1998 PG&E RESIDENTIAL ENERGY MANAGEMENT SERVICES PROGRAM: MARKET BASELINE AND MARKET EFFECTS

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EXECUTIVE SUMMARY

PG&E's 1998 Residential Energy Management Service Program (REMS) is a multi-faceted program designed to provide the residential sector with information on energy efficiency. The 1998 REMS includes single family energy audits[1],,hich can be done over the phone through the Smarter Energy Line, by mail, or on-site by PG&E personnel. In addition, the 1998 REMS program includes multifamily property energy management on-site audits and Energenius, a series of educational materials on energy efficiency, safety, and the environment for students in grades 1–8. An additional component of the 1998 REMS program includes providing energy efficient product information to residential customers and to vendors, manufacturers, and sales personnel who produce or sell energy efficient technologies for the residential market. This information is distributed primarily through the SEL.

This report presents a market baseline and the results of a near-term market effects study of the 1998 REMS program. The market baseline will enable future market effects studies of the REMS program to accurately measure market effects. The market effects analysis is necessary to analyze the near-term effects of the 1998 program. Since no baseline existed prior to this study, the market effects study had to estimate effects by looking backward in time, using historical data and survey techniques.

1. METHODS

This report examines a combination of primary research and secondary research that provide a basis for examining many of the key barriers affecting the market for residential energy efficiency actions and services. Primary data collection activities consisted of a comprehensive survey with participants and nonparticipants. This customer survey was primarily targeted at identifying barriers to energy efficiency and characterizing the level and type of communication on energy efficiency that is occurring in the market. Secondary data was assembled from past program records, other CBEE studies, and past surveys of residential customers completed for 1995 and 1997 REMS impact analyses and the 1996/7 PG&E process evaluation.

The market effects analysis was completed using two distinct methods. The first focussed on leading indicators of market transformation, that is changes in barriers to energy efficiency. The

[1] REMS documents occasionally refer to their energy audits as "surveys." To avoid confusion with other types of surveys discussed in this document, we used the term audit.

data for this analysis came from the residential customer surveys and, when possible, comparable data from earlier surveys. The second method estimated market share using survey and program tracking database data.

The original work plan called for implementing interviews and surveys with manufacturers and retailers in the following areas: insulation, CFLs, furnaces and central AC, refrigerators, and clothes washers. However, because there were several other studies underway for PG&E and others that would include interviews with many of the same companies, PG&E ultimately decided that this research project would not include interviews with *any* of the market actors except for residential customers. The REMS program was designed to influence consumer demand for energy efficiency products and services and perhaps only indirectly influence the supply and distribution of these products and services. That being the case, PG&E decided that this study should target the most significant barriers that the REMS program was designed to address (e.g., awareness, knowledge, interest and concern, attitudes, etc.).

2. BASELINE RESULTS

Information programs like REMS achieve their goals by changing what people know, the way they think, and what they believe. In this study, three information-related barriers were addressed via the baseline assessment:

- customer awareness and knowledge,
- their interest and concern in efficiency issues, and
- their attitudes towards energy efficiency.

Awareness and Knowledge

People encountering this barrier do not have not enough information to act on efficiency issues. They may or may not recognize their lack of knowledge. Baseline indicators of the current state of the residential market on the awareness and knowledge barriers include:

- As a whole, residential customers feel they need more information in order to make energy efficiency purchase decisions.
- Residential customers express some difficulty in finding energy efficiency information for central air conditioners and furnaces (they had less difficulty with information on other appliances).
- The average person feels they know something about energy efficiency, but there is clearly room for improvement, based on two different open-ended questions in the survey.

Interest and Concern

People exhibiting the effects of this barrier do not care enough about energy efficiency to act. They do not necessarily lack knowledge and are likely not to care if they do. This barrier has two main components:

- Lack of concern about energy (independent of knowledge)
- Too busy to think about it, too wealthy to care, too little consumption to care (e.g., small apartment dweller)

Baseline indicators of the current state of the residential market on the interest and concern barriers include:

- Indication that the general population has a moderate amount of interest or concern with energy efficiency (scoring 7 on three different 10 point scales where 10 is the highest level of concern).

- Participation of almost one-half of residential customers in a conversation about energy efficiency, providing more evidence of a moderate level of interest.

Attitudes

People showing the effects of this barrier think acting on efficiency issues would not be in their best interest. They may not think they lack knowledge and they probably do not care to learn. This barrier has two main components:

- Belief that efficient means uncomfortable, unreliable, short-lived, or expensive.

- Belief that “efficient” technologies will end up costing more money either because they are too expensive up front or because the advertised savings will not appear.

Baseline indicators of the current state of the residential market on the attitude barriers include:

- Indication that the general population has a moderately positive attitude toward energy efficiency (scoring 7 on a 10 point scale where 10 is the highest level of concern).

- Few customers express a negative attitude that might preclude them from considering making energy efficient purchases or taking energy efficient actions.

3. MARKET EFFECTS ASSESSMENT

Three related hypotheses were tested via the market effects assessment:

- REMS will raise the **awareness and knowledge** of residential customers, which should then lead them to make energy-efficient purchases and take energy-efficient actions.
- REMS will raise the level of **interest and concern** among residential customers by helping them see the value in saving energy, even if it benefits society in general and not them specifically (e.g., for the wealthy and small users). The increase in value they ascribe to energy issues will cause them to change their behaviors and purchasing patterns.
- REMS will influence residential customer **attitudes** through education on the positive characteristics of energy-efficient equipment and behaviors, improving their negative attitude, which in turn will cause them to change their behaviors and purchasing patterns.

