencing the customer's decision.

95% of DIY participants who decided before learning about the rebate would have bought an Energy Star-qualified programmable thermostat anyway, compared to only 56% of those that were aware before deciding. The DIY group that was aware before deciding also had the highest incidence of making no purchase in the absence of the program (19%).

The POS participants were similar to the DIY participants, but were more influenced to upgrade their purchase from a non Energy Star model. The POS participants that were aware before deciding were also the most likely to be an accelerated adopter (25% would have purchased later). No POS participant claimed that they would not have made a purchase, indicating that all POS participants were in the market or at least considering purchasing a thermostat.

Appendix D provides a more quantitative assessment of free ridership, based on detailed analysis of the participants stated influence, their timing of awareness, and what they claim they would have done in the absence of the program. The results of this analysis indicate that free ridership may be in the range of 42% to 78%.

Program Influence on Market Actors

The survey asked HVAC contractors how much their future sales of programmable thermostats would decrease if the rebates were not available. Contractors estimated that their sales would

only drop 9% if a rebate were not available in the future, as illustrated by Exhibit 4-22. In short, rebates appear to be having only a very modest effect on sales of programmable thermostats.

Exhibit 4-22
Influence of Program Rebates on Past and Future
Programmable Thermostat Sales

EQUIPMENT	% Decrease in past sales if no rebate	% Decrease in future sales if no rebate
Energy Star-Qualified Programmable Thermostats	9%	9%
N =37		

Retailers were also asked about how much their sales would decrease if the rebated had not existed or if the rebate ended this year. These estimates ranged from 35-39%, but only four retailers provided estimates. However, one of the larger retailers claimed that while he had sold 5,000 Energy Star-qualified programmable thermostats in California last year, without the rebate his sales would decline to only about 700 per year.

Finally, as noted previously in Exhibit 4-5, only 3% of HVAC contractors cited the rebate as a major reason why customers requested programmable thermostats. Only one retailer mentioned the availability of a rebate as a major selling point.

4.5 SUMMARY OF FINDINGS

The primary objective of the programmable thermostat assessment was to examine the influence that the program is having on participants' decisions to purchase an Energy Star-qualifying programmable thermostat. A detailed summary of these findings are provided below, for each of the three delivery mechanisms. The remainder of this section summarizes the type of existing equipment found in customers' homes, the reasons why they replace their thermostat, installation rates and sales trends for programmable thermostats, contractor installation practices, and how customers use their programmable thermostats after its installation.

Program Influence

Contractor Installations

For contractor installations, the contractor appears to have more influence than the rebate. Sixty-one percent said their contractor was very influential in their purchase decision, compared to only 23% that reported the rebate was very influential. This might be expected, given nearly all of these participants (93%) are also installing an air conditioner or furnace. Given the incremental cost of the thermostat and size of the rebate compared to the cost of the HVAC installation, it is not a surprise that the contractor's recommendation is more influential than the rebate. Furthermore, nearly all contractors (95%) replace the thermostat when installing a new

CAC, and most of those are Energy Star-qualifying (78%). In a comparison of contractors that actively promote the rebate and those that are inactive, there is not a significant difference in their installation rates for Energy Star-qualified programmable thermostats (84% vs. 68%), implying that the rebate is not significantly affecting what the contractors are installing. Furthermore, contractors report that their sales of Energy Star-qualified programmable thermostats would decrease by only 9% if the program was discontinued.

Participant survey results are consistent with the contractor results for contractor installed units. In addition to the low influence rating of the program, as mentioned above, 63% of the participants claim they would have purchased an Energy Star-qualified programmable thermostat in the absence of the program. Another 26% claim that they would have purchased a regular programmable thermostat (not Energy Star qualifying); however, the incremental benefit of installing a regular programmable thermostat over an Energy Star-qualified unit is likely to be significantly lower than the program's gross per unit energy savings estimate. In addition, 56% of the participants claim they were not aware of the rebate at the time they made their decision to purchase an Energy Star-qualified programmable thermostat.

Further reducing the net benefits from the program among contractor installed units is the fact that 26% of these participants previously owned a programmable thermostat. Furthermore, 32% of these participants use their thermostat manually, also likely reducing the potential energy savings benefits.

Therefore, there is significant evidence that the program is not influencing the contractor installed programmable thermostat market, and that the program's net benefits for this segment of participants is significantly lower than the gross estimate.

DIY Installations

For DIY installations, participant survey results indicate that the program is again having limited influence over the participants' purchase decision. These participants report that the program is not very influential (only 27% claim the rebate was very influential), and 69% claim they would have purchased an Energy Star-qualified programmable thermostat in the absence of the program. Another 15% claim that they would have purchased a regular programmable thermostat (not Energy Star qualifying); and only 12% claim they would not have made a purchase in the absence of the program. No DIY participants claim they would have purchased a manual unit. This is consistent with the fact that 43% of these participants purchased the unit as an upgrade, and 23% to save energy (It is unlikely that a customer would purchase a manual unit in order to save energy or upgrade the existing unit.). There is also little evidence that the program is influencing customers to accelerate their adoption (only 5%).

Further reducing the net benefits from the program among DIY installed units is the fact that 17% of these participants previously owned a programmable thermostat, and 12% use their thermostat manually. In addition, 34% of the participants claim they were not aware of the rebate at the time they made their decision to purchase an Energy Star-qualified programmable thermostat.

Therefore, there is significant evidence that the program is not influencing the DIY programmable thermostat market, and that the program's net benefits for this segment of participants is significantly lower than the gross estimate. The area where the program may be

most influential, is getting participants to upgrade their purchase from a non-Energy Star unit, to one that is Energy Star-qualifying. However, the incremental benefits for this case are significantly less than the program's gross savings assumptions.

POS Installations

Recall that we expect that the DIY responses are likely to be representative of a large portion of the POS population, as many of these customers would have turned to the POS option when the DIY Home Improvement Application removed programmable thermostats from its measure list. Also, recall that the POS results are based on a small sample of 25 customers that had also submitted a mail-in application for a rebate, but were rejected. However, these customers claim to have been unaware of the mail-in rebate at the time of their purchase, hopefully limiting any influence the mail-in process may have had on their purchase decision.

Nevertheless, POS participants do not look significantly different than the DIY participants, as we might expect. They do claim the program was more influential: 43% claim the rebate was very influential, and only 48% claim they would have purchased an Energy Star-qualified programmable thermostat in the absence of the program. However, the program does not seem to be influencing customers to *make a purchase* as much as it is influencing *what they purchase*. Only 5% claim they would not have purchased a programmable thermostat in the absence of the program. Also, 33% claim that they would have purchased a regular programmable thermostat (not Energy Star qualifying), and no POS participants claim they would have purchased a manual unit. There is some evidence that the program is influencing customers to accelerate their adoption (14%).

For this segment of customers, the program's influence is likely getting participants to upgrade their purchase from a non-Energy Star unit, to one that is Energy Star-qualifying. But again, the incremental benefits for this case are significantly less than the program's gross savings assumptions. This finding is also consistent with the fact that that 43% of these participants purchased the unit as an upgrade, and 32% to save energy. Only 12% are replacing a broken unit. Again, it is unlikely that a customer would purchase a manual unit in order to save energy or upgrade the existing unit. In addition, 47% of the participants claim they were not aware of the rebate at the time they made their decision to purchase an Energy Star-qualified programmable thermostat.

Twelve percent of these POS participants previously owned a programmable thermostat, and 20% use their thermostat manually, further reducing the net benefits from the program among POS installed units.

The retailer results, however, do indicate that the program may be having a positive effect on programmable thermostat sales. Retailers report that only 54% of the units they sell are programmable, and only 35% are Energy Star-qualified, indicating that the retail purchase of a program-qualifying unit is not standard practice, as it is among contractor installations. Retailers also report that discontinuing the program would have a significant effect on their sales of Energy Star-qualified programmable thermostats, decreasing sales by as much as a third. However, these findings are based on a very small sample of only four retailers, and do not represent the population of retailer Energy Star thermostat sales.

Again, there is not significant evidence that the program is influencing the POS programmable thermostat market, and that the program's net benefits for this segment of participants is likely to be significantly lower than the gross estimate.

Existing Equipment and Reasons for Replacement

- According to contractors, 44% of their residential customers already have some sort of programmable thermostat in their homes, and 21% of their customers have Energy Star-qualified thermostats.
- Contractors are more likely to replace a participating customer's existing programmable thermostat (26%) than a DIY (17%) or POS (12%) customer on their own.
- 93% of the participants who had their thermostats installed by contractors also had a new CAC or furnace installed, compared to only 10% of the DIY and 4% of the POS participants.
- "Doing Upgrades" was the primary reason for replacing the thermostat for all three categories of participants (about half the time). DIY (23%) and POS (32%) participants were far more likely to replace a thermostat in order to save energy, than those who relied on contractors (8%).
- Contractors cited the desire for energy savings as the number one reason participants request a programmable thermostat (41%), followed by the need for more control (31%).
- Similarly, retailers found energy saving and "More Control" to be the main selling points that they use to convince customers to purchase programmable thermostats (40% of the time for each point).
- Interestingly the availability of a rebate was not an important influencer for either HVAC contractors or retailers (3% and 7%).

Sales and Installation Trends

- The contractors found that half of their customers request programmable thermostats at least very often, but only about a third are asking for Energy Star-qualified thermostats.
- HVAC contractors indicated that the installation of Energy Star-qualified programmable thermostats has become standard practice, about 74% of all thermostat installations.
- Retailers claimed a much lower installation rate for Energy Star-qualified programmable thermostats compared to contractors, about 35% of all thermostat sales. (However, this result is based on a small sample of only 9 retailers, and is not weighted to represent the population of retailer thermostat sales.)
- About two-thirds of HVAC contractors believed programmable thermostat sales were higher in 2004 compared to 2003. Furthermore, 40% of retailers believed sales of Energy Star-qualified programmable thermostats were higher.

Thermostat Usage and Contractor Installation Practices

- The majority of DIY parts (53%) claim to use their air conditioner/furnace less after installing their new thermostat, compared with 38% of contractor installs and 40% of

POS installs. However, 18% of contractor-installs claim to use their air conditioner/furnace more, compared to only 10% of the DIY and 4% POS participants.

- Contractor installs (32%) are more likely to manually adjust the thermostat than DIY (12%), or POS (20%) participants, likely having no effect on the energy savings potential. Furthermore, very few customers are using the factory settings (11-14%), which is one of the benefits of an Energy Star-qualified thermostat.
- 52% of the contractor installs use the programmable features, compared to 76% of DIY and 60% of POS participants.
- Nearly two-thirds of the contractor installs reported that their contractor programmed the unit for them and 81% said the contractor showed them how to program their new thermostat. This is consistent with the contractor self reports, where 89% claim to program the thermostat for their customers (always or very often), and 88% said they always provide some sort of customer training (always or very often).

5. AIR CONDITIONING ASSESSMENT

Air conditioning represented 14%, or 8,748,886 kW, of the program's energy savings in 2003. However, the 2002 evaluation raised a few questions regarding its contribution to the program's net benefits. For instance, a sample of participating contractors surveyed as part of the 2002 evaluation suggested that the residential Central Air Conditioning (CAC) market was moving towards 12 SEER packaged units and 13 SEER split systems, and that rebates may not be necessary for these CAC specifications. To address the issue of program influence for CACs, telephone surveys of both contractors and participants were conducted. Thus, this chapter builds upon the findings and recommendations reported in the 2002 report by presenting results of 159 CAC participant surveys and 42 HVAC contractor surveys conducted in the summer of 2004.

The chapter has four sections:

- **Existing equipment and standard practices**: This section examines whether customers had an air conditioner previous to purchase, why they replaced their CAC, and the role that HVAC contractors play in influencing CAC replacement decisions.
- **Trends in the sale and installation of CACs**: This section discusses HVAC contractor estimates installation rates and sales trends for CACs across various levels of efficiency.
- **Program influence**: This section analyzes what the customer would have done in the absence of the program and whether the rebate influenced the customer's decision to purchase high efficiency CACs.
- **Summary of findings**: This section summarizes key findings from the chapter.

5.1 EXISTING EQUIPMENT AND STANDARD PRACTICES

Existing Equipment and Reasons for CAC replacement

The participant survey shed some light on the condition of the air conditioners that were being replaced by the rebated CACs, as shown in Exhibit 5-1. When asked why they replaced their air conditioner, over two-thirds of the participants said that the motivating factor was the replacement of old, broken, or poorly-performing air conditioners. In addition, 28% of the participants claimed they did not have an air conditioner before the purchase of the rebated CAC.

The implication for the program of so many first-time purchasers among the participant population is unclear. On one hand, if these first-time purchasers were already in the market for new CACs, then the program's potential influence would be similar to its influence on those who were replacing an old or broken-down air conditioner. On the other hand, if the rebate had encouraged these first-time purchasers to buy a CAC that they otherwise would not have, then the program would have a negative impact on savings. However, this latter case is unlikely, as the rebate offsets only a small percentage of the total costs of a new CAC system.

Furthermore, as discussed in detail below, 98% of all CAC participants claim they still would have purchased a CAC (either standard or high efficiency) in the absence of the program.

Exhibit 5-1
Reason for Purchase[28]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
AC20. What was your main reason for replacing your air conditioner?	Total (%)
Air conditioner was really old	37%
Did not have AC before	28%
Air conditioner was broken	22%
Other	10%
Not happy with performance of AC	9%
Save energy	6%
Remodeling home	1%
Don't know	0%
N	159

Contractor Influence

The participant data showed that HVAC contractors are very influential in the customer's decision whether to purchase an energy-efficient CAC. Exhibit 5-2 shows that about half of the participants claim the contractor was very influential in their decision, and only 22% said that the contractor was not at all influential. In addition, nearly three-quarters of participants (72%) said that their contractor explained the difference between an energy-efficient and a standard air conditioner.[29]

[28] Appendix Exhibit G-1 (Reason for Purchase).

[29] Appendix G-2 (Contractor Recommendation)

Exhibit 5-2
Influence of Contractor in CAC Purchase[30]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
AC75. How influential was your contractor in your decision to purchase an energy efficient air conditioner?	Total (%)
Not at all influential	22%
Somewhat influential	26%
Very influential	49%
Don't know	3%
N	137

Contractor Recommendations

HVAC contractors were asked how often they recommended higher energy efficiency heating or cooling equipment to their customers as well as how much their customers request such equipment. "Higher energy efficiency equipment" was defined as equipment that would qualify for a utility rebate. Overall, a surprisingly high percentage – 86% -- recommended such equipment at least very often. Moreover, 74% *always* recommend program-qualifying equipment. This was much higher than the percentage of residential customers requesting such equipment (45%). This finding, along with the relatively high influence rating that customers gave their contractors (shown above) and the low perceived customer knowledge of energy efficiency ratings (discussed below in Exhibit 5-6), indicates that HVAC contractors and not residential customers are the primary drivers for energy-efficient equipment sales.