Proving that a program has created market effects involves demonstrating that a market change has occurred, that the program created the market change, and that the change will last in the absence of program intervention in the market. Our analysis of market effects was split into these three components with the first component split into the three hypothesis shown above.

Awareness and Knowledge

The high awareness of the audits and the high and growing knowledge of energy-efficiency improvements that respondents want to make provide strong evidence that awareness and knowledge have improved. Two pieces of evidence temper that conclusion. First, there has been an increase in customers who do not make energy-efficiency improvements due to a lack of knowledge. Second, there has been an increase in customers citing an information-related disadvantage of energy-efficiency. However, the weakness of these two pieces of evidence means that the balance of the evidence points toward the conclusion that awareness and knowledge have improved.

Interest and Concern

The REMS program has made substantial headway in mitigating interest and concern barriers. The strongest evidence was from a high interest among those with inefficient homes in implementing efficiency improvements, combined with a significant increase in actions among those receiving information from PG&E. Moderately strong evidence includes the finding that the general population[2] interest score is moderately positive and there has been an 8 percent increase

[2] The data from single-family participants and nonparticipants was combined to form the group referred to as the "General Population" of customers throughout this report.

from 1996/7 to 1998 in the portion of the general population who want to make energy-efficiency improvements. This increase raises the interest level to 57.1 percent, which is higher than the threshold often cited in the diffusion of innovation literature. Weak, but positive evidence comes from the decrease in the proportion of people who do not make energy-efficiency improvements due to interest and concern issues. Only one piece of evidence was negative: the finding that only 40 percent of the general population expressed interest in having an audit.

Attitudes

On balance, the evidence points to improvements in the past few years in the general population's attitude toward energy-efficiency. The general population's attitude score based on several questions was fairly high and an 8 percent increase from 1996/7 to 1998 in the level of interest in making energy-efficiency improvements provides evidence that REMS has inspired a better attitude toward energy-efficiency. The proportion of people who think there are disadvantages to energy-efficiency declined from 1996/7 to 1998, providing further support to that conclusion. However, 61 percent of the general population who knew of an efficiency improvement that they would like to make said they did not make the change because they could not afford the expense.

Attribution

All of the evidence examined supported a conclusion that the REMS program deserves some credit for creating the market effects discussed above. However, none of the evidence, taken on its own, was very strong, as you might expect for an information program since there are several other avenues for affecting customers knowledge. Current and past year participants communicate enough with others about energy-efficiency and their experiences with the REMS program that there is reasonable support to the theory that REMS information makes it into the general population through participants. The participants are also sharing the information they received from REMS with others, providing a mechanism for creating market effects in the general population. The REMS program was the most visible and active energy-efficiency program in the residential sector in PG&E's territory and utility information was frequently cited as the source of information on energy-efficiency. Together, this evidence supports allocating credit to REMS for a significant portion of any relevant energy-efficiency market changes observed. There was also moderate support to the conclusion that the REMS is providing direct current and lasting impacts on participants.

Sustainability

All of the sustainability evidence was positive, although not strong. There was some evidence that the private sector is experiencing demand for energy audits, which is evidence that they believe the market has a future. Several measures of behavior or attitude were found to be over the 50 percent threshold usually cited in the diffusion of innovation literature as the point at which innovations become self-sustaining. Those include communication about energy-efficiency issues,

making energy-efficiency improvements, identifying other desirable energy-efficiency improvements, and an improving and positive attitude toward energy-efficiency.

4. RECOMMENDATIONS

This analysis used a variety of historical data to attempt to estimate changes over time. However, all such attempts are hampered when the data collected and the data collection methods of prior studies do not match current methods. This study defined an analysis method and framework and baseline data that can be used in the future to effectively demonstrate changes over time. It will be important to build future evaluation efforts upon the methods and data in this effort to ensure that accurate and comprehensive results can be obtained.

Future market effects studies should continue to utilize both the time series and gap analysis approaches defined in this study. The time series analysis examined changes over time in an attribute of the general population to provide evidence that a market change has occurred. When data collection methods differ enough to make the first kind of analysis unreliable, but the same attribute was measured over time, the data can still be used to measure market changes by examining the size of the gap between participants and the general population in an energy efficiency attribute. If the gap has declined over time, this provides evidence of a market change. The time series analysis provides a good basis for looking at the growth (or lack of growth) over time of the implementation of energy-efficiency measures by the general population. However, it is also important to take the next step to compare differences between participant and general population through the gap analysis.

CHAPTER 1
INTRODUCTION

PG&E's 1998 Residential Energy Management Service Program (REMS) is a multi-faceted program designed to provide the residential sector with information on energy efficiency. The 1998 REMS includes single family energy audits[1],,which can be done over the phone through the Smarter Energy Line (SEL), by mail, or on-site by PG&E personnel. In addition the 1998 REMS program includes multifamily property energy management on-site audits and Energenius, a series of educational materials on energy efficiency, safety, and the environment for students in grades 1–8. An additional component of the 1998 REMS program includes providing energy efficient product information to residential customers and to vendors, manufacturers, and sales personnel who produce or sell energy efficient technologies for the residential market. This information is distributed primarily through the SEL.

1.1 OBJECTIVES AND METHODS

The two main objectives of this study are to (1) create a comprehensive market baseline characterization and (2) assess the near-term market effects of the 1998 REMS program. The market baseline will enable future market effects studies of the REMS program to accurately measure market effects. The market effects analysis is necessary to analyze the near-term effects of the 1998 program. Since no baseline existed prior to this study, the market effects study estimated effects by using historical data and survey techniques. A summary of the data sources and analysis methods used to accomplish both of these objectives are summarized below

1.1.1 Baseline Market Characterization

Two sources of data were used in the market characterization: (1) the primary customer research completed for this study and (2) the 1997 REMS Impact Evaluation Study survey data.