Exhibit 5-3 compares contractors that actively promote rebates with those that do not.[31] Substantial differences exist among these contractors, an indication that the rebate may be influencing the sales practices of contractors. Contractors that actively promote the rebate *always* recommend high efficiency equipment 95% of the time, compared to only 36% for inactive rebate promoters. Furthermore, the active promoters *always* recommend Tier II or III CACs more than half of the time, compared to only 8% for inactive promoters.

[30] Appendix Exhibit G-3 (Influence of Contractor in A/C Purchase)

[31] Active rebate promoters" are contractors who rated their rebate promotion activity as "1" or "2" on a scale of 1-5 where 1 equals "very active" and 5 equals "not very active." "Inactive rebate promoters are contractors who rated their rebate promotion activity as "4" or "5." Not represented here are respondents who rated their rebate promotion activity as "3."

Exhibit 5-3
% of HVAC Contractors That Recommend Higher EE Equipment
by Level of Rebate Promotion Activity

Equipment Recommendation	Contractor Category	Always	Very Often	Sometimes	Seldom	Never	Don't Know
Recommend higher EE heating or cooling equipment?	**Active**	95%	5%	0%	0%	0%	0%
	Inactive	36%	21%	7%	29%	7%	0%
Recommend Tier III CAC?	**Active**	33%	10%	24%	29%	5%	0%
	Inactive	8%	8%	8%	31%	38%	0%
Recommend Tier II CAC?	**Active**	57%	29%	0%	10%	5%	0%
	Inactive	0%	31%	0%	54%	15%	0%
Recommend Energy-Star qualified CAC?	**Active**	76%	5%	10%	5%	5%	0%
	Inactive	15%	31%	15%	31%	8%	0%
Active N = 21, Inactive N = 13-14							

Note: "Active rebate promoters" are contractors who rated their rebate promotion activity as "1" or "2" on a scale of 1-5 where 1 equals "very active" and 5 equals "not very active." "Inactive rebate promoters are contractors who rated their rebate promotion activity as "4" or "5." Not represented here are respondents who rated their rebate promotion activity as "3."

Interviews with a small sample of California HVAC contractors in 2003 (as part of the 2002 program evaluation) suggested that recommendations for energy-efficient heating and cooling equipment might vary with the perceived income level or climate zone of the residential customer. For example, one contractor always recommended Tier III central air conditioners because he worked in an affluent area where residents could afford the most expensive models. There was also some limited evidence that HVAC contractors were less willing to recommend higher energy efficiency equipment when replacing broken equipment.

In 2004 the much larger sample size allowed a more accurate measurement of how frequently HVAC contractors change their equipment recommendations with their perceptions of the customer's situation. As Exhibit 5-4 shows, an extreme climate zone was the one customer characteristic that made a sizeable percentage of the contractors more likely to recommend high energy-efficient equipment. Perceptions of high customer income, or situations where broken equipment was being replaced, only caused a small minority of the contractors to change their recommendations.

Exhibit 5-4
How Contractor Equipment Recommendations Vary with Customer Situation

Equipment Recommendation Variation	Yes	No
More likely to recommend high EE equipment to higher income customer?	19%	81%
Less likely to recommend high EE equipment to replace broken equipment?	7%	93%
More likely to recommend high EE equipment to customers in extreme climate zones	45%	55%
N = 42		

Contractor Selling Points

The survey also asked HVAC contractors how they sell energy-efficient heating and cooling equipment. As illustrated in Exhibit 5-5, nearly two-thirds of them found the prospect of energy savings and lower utility bills to be the most effective sales pitches. The availability of rebates was a distant second at 14%. However, twice as many HVAC contractors mentioned rebates as window contractors; likewise, only 7% of retailers mentioned the programmable thermostat rebate as the most effective selling point. Exhibit 5-5 also shows that saying that higher efficiency HVAC equipment is higher quality and quieter are popular secondary selling points.

Exhibit 5-5
Selling Points for Energy Efficient Equipment
According to HVAC Contractors

Most Effective Selling Point	Most Effective Selling Points	Secondary Selling Points	All Selling Points Combined
Will save energy and lower your utility bills	62%	33%	49%
Can receive a rebate if you buy EE	14%	21%	17%
EE heating/cooling equipment is higher quality	5%	21%	12%
EE heating/cooling equipment is quieter	0%	18%	8%
Availability of a warranty/ extended warranties	5%	0%	3%
EE heating/cooling equipment is better for the environment	0%	6%	3%
Availability of financing	2%	0%	1%
Brand name that we carry	2%	0%	1%
New SEER rating mandated in 2006	2%	0%	1%
Existing equipment is broken and need cooling right away	2%	0%	1%
Contractor doesn't recommend higher EE equipment	2%	0%	1%
Refused/ Don't Know	2%	0%	1%
Total	100%	100%	100%
Respondent N = 42, All Selling Points N = 75			

Contractor's Perceived Knowledge of Customers

Contractors were asked what they perceived to be their residential customers' knowledge of energy efficiency ratings for air conditioners, heat pumps, and programmable thermostats. Exhibit 5-6 shows that contractors estimated that less than a third of their customers were knowledgeable about either SEER or Energy Star ratings for these types of equipment. This is consistent with the general population survey presented in the 2002 evaluation of this program, which also found that about a third of customers were aware of SEER.

Exhibit 5-6
Perceived Customer Knowledge
of Energy Efficiency Ratings

	% of Total Survey Responses
Residential customers knowledgeable about SEER ratings	30%
Residential customers familiar with Energy Star ratings for HVAC equipment	32%
N= 42	

Contractor Assessment of Market Barriers

Contractors were asked about energy efficient products and services they may be aware of, but do not offer. The majority—62%—of HVAC contractors are aware of energy efficient products and services that they do not offer for various reasons, as shown below in Exhibit 5-7. Most contractors believe the products and services they do not offer are too expensive (31%), are not readily available (13%), or lack demand/customer interest (13%).

Exhibit 5-7
HVAC Contractor Reasons for Not Offering EE Products

Reasons for not selling EE heating and cooling products that they are aware of	% of Total Survey Responses
The products are too expensive	31%
The products are not readily available	13%
Lack of customer interest	13%
I must limit # of brands/models I offer	13%
No rebates available for model	6%
Uncertain about performance of products (other than energy savings)	6%
Difficult to install	6%
Some EE equipment has added features that customers don't need	6%
Tier II CACs have a better rebate value	6%
Don't trust energy savings claims for products	0%
Don't know enough about the product	0%
Total	100%
Respondent N = 13, Responses N = 16	

Contractors were also asked a series of questions focused on different aspects of potential market barriers, to see if contractors agreed or disagreed that the barrier existed. Exhibit 5-8 shows that in no case did more than half of the HVAC contractors agree (ratings of 5 or 4) that a specific market barrier existed. The barriers that the contractors most agreed with were cost of training (38%) and the fact that their company does not get added value from promoting EE products (35%). Difficulty in obtaining energy efficient heating and cooling products was a potential barrier that contractors were most likely (71%) to disagree with.

Exhibit 5-8
HVAC Contractor Assessment
of Potential Market Barriers
To EE Product Offerings

Potential Barrier	Strongly Agree =5	4	3	2	Strongly Disagree = 1	Don't Know
Costly to keep up with new EE products	19%	7%	21%	10%	40%	2%
Some EE products haven't been proven in field	10%	7%	33%	21%	21%	7%
Training need to offer EE products is costly	14%	24%	19%	10%	33%	0%
Company doesn't get added value from promoting EE products	21%	14%	17%	12%	33%	2%
Many EE products are not readily available.	5%	7%	12%	21%	50%	5%
Reluctance to specify higher EE product because might lose sale to supplier of lower EE product	17%	7%	12%	17%	45%	2%
N = 42						

5.2 TRENDS IN THE SALES AND INSTALLATION OF CACS

Installation Rates

HVAC contractors were asked how much the various categories of high-efficiency central air conditioners accounted for as percentages of their total installations. Exhibit 5-9 shows that they report that nearly two-thirds of the CACs they install are rebate eligible. However, the Tier III share is relatively small. Exhibit 5-9 also compares the installation rates of active and inactive rebate promoters. A clear difference emerges for the higher-efficiency Tier II and Tier III installations, between vendors that actively promote rebate and those who do not. However, there is not a large difference in installation rates of Energy Star-qualified units.

Exhibit 5-9
Installation Rates for Central Air Conditioners
According to HVAC Contractors

Equipment Installed	All HVAC Contractors (% of all Installations)	Active Rebate Promoters (% of all installations)	Inactive Rebate Promoters (% of all installations)
Tier III CAC	16%	22%	5%
Tier II CAC	21%	35%	5%
Energy-Star qualified	25%	21%	26%
	N = 41	N = 21	N =13

Note: "Active rebate promoters" are contractors who rated their rebate promotion activity as "1" or "2" on a scale of 1-5 where 1 equals "very active" and 5 equals "not very active." "Inactive rebate promoters are contractors who rated their rebate promotion activity as "4" or "5." Not represented here are respondents who rated their rebate promotion activity as "3."

Exhibit 5-9 above shows that contractors are installing an efficient CAC, whether Energy Star-qualified, Tier II or Tier III, 62% of the time. Active promoters are much more likely to install energy efficient CACs (78%) versus inactive promoters (36%). This is in line with the earlier finding that active promoters always or very often recommend energy efficient equipment 100% of the time, versus only 57% for inactive promoters. These findings also underscore the contractors' influence in moving customers to high efficiency equipment.

Sales Trends

The HVAC contractors were also asked about sales trends (2004 versus 2003) for various categories of energy-efficient CACs in the residential market. Exhibit 5-10 compares the sales estimates of active and inactive rebate promoters. Again, we see a difference between active and inactive promoters, with nearly three-quarters of the active promoters seeing significantly or moderately higher sales trends occurring in the Tier II and Tier III categories; compared to only 15% or fewer among inactive promoters. Although contractors were specifically asked to comment on sales trends for the residential HVAC market in general, not just their own company's sales experience, it is possible that some contractors were still extrapolating market trends from their own personal experiences. Therefore the active rebate promoters who are installing a lot of high efficiency CACs might be assuming that everybody else is, and contrariwise for the inactive promoters.

Exhibit 5-10
Sales Trends for Energy-Efficient CACs
According to HVAC Contractors
by Level of Rebate Promotion Activity

CAC Category	Contractor Category	Significantly higher	Moderately higher	About the same	Moderately lower	Significantly lower	Don't Know
Tier III CAC	**Active**	24%	48%	19%	5%	0%	5%
	Inactive	0%	8%	77%	8%	0%	8%
Tier II CAC	**Active**	43%	29%	19%	5%	5%	0%
	Inactive	0%	15%	69%	8%	0%	8%
Energy Star-qualified	**Active**	48%	10%	33%	5%	5%	0%
	Inactive	8%	23%	46%	8%	0%	15%
Active N = 21, Inactive N = 13-14							

5.3 PROGRAM INFLUENCE

There was a fairly sharp difference between participants and HVAC contractors as to their assessments of the influence of the CAC rebates. In general, HVAC contractors found the rebates to be very influential while the participants did not. Possible reasons for these differing assessments of program influence are discussed below.

Participant Indicators of Program Influence

The survey of participants found that about half of the participants were influenced by the rebate, although only 18% were very influenced, as illustrated in Exhibit 5-11. Over a third (37%) of participants were not at all influenced by the rebate.

Exhibit 5-11
Influence of CAC Rebate[32]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
AC65. How influential was the rebate in your decision to purchase an energy efficient air conditioner?	Total (%)
Not at all influential	37%
Somewhat influential	43%
Very influential	18%
Refused/don't know	2%
N	159

Another way of examining influence is looking at the relationship between the program influence and the timing of when customers became aware of the rebate. Customers were asked if they were aware of the rebate at the time they made a decision about the CAC they were going to purchase. Forty-two percent claim they had already decided to purchase an energy efficient CAC before even being aware that there was a rebate for that equipment. Therefore these customers are less likely to be influenced by the program than those that were already aware of the rebate. Exhibit 5-12 shows that there is a correlation between the program's influence and when customers become aware. Over half (52%) of those who decided to purchase an energy efficient CAC before becoming aware of the rebate said the rebate was not at all influential, compared with 28% of participants who were aware of the rebate before deciding on an energy efficient air conditioner.

[32] Appendix Exhibit G-4 (Influence of A/C Rebate)

Exhibit 5-12
Influence of Rebate and Timing of Awareness

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
AC65. How influential was the rebate in your decision to purchase an energy efficient air conditioner?	Total (%)	Aware Before Decide (%)	Decide Before Aware (%)
Not at all influential	37%	28%	52%
Somewhat influential	43%	48%	36%
Very influential	18%	24%	10%
Refused/don't know	2%	0%	3%
N	159	73	53

Likely Actions in the Absence of Rebate

When considering the program's influence, it is important to differentiate between:

- Influencing a customer to purchase something different and significantly better (high efficiency CAC instead of a standard/baseline CAC).
- Influencing a customer to purchase something different and somewhat better (high efficiency CAC instead of a CAC that is slightly more efficient than standard).

The program's savings estimates for CACs are based on the assumption that if not for the program rebate, the customer would have purchased a standard efficiency CAC. To the degree that customers would have purchased a CAC above the standard efficiency, the energy savings that could be attributed to the program would be reduced.

Participants were asked what they would have done in the absence of the program. Exhibit 5-13 reports that 88% would have purchased an energy efficient CAC, and only 8% a standard CAC. As noted earlier, it is unclear how participants are defining as an "energy efficient air conditioner," as fewer than a third of customers seem to be knowledgeable about SEER ratings. It is possible that customers consider a standard CAC to be energy efficient simply because it is more efficient than their old unit.

Participants may also be unaware of the higher costs of the more energy-efficient CACs or underestimating these costs due to the receipt of the rebates. This would cause them to overestimate their willingness to purchase higher-efficiency CACs in the absence of a rebate.

Exhibit 5-13
What Participants Would have Purchased in Absence of Rebate[33]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
AC50. Which of the following statements best describes the action you would have taken had the rebate not existed:	Total (%)
We would not have bought an air conditioner	2%
We would have bought an energy efficient AC	88%
We would have bought a standard AC	8%
Don't know	1%
N	159

For those that claim they would have purchased an energy efficient CAC, the vast majority (88%) of would have bought the CAC at the same time if a rebate was not available, as shown in Exhibit 5-14. This indicates that the program is not encouraging customers to purchase an energy efficient CAC sooner than they otherwise would.