> *Primary Customer Research* – A telephone survey of 1998 REMS single-family participants and nonparticipants was implemented for this study that specifically addressed barriers to energy efficiency and the level of communication among customers about energy efficiency. A more complete description of the survey components and the data collection methods are described in Chapter 2.

[1] REMS documents occasionally refer to their energy audits as "surveys." To avoid confusion with other types of surveys discussed in this document, we used the term audit.

1997 REMS Impact Evaluation Survey Data – Existing survey data from the 1997 PG&E REMS Impact Evaluation conducted by Hagler Bailly. This survey was conducted in the fall of 1998 from a random sample of 1997 REMS participants and nonparticipants.

The majority of the analysis for the baseline characterization involved examining the data from the primary customer research. The data from single-family participants and nonparticipants was combined to form the group referred to as the "General Population" of customers throughout this report. (When we talk about the multifamily population, we will use "multifamily population".) 1998 REMS participants were oversampled for the survey, therefore the data were weighted in order to accurately reflect the proportion of participants in the entire population of PG&E customers. As a result the information presented in the baseline characterization is largely driven by the nonparticipant sample.

The nonparticipant survey data from the 1997 REMS Impact Evaluation were used to provide additional information on the types of appliances PG&E customers currently have in their homes. This information was useful in developing a general characterization of PG&E customers that included customers' current appliance holdings.

1.1.2 Market Effects

The market effects analysis was completed using two distinct methods. The first focussed on leading indicators of market transformation, that is an analysis of the reduction in barriers to energy efficiency. The second method estimated a lagging indicator of market transformation, market share.

Leading Indicators of Market Transformation

The REMS program was designed to influence consumer demand for energy efficiency products and services and perhaps only indirectly influence the supply and distribution of these products and services. That being the case, PG&E decided that this study should target the most significant barriers that the REMS program was designed to address (e.g., awareness, knowledge, interest and concern, attitudes, etc.)."

The data sources used for this analysis included the primary customer research described above, survey data from the 1996-97 Residential Energy Efficiency Program Process Evaluation, and PG&E REMS program documents.

The *Process Evaluation*, conducted by Hagler Bailly, collected data from a random sample of customers who had participated in any residential energy efficiency program in 1994 – 1996 and a sample of nonparticipants. This data was collected during the winter of 1996-1997.

PG&E REMS Program Documents provided the number of SEL calls and audits from 1991 through 1998.

The data from the primary customer research was analyzed to examine changes in a number of indicators among three groups of customers: 1998 participants, other year participants, and the general population. 1998 participants consisted of customers sampled from the PY98 REMS program tracking databases while other year participants were customers who were not in the PY98 program tracking database but self-reported participating in a home energy audit. The general population of customers is the same group of customers reported on in the baseline characterization (i.e., participants and nonparticipants combined). When possible, this data was compared to the process evaluation data in order to draw conclusions about changes over time.

The information from the program documents was used to assess the level of REMS activity over time in PG&E's survey territory.

Lagging Indicators of Market Transformation – Market Share Analysis

Reductions in barriers to energy efficiency created by the REMS program should generally produce increases in purchases of energy efficiency products and services. Since these effects appear in the market *after* barrier reductions, they represent a lagging indicator of market change. This study examined market share changes using data from three surveys: (1) The primary customer research survey implemented for this study (discussed above); (2) The 1997 REMS Impact Evaluation Survey Data (also discussed above); and (3) 1995 Residential Direct Assistance and REMS Impact Evaluation survey data. This survey was conducted in the winter of 1996-1997 from a random sample of 1995 participants and nonparticipants.

The data from these three surveys was analyzed to detect patterns over time in the purchase of energy efficiency products and services among both participants and nonparticipants. These patterns provided evidence of market share changes attributable to the REMS program, both in 1998 and from other years.

This historical implementation data was also compared to the recommendations given to participants, as recorded in the program tracking database, to look for evidence that the REMS program created market effects in participants.

1.2 REPORT CONTENT

Chapter 2 provides a detailed discussion of the methods used to gather and analyze data for this report. Chapter 3 presents a detailed description of the REMS program (additional details are included in Appendices E and F). This chapter is based primarily on PG&E reports and discussions with PG&E personnel. It sets the stage for understanding the intent and methods of the REMS program. Chapter 4 presents the baseline market characterization. Chapter 5 presents the market effects analysis, focusing on reductions in the level of barriers to energy efficiency. This chapter begins with a detailed discussion of the theoretical framework for proving market effects for an information program. Chapter 6 continues the market effects analysis by presenting the evidence that REMS created changes in the market share of several energy efficiency

technologies. Finally, Chapter 7 summarizes the evidence and presents resulting conclusions about the impact of REMS on the market.

Throughout the body of the report, any tables that do not list a specific source can be assumed to be based on the data from the customer survey implemented for this study.

Appendices to this report include a detailed bibliography (Appendix A), and a summary of the literature review analysis, which came out of one of the initial tasks for this project (Appendix B). Appendix C presents the survey instruments and Appendix D presents the telephone-interview disposition report for the surveys. Appendix E contains a complete program description. Appendix F presents a further description of the program participants and the actions they took as a result of their participation in REMS. It is primarily based on the survey completed for this study. Finally, Appendix G contains detailed results from the analysis of the audit recommendations.

CHAPTER 1. INTRODUCTION

CHAPTER 2
METHODOLOGY

The two main objectives of this study are to (1) create a comprehensive market baseline characterization and (2) assess the near-term market effects of the 1998 REMS program. This chapter presents the methodology we used for achieving those objectives, organized according to the two objectives. We conclude this chapter by presenting specific details on the sample and survey response rate.