Exhibit 5-14
When Participants Would Have Purchased in Absence of Rebate[34]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
AC55. If the rebate was not available, when would you have bought the energy efficient air conditioner?	Total (%)
At the same time	88%
Within a year	9%
More than a year later	3%
N	139

[33] Appendix Exhibit G-5 (What Participants Would have Purchased in Absence of Rebate)

[34] Appendix Exhibit G-6 (When Participants Would Have Purchased in Absence of Rebate)

Exhibit 5-15 shows how what customers would have purchased correlates with their assessment of rebate influence. As expected, the people who said that they would have made no purchase, bought a standard efficiency CAC, or bought an energy-efficient CAC later were more likely to say that the rebate was influential. Similarly, among those that would have bought the same unit at the same time, nearly half (46%) claimed to be not at all influenced by the program.

Exhibit 5-15
Influence of Rebate and Purchase in Absence of Rebate
Contractor Installations

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED				
AC65. How influential was the rebate in your decision to purchase an energy efficient air conditioner?	AC50. What type of AC would you have purchased if the rebate had not existed?			
	Energy Efficient AC Now	Energy Efficient AC Later	Standard AC	None
Not at all influential	46%	6%	31%	0%
Somewhat influential	42%	63%	34%	33%
Very influential	13%	31%	35%	67%
N	123	16	15	3

Although the comparison shown above helps validate customer responses to program influence and what customers claim they would have done in the absence of the program, there are some anomalies. For example, for the customers claiming they would have still purchased an energy efficiency CAC at the same time in the absence of the program, 42% are claiming the rebate was somewhat influential, and 13% claim it was very influential. And conversely, 31% of the customers claiming they would have purchased a standard CAC claim they were not at all influenced.

It is important to keep in mind that "influence" may mean a variety of things to a customer. It does not necessarily imply that the rebate influenced a customer to change their purchase decision from a standard CAC to a program-qualifying unit. It may mean a customer was influenced to purchase a unit from a different vendor (perhaps one that promoted the rebate and offered to fill out the paper work), but not necessarily a more efficient unit. Or a customer may have planned on buying an energy efficient CAC, but is now upgrading to an even more efficient unit. And, as is the case with any self-reported data, there is the danger that respondents might be providing the most "socially acceptable" responses and/or the ones they think that the interviewer wants to hear. Fortunately, for the most part, the responses to these two questions correlate well, and provide a fair level of credibility and confidence in their results.

HVAC Contractor Indicators of Program Influence

The survey asked HVAC contractors how much their sales of high efficiency equipment would have decreased if the rebates for the 2003 program had not been available. It also asked them that if the rebates ended this year, how much their future sales would decrease. Exhibit 5-16 shows the contractor responses. Rebates appear to be having a significant influence on sales of Tier III CACs and a sizeable influence on the sale of Tier II and Energy Star-qualified CACs.

Since it is reasonable to assume that the sales benefits of the rebates would be less if they were not promoted to customers, the sales decrease estimates were further broken out by contractors that were active in promoting rebates and those that were not (Exhibit 5-16). This table shows that in most cases, but not all, the "rebate promoters" gave the rebates more credit for sales benefits.

Of course, these results could be interpreted in different ways. One interpretation is that more active promotion of rebates increases the sales benefits of the rebates. Another interpretation is that the HVAC contractors who see the most sales benefits from rebates simply promote these rebates more. In other words, is rebate promotion the cause or effect of rebate effectiveness? In all likelihood both these things are happening, but it is impossible to weight their relative effects with the data available.

Exhibit 5-16
Influence of Program Rebates on Past and Future CAC Sales

Equipment	% Decrease in past sales if no rebate	% Decrease in future sales if no rebate
Tier III CACs	29%	31%
Tier II CACs	19%	21%
Energy Star-Qualified CACs	22%	21%
N =37		

To better understand program influence, results from the HVAC contractor surveys were broken down between "active" and "inactive" contractors in Exhibit 5-17. Active contractors are those who rated their activity in promoting program rebates as "1" or "2" on a scale of 1 to 5 where 1 equals "very active" and 5 equals "not very active." Inactive rebate promoters are contractors who rated their rebate promotion activity as "4" or "5." In tables where results are broken out this way, contractors who rated their rebate promotion activity as "3" are not represented. One other possible way to gauge program influence was to differentiate between contractors who were aware of the rebate program and those that were not. However, the number of contractors that were unaware of the rebate program was so small (5 out of 42) that any results from the "unaware" class would have doubtful statistical validity

Exhibit 5-17
Rebate Influence on CAC Sales
as Affected by Level of Rebate Promotion

Equipment	Contractor Category	% Decrease in past sales if no rebate	% Decrease in future sales if no rebate
Tier III CACs	Active	34%	36%
	Inactive	28%	28%
Tier II CACs	Active	16%	18%
	Inactive	20%	22%
Energy Star-Qualified CACs	Active	23%	22%
	Inactive	18%	15%
N = 35			

Making Sense of Differing Assessments of Program Influence

What accounts for the contradiction in opinion between participants and HVAC contractors as to their assessments of the influence of the CAC rebates? As discussed above, some of these participant assumptions may be based on a lack of understanding of what a truly energy-efficient CAC is or an underestimation of the higher costs of the more efficient models. Some residential customers may also be providing "socially desirable" estimates of their actions in the absence of the program.

More likely, however, is that the rebates are influencing participants but indirectly through the actions of their contractors. To understand this we must consider various findings from the participant and HVAC contractor surveys:

- Participants say that their contractors are very influential in their decisions to purchase higher efficiency equipment, much more so than the rebate (only 22% said their contractor was not influential).
- There is a strong correlation between the contractor's activity in the rebate program and their tendency to recommend higher efficiency equipment (Active promoters always recommend high efficiency equipment 95% of the time, compared to only 36% of inactive promoters).
- Contractors that recommend high efficiency equipment, have a high close rate. Active rebate promoters recommend high efficiency equipment 100% of the time, and claim 78% of their sales are high efficiency.
- Eighty-six percent of participants say their contractor recommended high efficiency equipment.

- HVAC contractors rarely use the rebate as a primary selling point for high efficiency equipment (only 14% of the time).
- Seventy percent of contractors fill out rebate applications on behalf of their customers.

From this information it is possible to describe a scenario where the rebate is influencing participant behavior without many participants being aware of this influence. First the rebate is causing contractors to recommend higher efficiency CACs than they otherwise because they can offer them at lower prices. These contractor recommendations are in turn causing customers to purchase more energy-efficient CACs than they otherwise would. However, most contractors are not featuring the rebate prominently in their sales pitch and are filling out the rebate applications for the customers. Therefore when asked what influenced their decision to purchase a high-efficiency CAC, most participants are saying it is their contractor's recommendation rather than the rebate. In contrast, the contractors realize the importance of the rebates since they understand the difficulty of selling high efficiency equipment at non-rebated price points.