This report is based on an extensive examination of a wide range of information including primary and secondary research. A complete list of the secondary data sources consulted for this report is included as Appendix A. An analysis of those sources is included as Appendix B.

2.1 MARKET BASELINE CHARACTERIZATION

The baseline characterization was designed to provide data that can be used in the future in efforts to measure changes to the market created by the REMS program. According to the theory defined in the Scoping Study[1] and elaborated on in subsequent studies and discussions, market effects are best measured by looking for changes in barriers, predicting whether those changes will last in the absence of market intervention, and attributing those changes to the market intervention created by the program. To provide data that will enable such analysis in the future, the baseline focuses on identifying barriers and measuring their strength. It also examines issues that are important for demonstrating attribution and sustainability, such as communication patterns and awareness and knowledge of conservation actions and PG&E efforts. The next section will describe the data sources used in this analysis. It is followed by a discussion of the analysis methods used to extract the baseline data from the data sources.

2.1.1 Data Sources

Two sources of data were used in the market characterization: (1) the primary customer research completed for this study and (2) the 1997 REMS Impact Evaluation Study survey data.

[1] *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs*, by Joseph Eto, Ralph Prahl, and Jeff Schlegel. Prepared for the California Demand-Side Measurement Advisory Committee. July 1996. (Hereafter referred to as "the Scoping Study").

Primary Customer Research

A telephone survey of 1998 REMS single-family participants and nonparticipants and multifamily participants was implemented for this study that specifically addressed barriers to energy efficiency and the level of communication among customers about energy efficiency. (The survey instrument is included as Appendix C and the call disposition is shown in Appendix D.) The survey served three purposes (1) provide data for the baseline; (2) provide data on changes in the level of barriers to energy efficiency to support the market effects assessment; and (3) provide data on implementation rates for energy efficiency measures to support the market effects assessment. Issues addressed in the survey are presented in Table 2-1.

Table 2-1.
Customer Survey Topics and Use

Presence and Status of Barriers to Energy Efficiency

- Knowledge and attitudes toward energy issues. Provides detail on information barriers and direct program effects.
- Nonparticipant interest in and barriers to participating in energy audit and SEL programs. Provides information for characterizing the market and addressing information barriers.

Energy efficiency actions to provide a baseline and support estimates of market effects as seen in changes in market share.

- Purchases of energy efficiency products and services and implementation of energy efficiency actions to address direct program effects and provide the data for implementation rate analysis.

Information on the dynamics of the market for the baseline and to support claims that REMS was responsible for the observed market effects.

- Information sources and information flows on energy efficiency-related issues in hypothetical and actual purchase decisions. General questions about the influence of information on actual purchase decisions. Characterizes the market and quantifies information, hassle cost, and asymmetric information barriers. Also provides evidence of direct program effects.
- Questions about whether respondents have initiated or participated in conversations about energy efficiency to identify how fully energy efficiency has been incorporated into the ethos of the individual. Provides evidence of the sustainability of the market effects.
- Audit and SEL awareness and influence to address information barriers and provide evidence for attributing observed market changes to REMS.

1997 REMS Impact Evaluation Study

Existing survey data from the 1997 PG&E REMS Impact Evaluation conducted by Hagler Bailly was used to provide additional data for the baseline characterization. This survey was conducted in the fall of 1998 from a random sample of 1997 REMS participants and nonparticipants. It was designed to create a much more complete picture of measure implementation than the survey described above. The baseline data was primarily based on the *nonparticipant* data from this

survey. Since it was quite close in time to the primary survey for this study, it provides appropriately complementary data.

2.1.2 Analysis Methods

The majority of the analysis for the baseline characterization involved examining the data from the primary customer research. The data from participants and nonparticipants was combined to form the group referred to as the "general population" of customers throughout this report. 1998 REMS participants were oversampled for the survey, therefore the data were weighted in order to accurately reflect the proportion of participants in the entire population of PG&E customers. As a result the information presented in the baseline characterization is largely driven by the nonparticipant sample.

The nonparticipant survey data from the 1997 REMS Impact Evaluation were used to provide additional information on the types of appliances PG&E customers currently have in their homes. This information was useful in developing a general characterization of PG&E customers that included customers' current appliance holdings.

The primary analysis method used for the baseline characterization was simple frequencies, cross-tabs, and means to quantify characteristics for different subsets of the data. Open-ended questions were also analyzed to identify and quantify underlying barriers. The analysis also included a factor analysis on a battery of attitudinal statements that represent different customers' views about purchasing energy efficient products. Factor analysis is a statistical technique that groups items based on their inter-correlation so that items that are highly inter-correlated "load" together on one factor. This technique was used to identify the underlying dimensions in a set of items and to understand which types of items load together.

2.2 ASSESSMENT OF MARKET EFFECTS

The assessment of market effects was designed to assess the near-term market effects of the 1998 REMS program. The market effects analysis was completed using two distinct methods. The first focussed on leading indicators of market transformation, that is an analysis of the reduction in barriers to energy efficiency. The second method estimated a lagging indicator of market transformation, market share. The first method was designed in keeping with the approach defined in the Scoping Study, as an examination of changes in barriers to energy efficiency, predicting whether those changes will last in the absence of market intervention, and attributing those changes to the market intervention created by the program.

The second method examined energy efficiency measure installation levels over time to estimate changes in market share that could be attributed to the 1998 REMS program.

The next section will describe the data sources and analysis methods used in the market effects analysis of changes in barriers. It is followed by a discussion of the data sources and analysis methods used in the analysis of market share.

2.2.1 Reductions in Barriers

The analysis of barriers was primarily based on survey data and analyzed by looking for trends in the data over time, as we discuss below.