5.4 SUMMARY OF FINDINGS

The primary objective of this assessment was to examine the influence that the program is having on the residential air conditioning market. Although most participants claim that they would have purchased high efficiency equipment in absence of the program, and that rebate had low to moderate influence, the program does appear to be influencing the market. The program's influence on the market, however, is seen more directly on the actions taken by contractors that actively promote the program. Therefore, the program is influencing participants indirectly through the contractors, consistent with their viewpoint that the rebate itself is not influential. Participants' indirect influence, and lack of attribution to the rebate, is consistent with both participant and contractors claims that:

- Contractors are recommending and explaining the benefits of high efficiency equipment to over three quarters of participants
- Contractors are very influential on the participants' decision (only 22% said their contractor was not influential)
- Contractors are not using the rebate as a selling point (only 15% use the rebate as a main selling point)
- Contractors are filling out the application on behalf of the participant (70% of the time).
- Participants are not very knowledgeable about SEER and/or Energy Star ratings for HVAC equipment (only about a third are knowledgeable)
- Most participants (55%) do not request high efficiency equipment from their contractor.

As mentioned, the direct influence of the program appears to be on the actions of the contractors. There is strong evidence of the program's influence on contractors, particularly when comparing contractors that actively promote the program with those that do not, as follows:

- Contractors that actively promote the rebate have installation rates for program qualifying equipment that are twice that of inactive contractors (and much higher among Tier II and III equipment).

- Most contractors (72%) that actively promote the rebate report that they have seen significantly or moderately higher increases in sales of Tier II and III equipment over the year, compared to only 8 to 15% of inactive contractors.
- Contractors that actively promote the rebate, claim their sales would be significantly reduced without the rebate, by as much as a third for Tier III equipment.

The remainder of this section provides a more detailed summary of findings for the residential air conditioning assessment, including a summary of existing equipment and standard practices, trends in sales, and additional findings on the program's influence.

Existing equipment and standard practices

- A sizeable share (28%) of the program participants were first-time CAC purchasers. However, the data indicate that the vast majority of these were going to purchase a new CAC regardless of the rebate (68% reported that their previous unit was broken, had performance problems, or was really old).
- Participants rate HVAC contractors s very influential (49%) in the their decision to purchase an energy-efficient CAC.
- There is a strong correlation between an HVAC contractors' activity in the program and their willingness to recommend high-efficiency CACs.
- Forty-five percent of HVAC contractors are more likely to recommend high-efficiency HVAC equipment to customers in extreme climate zones. However, HVAC contractors are unlikely to vary their high-efficiency recommendations for other considerations such as customer income or the replacement of broken-equipment.
- HVAC contractors claim that greater energy savings is by far the most effective selling point for high-efficiency equipment, with the availability of a rebate being a distant second in terms of sales influence.
- HVAC contractors estimated that less than a third of their customers were knowledgeable about either SEER or Energy Star ratings for CACs, heat pumps, and programmable thermostats.
- Sixty-two percent of HVAC contractors are aware of energy efficient products and services that they do not offer. Important barriers to offering these are higher product prices and the costs of keeping up with new energy efficiency products.

Trends in the sales and installation of CACs

- HVAC contractors report that nearly two-thirds of the CACs they install are rebate eligible. However, the Tier III share is relatively small – 16 percent.
- There is a strong correlation between HVAC contractor promotion of rebates and installation rates for Tier II and Tier III CACs. Yet there is no such correlation for the installation of Energy-Star-qualified CACs.
- There is a strong correlation between HVAC contractor promotion of rebates and contractor belief that general market sales of high-efficiency CACs have been increasing.

Program Influence

- Eighty-eight percent of participants say they would have purchased an energy efficient CAC without the rebate.
- Thirty-seven percent of participants were not at all influenced by the rebate, and only 18% were very influenced.
- Contractors are much more influential on CAC purchase decisions than the rebate. Forty-nine percent of participants claim that their contractors were very influential and only 22% said that they were not at all influential.
- Forty-two percent of participants had already decided on purchasing an energy efficient CAC before knowing about the rebate.
- In contrast, HVAC contractors claimed that rebates having a significant influence on sales of Tier III CACs and a sizeable influence on the sale of Tier II and Energy Star-qualified CACs.
- Possible explanations for this disagreement between participants and HVAC contractors as to the influence of the rebate include:
  - Most likely, rebates are influencing participants but indirectly and invisibly through the actions of their contractors. In summary, rebates are influencing contractors to recommend higher efficiency CACs and participants are giving credit to the contractor recommendations rather than the rebate.
  - Participant claims that they would have bought the same efficiency CAC without the rebate may be based on a lack of understanding of what a truly energy-efficient CAC is or an underestimation of the higher costs of the more efficient models.
  - Some residential customers may also be providing "socially desirable" estimates of their actions in the absence of the program.

6. WINDOW ASSESSMENT

Windows represented 12% of the program's energy savings in 2003. The window rebate is of interest not only because of these significant savings claims, but also because the 2002 evaluation raised a few questions regarding program influence. A small sample of participating window contractors surveyed as part of the 2002 evaluation indicated that almost all replacement windows that they specify qualify for the program and felt that the rebate was not needed to motivate customers to purchase program-eligible windows. To address the issue of the influence of the window rebate, telephone surveys of both contractors and participants were conducted. Thus, this chapter builds upon the findings and recommendations reported in the 2002 report by presenting results of 107 window participant surveys and 40 window contractor interviews conducted in the summer of 2004. A sample of 40 window contractors were surveyed in July 2004. These contractors reported that 62% of their revenues came from the sale and installation of replacement windows in residential homes. Companies that install replacement windows tend to be small. On average, contractors employed eight workers, on average.

The chapter has three sections:

- **Existing equipment and standard practices**: This section examines what type of windows customers had before purchasing high performance windows and reasons for window replacement. Contractor installation rates, sales trends and selling points are also examined.
- **Program influence and impact**: This section analyzes what the customer would have done in the absence of the program and whether the rebate influenced the customer's decision not purchase high performance dual pane windows. This section also examines the timing of a customer's awareness of the rebate, as customers that decided to purchase before becoming aware of the rebate are less likely to be influenced by the program.
- **Summary of findings**: This section summarizes key findings from the chapter.

6.1 EXISTING EQUIPMENT AND STANDARD PRACTICES

Existing Equipment and Reasons for Window Replacement

Most participants (94%) had single pane windows before replacing them with program-qualifying dual-pane windows.[35] About half of the participants claim that saving energy was a main reason they replaced their windows, as illustrated in Exhibit 6-1.

[35] Appendix Exhibit H-1 (Existing Windows)

Exhibit 6-1
Reason for Replacing Windows[36]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
WIN20. What was your main reason for replacing your windows?	Total (%)
Save energy	49%
Less drafty/less heat gain in summer	37%
Windows were really old	33%
Better looking/design	29%
Reduce noise	19%
Other	11%
Remodeling home	8%
Windows were broken/emergency replacement	5%
Better quality	5%
Moisture buildup in window	3%
UV light blocking/reduces fading	3%
N	96

Contractor Influence

Window contractors are important drivers in the decision to purchase high performance windows. The participant data, shown in Exhibit 6-2, indicate that about half (47%) of the respondents said that their contractor was very influential in helping them decide to buy program-qualifying windows.

[36] Appendix Exhibit H-2 (Reason for Replacing Windows)

Exhibit 6-2
Influence of Contractor in Window Purchase[37]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
WIN75. How influential was your contractor in your decision to purchase high performance dual pane windows?	Total (%)
Not at all influential	18%
Somewhat influential	33%
Very influential	47%
Don't know	2%
N	86

The contractor survey data also provided further evidence of contractor influence. Over 90% of contractors said that they recommend the installation of high-performance dual-pane windows at least "very often." In contrast, the contractors estimated that only 58% of their residential customers are asking for high performance windows. This disparity, along with evidence of limited customer knowledge of high-performance window characteristics (presented below in Exhibit 6-7), indicates that contractors and not customers are the primary drivers for sales of high performance windows.