Data Sources

Three data sources provided the majority of the information for this analysis: (1) the customer survey implemented for this study, (2) the survey implemented for PG&E's Residential Energy Efficiency Program Process Evaluation, covering PY94 to PY97; and (3) PG&E REMS Program Documents, which provided the number of SEL calls and audits from 1991 through 1998. The customer survey was discussed in the previous section. Data from the process evaluation (especially awareness and use of information from PG&E and other sources) were compared to data collected from the market effects survey to examine trends over time to identify market effects. The process evaluation survey was of REMS participants and nonparticipants as well as participants in PG&E's other residential programs. Table 2-2 summarizes the data used from the process evaluation.

Table 2-2.
PY94-97 Process Evaluation Survey Issues

Research issues addressed by the process evaluation:
◆ Benefits and barriers to energy efficiency
◆ Awareness and effectiveness of energy efficiency information obtained from PG&E
◆ Awareness and effectiveness of energy efficiency information obtained from sources other than PG&E
◆ Awareness of and participation in PG&E's energy efficiency programs
◆ Interest in and barriers to participation in PG&E's energy efficiency programs
◆ Additional needs, suggestions for program improvement

Analysis Methods

The Scoping Study discusses many possible barriers to energy efficiency. The REMS program tackles some of these directly and other more indirectly. The most important ones that REMS directly addresses are information-related and specifically related to the information on energy efficiency that is available to residential customers. Information programs like REMS achieve their goals by changing what people know, the way they think, and what they believe. In this study, three information-related issues were testable: customer awareness and knowledge, their interest and concern in efficiency issues, and their attitudes towards energy efficiency.

Demonstrating market effects involves three related evidences: (1) that a market change has occurred; (2) that the program created the observed market change (*attribution*); and (3) that the change will last in the absence of program intervention (*sustainability*). We analyzed evidence for each of these three issues together when possible, but separately in most cases, and present the evidence in Chapter 5 organized according to the three issues.

We used three basic approaches to identifying and quantifying market effects:

(1) Changes over time in an attribute of the general population[2] provide evidence that a market change has occurred. This analysis usually involved comparing data from the new survey to data from earlier surveys to identify changes in the general population.

(2) When data collection methods differ enough to make the first kind of analysis unreliable, but the same attribute was measured over time, the data can still be used to measure market changes by examining the size of the gap between participants and the general population in an energy efficiency attribute. If the gap has declined over time, this provides evidence of a market change.

(3) The third approach is based on the diffusion of innovation literature. For most of our applications, this argument takes the following form: If an attribute has become common enough in the general population, it is likely to persist over time on its own momentum (that is, absent any further program intervention).

These analysis methods are discussed in more detail in the introduction to Chapter 5.

2.2.2 Changes in Market Share

The analysis of changes in market share was based on survey data from several sources and program tracking data. It was analyzed by looking for trends in the data over time, as we discuss below.

Data Sources

The majority of the analysis of market share information was done on data from three surveys: (1) The primary customer research survey implemented for this study (discussed above); (2) The 1997 REMS Impact Evaluation Survey Data (also discussed above); and (3) 1995 Residential Direct Assistance and REMS Impact Evaluation study, using the REMS survey data. This survey

[2] The data from participants and nonparticipants was combined to form the group referred to as the "General Population" of customers throughout this report. 1998 REMS participants were oversampled for the survey, therefore the data were weighted in order to accurately reflect the proportion of participants in the entire population of PG&E customers.

was conducted in the winter of 1996-97 from a random sample of 1995 participants and nonparticipants.

The market share analysis also included an examination of the data from the REMS program tracking databases, including the following:

- **Direct Mail and Phone Survey Tracking Databases.** These databases are fairly complete and virtually identical in terms of what they capture, so comparisons between the two could be made.

- **SEL Phone Tracking Database.** The SEL database tracks reasons customers call the SEL (e.g., to ask about high efficiency appliances), what gets communicated to them during the call (e.g., general references to energy and cost saving potential), and what happens to them after the call (e.g., a brochure or fact sheet on Energy Star appliances is mailed to the customer). A historical record is maintained for each customer.

Analysis Methods

The data from the three surveys was analyzed to detect patterns over time in the purchase of energy efficiency products and services among both participants and nonparticipants. These patterns provided evidence of market share changes attributable to the REMS program, both in 1998 and from other years. This historical implementation data was also compared to the recommendations given to participants, as recorded in the program tracking database, to look for evidence that the REMS program created market effects in participants.

Two different approaches were used to find evidence of market change using measure installation rates from 1995 through 1998. The first is comparable to the first approach discussed in the Reductions in Barriers section above. This approach involves examining changes over time in the implementation rates of energy efficiency measures for the general population. An increase in implementation rates from 1995 to 1998 would indicate that market changes have occurred.

The second approach is comparable to the second approach discussed in the Reductions in Barriers section above. This approach is based on the logic that if the size of the gap between nonparticipant and participant implementation rates in 1998 was smaller than the size of the gap in 1995 this would indicate that nonparticipants were implementing relatively **more** conservation actions in 1998, which is a sign of market change.

These approaches have their limitations. For example, comparing results across time is open to criticism since the data were collected using two different (although similar) methodologies. One method could have been more effective in eliciting recall than the other, which would inflate its implementation rates relative to the other method. This is a more significant criticism of the first approach than the second, since the latter compares gaps that were calculated within a single study. Both approaches measure the cumulative impact of programs from 1995 to the 1998. They

cannot be used to identify impacts specific to the 1998 REMS program. Also, taken alone, neither of these analysis approaches provide evidence that REMS helped create the observed market change.