Contractor Recommendations

Window contractors were asked how frequently they recommend high-performance dual-pane windows to their customers. These were defined as dual-pane windows that have both a U-factor rating and a Solar Heat Gain Coefficient (SHGC) of 0.4 or less. Exhibit 6-3 shows how frequently contractors recommend high performance windows, as segmented by contractors that are aware of the program versus those contractors that are not aware of the program. Ninety-one percent of aware contractors recommend high-performance dual-pane windows to their customers at least very often, compared with 100% of their unaware counterparts. In sum, Exhibit 6-3 suggests that the rebate has little, if any, impact on whether window contractors recommend high-efficiency dual pane windows.

[37] Appendix Exhibit H-3 (Influence of Contractor in Window Purchase)

Exhibit 6-3
Frequency that Window Contractors
Recommend High Performance Dual-Pane Windows
Sorted by Rebate Program Awareness of Contractor

Equipment Recommendation	Contractor Category	Always	Very Often	Sometimes	Seldom	Never	Don't Know
Recommend high performance dual-pane windows?	**Aware**	76%	15%	3%	3%	3%	0%
	Unaware	71%	29%	0%	0%	0%	0%
Aware N = 33, Unaware N = 7							

Window contractors were also asked whether their window recommendations varied with the perceived income of the residential customers or the customer's climate zone. As was the case with the HVAC contractors, perceptions of customer income rarely influenced the product recommendations of the windows contractors. Unlike the HVAC contractors, however, few window contractors changed their recommendations for residential customers living in extreme climate zones. This is likely due to the fact, as discussed below, that most window contractors promote high performance windows for other benefits besides energy savings.

Contractor Selling Points

The survey also asked the contractors what the most effective selling points for high-performance windows were, shown in Exhibit 6-4. The prospect for reduced energy use and lower utility bills was the top selling point for these windows. Yet the percentage of window contractors who found this selling point most effective – 28% – was much lower than the percentage of HVAC contractors (62%) who did so. Similarly a much smaller percentage of window contractors (7%) named rebate promotion as their top sales pitch than HVAC contractors did (14%).

Exhibit 6-4
Selling Points
for High-Performance Windows
According to Window Contractors

Most Effective Selling Point	Most Effective Selling Points	Secondary Selling Points	All Selling Points Combined
Reduce energy use and lower utility bills	28%	16%	22%
Increase comfort (through reduced heat loss/gain)	21%	9%	15%
Block UV/ Reduce fading of furniture	7%	20%	14%
Are eligible for rebates	7%	11%	9%
Reduce noise	5%	11%	8%
New windows are more attractive	0%	14%	7%
Are affordably priced	7%	2%	5%
Company doesn't try to sell them	7%	0%	3%
Are higher quality	5%	2%	3%
Company promotes other attributes (installation/ service/ guarantees)	5%	2%	3%
General unspecified customer education	5%	0%	2%
Reduce condensation	0%	5%	2%
Add value to house	0%	2%	1%
Ease of window operation	0%	2%	1%
Reduces Dust	0%	2%	1%
Don't know	5%	0%	2%
Total	100%	100%	100%
Respondent N= 40, All Selling Points N = 87			

The program participants were also asked why their contractors were recommending high performance windows (Exhibit 6-5). Once again energy savings was cited as the top factor although participants were much more likely to cite this as a reason (70%) than the contractors themselves. Participants were also much more likely than the contractors to cite noise reduction as a reason for recommending high performance windows.

Exhibit 6-5
Why Did Contractor Recommend High Performance Windows[38]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
WIN85. Why did your contractor recommend high performance dual pane windows?	Total (%)
Energy efficiency	40%
Save energy	30%
Reduces noise	19%
Other	18%
Regulates temperature better	14%
Higher quality	12%
That is the only window they sell	10%
Save money	6%
Refused	1%
Don't know	9%
N	63

Customer Knowledge

The survey also asked contractors what they perceived to be their residential customers' knowledge of high performance windows. They estimated that about half of their customers knew there was a difference between regular and high-performance dual pane windows, illustrated in Exhibit 6-6. They believed that only about a fifth knew what the U-factor or U-value of a window meant.

[38] Appendix Exhibit H-4 (Why Did Contractor Recommend High Performance Windows)

Exhibit 6-6
Perceived Customer Knowledge
of High Performance Windows

	% of Their Residential Customers
Residential customers aware that there is a difference between regular and high performance dual pane windows	49%
Residential customers knowing what the U-factor or U-value of a window means	21%
N = 40	

However, the participant data indicates that program contractors are making an effort to educate their customers. Three-quarters of contractors (74%) explained the difference between high performance dual pane and standard efficiency windows to their participating customers.[39]

Contractor's Perceived Market Barriers

The survey also asked window contractors about any market barriers they faced in offering high performance dual-pane windows. Nearly two-thirds of window contractors were aware of high-performance window products that they do not offer. Many contractors said they did not offer these products due to a practical need to limit the size of their product portfolio or because they had preferred vendors. It was not due to any doubts about the reliability or cost of these high performance windows. In general, the window contractors identified no major barriers to offering high performance windows. The most significant barrier – which a third of the contractors agreed with – was that their company does not get added value from promoting high performance dual-pane window products.

Installation Rates and Sales Trends

Exhibit 6-7 below shows very similar installation rates for high performance dual-pane windows among contractors that are both aware (80%) and unaware (77%) of the program. This again suggests that the windows rebate has little effect on what products contractors install. About half of the window contractors believed that sales of high performance windows have increased over the last year (Exhibit 6-8).

[39] Appendix Exhibit H-6 (Contractor Explanation of Difference between Windows)

Exhibit 6-7
High-Performance Dual Pane Window Installation Rates
According to Window Contractors
by Program Awareness

Equipment Installed	All Window Contractors (Average %)	Aware of Rebate Program	Unaware of Rebate Program
High-Performance Dual-Pane Windows (of all windows)	80%	80%	77%
All N =40, Aware N = 33, Unaware N = 7			

Exhibit 6-8
Sales Trends for High-Performance Dual-Pane Windows
According to Window Contractors
by Program Awareness

Measure Category	Contractor Category	Significantly higher	Moderately higher	About the same	Moderately lower	Significantly lower	Don't Know
High-Performance Dual-Pane Windows	**Aware**	15%	39%	36%	0%	0%	9%
	Unaware	29%	0%	43%	0%	0%	29%
	All	18%	33%	38%	0%	0%	0%
Aware N = 33, Unaware N = 7							

6.2 PROGRAM INFLUENCE

Participant Indicators of Program Influence

Participants were asked to rate how influential the rebate was in their decision to purchase high performance windows. Exhibit 6-9 shows that only 10% of participants claimed the rebate was very influential in their purchase decision, but almost half thought that the rebates had some influence. Moreover, 43% said that the rebate was not at all influential.