The three surveys used in the market share analysis all had different response rates. The survey done for this study had a 39 percent response rate for nonparticipants and 45 percent overall response rate. The 1997 impact survey response rate was 15 percent for nonparticipants and 19 percent overall. The 1995 impact survey response rate was 26 percent for nonparticipants. These differences mean that there is some possibility that the non-response bias is different for the different surveys, which could skew the results.

To provide some evidence that the REMS created the market changes, we examined actions taken by participants (as reported in the 1997 REMS impact evaluation survey) and compared them to the recommendations provided to them through the audit (as found in the program tracking databases). We identified which recommendations were most often implemented and which were not. We also examined actions taken beyond the audit recommendations, which provides an indication of spillover or market transformation effects. In addition, we compared implementation rates for the phone audit with the direct mail audit, since detailed data on audit recommendations are available for these two program elements.

2.3 PRIMARY DATA COLLECTION AND SAMPLING

This section will provide additional details on the survey implemented to support this study.

Data were collected by telephone from 1998 REMS participants and non-participants in PG&E's service territory. Data collection was conducted using Ci3 for Windows and Sawtooth Software, a computer-assisted telephone interviewing (CATI) software package.

2.3.1 Sampling

Participants in the 1998 REMS program were identified as five different subsets of customers (Table 2-3). These subsets included customers who completed an energy audit by mail, over the telephone, or had an on-site audit completed in their homes. It also includes multi-family property owners who had an on-site audit completed in their buildings. The fifth subset in the participant sample consists of customers who had called PG&E's Smarter Energy Line (SEL) in 1998 but did not have an audit completed. A sample of households was randomly selected from the five individual program participant databases. A total of 348 surveys were completed with participants from this sample.

Table 2-3.
Participants by Audit Type

	Total Participants	Completed Surveys
Direct Mail Audit	61,284	120
Telephone Audit	1,106	83
Onsite Audit	5,888	76
Multi-Family Audit	190	27
SEL Callers	175,740	42

A sample of households was randomly selected from PG&E's customer database for the non-participant sample. This sample was cross-checked with the participant sample to assure that they had not participated in the 1998 REMS program. A total of 275 surveys were completed with customers from this sample.

2.3.2 Survey Implementation

Data were collected from April 19, 1999, to May 12, 1999. As part of the initial telephone call to these phone numbers, businesses and other non-working residential telephone numbers were screened out of the sample. Respondents were also ineligible to answer the survey if they did not own a single family home.[3]

A minimum of eight attempts were made to contact each sampled phone number. Overall, telephone surveys were completed with 45 percent of the valid sample (Table 2-4). The interviews averaged 15 minutes in length.

[3] This was done primarily to maximize the comparability of the 1998 REMS participant and nonparticipant survey data with similar data collected from single-family homeowners in prior studies (e.g., 1995 and 1997 REMS impact evaluation surveys, 1996-1997 process evaluation surveys). It also served to make the survey population match more closely the population of customers who generally receive audits (which typically does not include renters).

Table 2-4.
Residential Sample Baseline Survey Response Rate

	Non-Participants	Participants
Telephone Numbers Sampled	1,160	898
Out of Sample[a]	447	235
Adjusted Sample Size	713	663
Language Barrier/Non-English speaking	34	12
Respondent incapable	17	6
Unavailable for duration of study	16	11
Refusals[b]	140	94
Unable to contact after repeated attempts	231	192
Completed Survey	275	348
Survey Response Rate[c]	39%	52%

[a] No phone number found after calling directory assistance, business number, not in service/disconnected, not a single family homeowner.

[b] Refusal conversion attempts were attempted on all "soft" refusals.

[c] Computed as the number of completions divided by the adjusted sample size.

CHAPTER 2. METHODOLOGY

Tables

CHAPTER 3
1998 REMS PROGRAM DESCRIPTION

PG&E's 1998 Residential Energy Management Service Program (REMS) is a multi-faceted program designed to provide the residential sector with information on energy efficiency. The 1998 REMS includes single family energy audits[1],,hich can be done over the phone through the Smarter Energy Line (SEL), by mail, or on-site by PG&E personnel. In addition the 1998 REMS includes multifamily property energy management on-site audits and Energenius, a series of educational materials on energy efficiency, safety, and the environment for students in grades 1–8. An additional component of the 1998 REMS includes providing energy efficient product information to residential customers and to vendors, manufacturers and sales personnel who produce or sell energy efficient technologies for the residential market. This information is distributed primarily through the SEL.

The 1998 REMS program is designed to mitigate a variety of barriers to purchasing energy efficient products and produce several market effects eventually resulting in a transformed marketplace. Table 3-1 lists the most important barriers targeted by the 1998 REMS program and the desired market effects related to reducing those barriers.

Table 3-1.
Market Barriers Addressed by 1998 REMS and the Intended Market Effects

Market Barriers	***Market Effects***
Low awareness of or understanding of energy efficient products	Increased customer knowledge of their home/facility, how it uses energy, and how to make it more energy efficient
Low awareness of the benefits of energy efficiency	Increased consumer demand for energy efficient products and services
Information or search costs Hassle costs	Reduced information or search costs
Asymmetric Information Technical limitations in assessing options/ understanding technology	Increased customer trust of new technologies Increased demand on manufacturers and trade allies for energy efficient products
Lack of motivation to choose environmentally preferable alternative	Increased awareness of long term benefits of new technologies
Disconnect in customers taking responsibility for their energy use and how it affects the environment	More efficient management of home energy consumption
Availability of information at the time they are making a purchase decision	Increased implementation of efficiency products due to better decision making
Bounded rationality Performance uncertainties	Faster market penetration of new technologies
Organization practices	Reshaping of organization practices
A reduction in all market barriers	Sustainability

[1] REMS documents occasionally refer to their energy audits as "surveys." To avoid confusion with other types of surveys discussed in this document, we used the term audit.

A brief description of each of these components is included in the following sections.[2]

3.1 COMPONENTS OF THE 1998 REMS

3.1.1 Single Family and Multi-Family Audits

Successful distribution of energy efficiency awareness and information is necessary for the development of a more economically efficient market which is required to assure the sustainability of unsubsidized energy efficient products and services. Through single family audits provided via mail, phone and on-site, the program strives to increase customer awareness by providing information on the most cost effective energy improvements that can be made. These education and information efforts are designed to help reduce barriers and increase customers' willingness to make energy efficient improvements to their homes.

The Multifamily Property (MFP) EMS provides energy education to owners and property managers of residential multi-family buildings through on-site audits. MFP's objective is to help customers implement energy efficiency projects, select energy efficient equipment, and control energy use. Energy education improves customer knowledge, creates technology transfer options and reduces several market barriers, while assisting customers' to make the best energy efficiency decisions.

Products and Services

The SEL is the initial point of contact for many of the direct mail and on-site single family energy audits. The entire phone audit is completed through the SEL. The various type of audits and how they are performed is discussed in more detail in the implementation section.

Single family audits are delivered through the Energy Savings Plan (ESP) program and may be performed through on-site visits, telephone (through the SEL), or direct mail. Single family audits focus on the largest energy users in each home, as well as recommended behavioral practices and measures that may be incorporated to reduce energy costs.

The MFP activities range from answering customer questions over the telephone to providing detailed energy reports that include an energy balance, energy saving recommendations and technical information. The technical information can increase the customer's technical understanding of energy efficiency technologies, systems, designs and practices. Multi-family

[2] A more detailed and complete program description can be found in Appendix E. It is supplemented in Appendix F which provides additional information to characterize the participants in the 1998 REMS program. It provides additional background to understand the structure of the market and the types of customers who participate in REMS. It also provides some feedback to program planners on how customers heard of REMS and on customer satisfaction.

tenants also have access to energy savings information available on PG&E's Web site that is focused toward apartment living.

Implementation

The single family audits are marketed primarily through the SEL, direct mail, and PG&E's Web site. Marketing materials include bill inserts, the Spotlight newsletter and brochures. In 1998, the program was featured in articles in the March and October issue of Spotlight. Spotlight is included with the PG&E bill and is sent to all PG&E customers.

A customer interested in the audit program may call PG&E's SEL and speak with a certified energy advisor for 10 to 15 minutes about his or her home's energy usage. The energy advisor performs an in-depth analysis of the customer's energy usage. Each customer is sent a package of information which includes a graph of their 12 month billing history (electric and gas), a pie chart showing the operating cost of their appliances, and customized recommendations on how to cut energy expenses.

For a more detailed energy analysis, a customer may receive a Do-It-Yourself Home Energy Audit in a mailing or may request one from the SEL. The Home Energy Audit includes questions on the customers home and lifestyle including their heating, cooling, water heating, laundry, refrigerators, freezers, food preparation, spas hot tubs and pools, lighting and other appliances. The customer completes the audit, mails it back to PG&E and in a few weeks receives an evaluation of his or her energy use and recommendations on how to save on energy expenses. An Internet version of the home energy audit is expected to be added to PG&E's website in the future.

The multi-family activities range from answering customer questions over the telephone to providing detailed energy reports that include an energy balance, energy saving recommendations and technical information. The technical information can increase the customer's technical understanding of energy efficiency technologies, systems, designs and practices. Multi-family tenants also have access to energy savings information available on PG&E's Web site that is focused toward apartment living.

On-site audits are also available to single family and multi-family customers. A PG&E Division Representative performs the audit of the customer's home or building and presents the customer with an evaluation of his or her energy use and recommendations on how to save on energy expenses.

3.1.2 Residential Energy Education and Information Services

This component of the REMS provides energy efficient product information to residential customers and to vendors, manufacturers, and sales personnel who produce or sell energy efficient technologies for the residential market. Included in these efforts is information on home energy efficiency loans and the statewide CHEERS program (California Home Energy

Efficiency Rating System). The SEL is the primary vehicle for distributing the information for this component of the REMS program.

Products and Services

Energy education and information services provided by PG&E include an overall educational awareness campaign, an educational video series focusing on end use applications, informational videos providing program and related product information, and information fact sheets on various energy efficient products.

Implementation

The overall educational awareness campaign uses various media channels to reach residential market segments and targeted markets. Included in this campaign is dissemination of an educational video series focusing on end use applications and informational videos providing program and related product information. The videos have been sent to manufacturers and retailers, the League of California Cities and all libraries in the greater Bay area. Information sheets were given to vendors and contractors for customer product education and this information was provided directly to customers via PG&E's SEL, on-site audits, and PG&E's Web site.

The two videos currently available to residential customers are High Performance Windows and Horizontal Axis Washing Machines. The following information fact sheets are available:

- Learn where your energy is going (both for single family homes and apartments)
- Home Cooling
- Windows
- Weatherization
- Lighting
- Home Heating
- Heat Pump
- Water Heater
- Home Environmental
- Indoor Air Quality

In 1998, fact sheets, program information, the SEL, and specific energy efficient end uses were highlighted in each issue of Spotlight.

3.1.3 Energenius

The Energenius Educational Series is designed to promote energy efficiency strategies among young people by appealing to their natural playfulness and curiosity about their environment. Energenius programs can be used by educators in sequence or separately to help students understand how they use energy in their expanding world and how they can take positive action

to save energy, conserve natural resources, and stay safe. The Energenius program appeals to students by providing them with colorful posters, handouts, rewards and awards, group learning games and lively videos that empower them to do good in their lives. Educators are attracted to the program because it provides: (1) energy and environmental lessons that interest their students, (2) fully field-tested materials that relate to standard-setting education frameworks, (3) clear detailed lesson plans and (4) materials that take the drudgery out of preparing for class.