Exhibit 6-9
Influence of Rebate on Window Purchase[40]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
WIN65. How influential was the rebate in your decision to purchase high performance dual pane windows?	Total (%)
Not at all influential	43%
Somewhat influential	46%
Very influential	10%
Don't know	1%
N	107

Likely Purchase In Absence of Rebate

When considering the program's influence, it is important to differentiate between:

- influencing a customer to make a purchase (High Performance windows instead of nothing at all)
- influencing a customer to purchase something different and significantly better (High Performance windows instead of single pane windows)
- influencing a customer to purchase something different and somewhat better (High Performance windows instead of standard dual pane windows)

When asked about their actions if the rebate had not existed, 90% of the participants said they would have purchased high performance dual pane windows in the absence of a rebate, as shown in Exhibit 6-10. However, this response must be interpreted with caution since there is some doubt whether customers really know what a high performance dual pane window is. As noted, window contractors believe that only about half of their residential customers know that there is a difference between regular and high performance dual pane windows. In addition, these contractors estimate that only about one fifth of their customers know what the U-factor or U-value for a window indicates.

[40] Appendix Exhibit H-6 (Influence of Rebate)

Exhibit 6-10
What Participants Would have Purchased in Absence of Rebate

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
WIN50. Which of the following statements best describes the actions you would have taken had the rebate not existed?	Total (%)
We would have bought high performance dual pane windows	90%
We would have bought dual pane windows, but not high performance	6%
We would have bought standard windows	2%
We would not have bought windows	0%
Don't know	1%
N	107

Of the participants that claimed they would have bought the same windows without a rebate, 90% indicated they would have purchased at the same time, suggesting that the program cannot claim any accelerated adoption, as shown in Exhibit 6-11.

Exhibit 6-11
When Participants Would Have Purchased in Absence of Rebate[41]

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED	
WIN55. If the rebate was not available, when would you have bought the high performance dual pane windows?	Total (%)
At the same time	90%
Within a year	7%
More than a year later	2%
Don't know	2%
N	95

[41] Appendix Exhibit H-7 (When Participants Would Have Purchased in Absence of Rebate)

Exhibit 6-12 provides a further breakdown of Exhibit 6-11 and shows how customer purchase assumptions correlate with their assessment of rebate influence. There is a strong correlation between influence and the customers stated actions. Nearly half (48%) of those who would have bought the same type of windows at the same time in the absence of the rebate claim the rebate was not at all influential, and only 5% claim the rebate was very influential. By contrast, 64% of those who claimed they would have bought standard single pane windows in the absence of the program, found the rebate to be very influential.

Exhibit 6-12
Influence of Rebate and Purchase in Absence of Rebate

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED				
WIN65. How influential was the rebate in your decision to purchase high performance dual pane windows?	WIN50. What type of windows would you have purchased if the rebate had not existed?			
	High Perf. Dual Pane Now	High Perf. Dual Pane Later	Standard Dual Pane	Standard
Not at all influential	48%	10%	13%	36%
Somewhat influential	47%	41%	55%	0%
Very influential	5%	48%	32%	64%
N	85	8	8	2

Although the comparison shown above helps validate customer responses to program influence and what customers claim they would have done in the absence of the program, there are some anomalies. For example, for the customers claiming they would have still purchased high performance windows at the same time in the absence of the program, 47% are claiming the rebate was somewhat influential. And conversely, 13% of the customers claiming they would have purchased a standard dual pane windows claim they were not at all influenced.

When people indicate that they were influenced by a rebate, this does not necessarily mean that they were influenced *to purchase a product that they otherwise would not have*. The rebate could have influenced the customer to buy at a different time, to buy from a different vendor, or to buy a different product. It may mean a customer was influenced to purchase different windows from another vendor (perhaps one that promoted the rebate and offered to fill out the paper work), but of equal efficiency. Or a customer may have planned on buying dual pane windows, but is now upgrading to more efficient windows. And, as is the case with any self-reported data, there is the possibility that respondents are providing the most "socially acceptable" responses and/or the ones they think that the interviewer wants to hear.

Another way of examining influence is looking at the relationship between the program influence and the timing of when customers became aware of the rebate. Participants were asked if they were aware of the rebate at the time they made a decision about the windows they were going to purchase. Fifty-two percent said they had already decided on the windows they were going to purchase before even being aware that there was a rebate. Therefore, these customers are less likely to be influenced by the program than those that were already aware of the rebate. Exhibit 6-13 shows that there is a correlation between the program's influence and

when customers become aware. Sixty-three percent of those who had decided on their windows before they were aware of the rebate said the rebate was not at all influential in their decision to purchase. Conversely, only 24% of those who were aware of the rebate before deciding on their purchase said the rebate was not at all influential.

Exhibit 6-13
Influence of Rebate and Timing of Awareness

SINGLE FAMILY REBATE PARTICIPANTS SURVEYED			
WIN65. How influential was the rebate in your decision to purchase high performance dual pane windows?	Total (%)	Aware Before Decide (%)	Decide Before Aware (%)
Not at all influential	43%	24%	63%
Somewhat influential	46%	61%	27%
Very influential	10%	15%	8%
Don't know	1%	0%	1%
N	107	44	47

Appendix D provides a more quantitative assessment of free ridership, based on detailed analysis of the participants stated influence, their timing of awareness, and what they claim they would have done in the absence of the program. The results of this analysis indicate that free ridership may be in the range of 76% to 91%.

Window Contractor Indicators of Program Influence

The survey also asked window contractors how much lower their past sales of high performance dual-pane windows would have been, and how much lower their futures sales would be, if no rebates were available. As Exhibit 6-14 shows, the attributed sales impact of the rebates was fairly modest. This sales benefit was much lower than that for central air conditioners and only slightly higher than that for programmable thermostats.

Exhibit 6-14
Influence of Program Rebates
on Past and Future High Performance Dual-Pane Window Sales
According to Window Contractors

	% Decrease in past sales if no rebate	% Decrease in future sales if no rebate
High Performance Dual-Pane Windows	12%	13%
Sample = 28, 31		

6.3 SUMMARY OF FINDINGS

The findings from both participant and contractor surveys seem to indicate that rebates for high-performance dual-pane windows are not having any significant influence on whether or not customers purchase these types of windows. This differs from the case of the Central Air Conditioning rebates, where the participant survey findings and the market actor findings appeared to be telling different stories about rebate influence.

The participant survey findings that suggest that the high-performance window rebates are not very influential include:

- Ninety percent of participants said that they would have purchased high performance windows absent the rebate, 6% said that they would have purchased standard dual pane, and no customers said that they would have done nothing.
- Forty-three percent of participants said that they were not at all influenced by the rebate, and only 10% said that they were very influenced.
- Fifty-two percent of participants had already decided on purchasing high performance windows before knowing about the rebate.

These participant claims must be qualified by a number of considerations including:

- Window contractors did not rate their customers very highly in terms of their knowledge of high-performance dual-pane windows. Therefore some participants may be overestimating their willingness to purchase high-performance windows due to a misunderstanding over what high performance dual-pane windows are, and how much more they cost.
- Some participants may be providing the most "socially acceptable" responses and/or the ones they think that the interviewer wants to hear.

However, some of the findings from the windows contractor survey also suggest that the window rebates have limited influence in increasing sales of high-performance dual-pane window sales. These findings include:

- All the window contractors who were unaware of the rebate program said that they are recommending high-performance dual-pane windows at least "very often" and 71% said that they are always recommending such windows. These recommendation rates were even higher than for those window contractors who were aware of the rebate program.
- Window contractors who were unaware of the rebate program still claimed that high-performance windows accounted for 78% of their total installations. This was very close to the high-performance installation rate (80%) for window contractors who were aware of the rebate program.
- Window contractors only estimated a 12-13% decrease in their past and future sales absent a rebate. This sales benefit was much lower than that for central air conditioners and only slightly higher than that for programmable thermostats.