Products and Services

The primary school program (grades 1 – 3) focuses on how changing habits can save energy. The intermediate school program (grades 4 – 6) focuses on energy efficient retrofits and the sources of energy. The safety programs for both levels cover indoor and outdoor safety related to energy use.

For middle/junior high school (6 – 8), the program includes an energy analysis of the student's home and their personal energy usage. This program uses computer software as a tool for performing this analysis.

The Energenius programs are:

- Energenius Habits (grades 1 – 3)
- Energenius Measures (grades 4 – 5)
- Energenius Primary Safety (grades 1 – 3)
- Energenius Intermediate Safety (grades 4 – 6)
- Energenius Bill Buster (grades 6 – 8)

Implementation

The Energenius program materials are marketed to appropriate grade levels and school districts through direct mail and PG&E's Web site. Educators and schools within PG&E's service territory can order Energenius programs.

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CHAPTER 4
BASELINE MARKET CHARACTERIZATION

4.1 INTRODUCTION

One of the main goals of this study was to characterize the current market for energy-efficient products and services by creating a comprehensive baseline measure of PG&E customers' attitudes, awareness, and experience with energy efficient products. The baseline study accomplished two objectives: it helped identify all the likely market effects of the 1998 REMS program and it can be used to accurately measure market effects in future studies.

To provide an appropriate baseline characterization of the entire population of single-family homeowners, the analysis in this chapter is based on the entire sample of customers surveyed for this study (both 1998 participants and nonparticipants). This group of customers is referred to as the general population. 1998 REMS participants were oversampled for the survey. Therefore, to include them in the baseline, the data have been weighted to accurately reflect the actual proportion of these customers in the entire population of PG&E customers.

This baseline characterization segregates the analysis into the three main types of barriers relevant to information programs such as REMS: awareness and knowledge, interest and concern, and attitudes toward energy efficiency. (The distinction between these three attributes is explained in detail in the next chapter in conjunction with a discussion of the analysis methods for market effects.) One of the primary factors in determining how effective REMS will be in influencing the general population and how likely the REMS market effects are to last is the amount of communication that participants and the general population do about energy efficiency. As a result, the baseline characterization summarizes how energy efficiency information is currently being communicated by participants and the general population. The following sections present the analysis organized by the three barriers, a section on other barriers, and communication issues. Following that, we present background information that will provide further information for understanding the current market including information on the efficiency of appliances and the housing stock and some general characteristics of the residential customers.

4.2 AWARENESS AND KNOWLEDGE

The general population of PG&E customers believe they do not have an adequate amount of information about energy efficiency to make an informed purchasing decision. Eighty-eight percent of customers said they needed at least a little more information in order to make a

decision about appliance energy efficiency. A similar proportion (90 percent) said the same was true for making a decision regarding furnace or central air efficiency (Table 4-1). Customers felt it was somewhat easy to find information on appliance energy efficiency but more difficult to locate information on furnace or central air conditioning.

Table 4-1.
Energy Efficiency Information Requirements

	General Population
Information needed about energy efficiency for an appliance purchase	
No more information	12%
A little more information	28%
A fair amount more information	33%
A lot more information	28%
Ease of finding appliance energy efficiency information on a 1 – 10 scale (10 = very easy)	6.97
Information needed about energy efficiency for a furnace or a/c purchase	
No more information	10%
A little more information	21%
A fair amount more information	36%
A lot more information	34%
Ease of finding furnace or a/c energy efficiency information on a 1 – 10 scale (10 = very easy)	4.70

The general population of single-family use five main resources for information about the energy efficiency of products (Table 4-2). These include Consumer Reports magazine, the Internet, the respondent's utility, the information label on the product/Energy Guide tag, and contractors or sales people. Substantial percentages of the population also use the library (12 percent) and their friends, family, and co-workers as information resource (10 percent).

Table 4-2.
Resources Used for Energy Efficiency Information

	Percent of General Population Using Source for Appliance Energy Efficiency	Percent of General Population Using Source for Furnace or AC Energy Efficiency
Consumer Reports	41%	54%
Internet	39%	54%
Utility	28%	33%
Information label on product/ the Energy Guide tag	29%	25%
Contractor or sales person	20%	26%
Library	12%	19%
Friends, family, co-workers	10%	19%
Manufacturer information	6%	12%
Technical magazines	5%	8%
Comparison shopping at stores	5%	6%
TV/newspaper/magazine ads	5%	5%
Yellow pages	1%	3%

(Note: Data from open-ended survey question "Where would you look for information …?")

As knowledge score was computed for respondents based on their agreement with three statements that focused on energy issues (Table 4-3). The knowledge score is an average based on a 1 to 10 scale. A high knowledge score indicates a high level of knowledge about energy efficiency. Based on this score of 6, customers appear to be somewhat knowledgeable of energy efficiency. Clearly, there is room for improvement.

The majority of single-family homeowners (57 percent) indicated they would like to make energy efficiency improvements to their home. Of those who had already made improvements in the last 2 years, 60 percent still wanted to make more.

To assess how much of a barrier knowledge issues are to taking energy efficiency actions, a knowledge barrier score was calculated for the general population of customers. Barriers were considered to be in place for customers who indicated they would like to make energy efficiency improvements but have not made those improvements due to a knowledge issue (e.g., don't know what to do, say it's too difficult/they don't know how, say it's too hard to get information). This score indicates that knowledge issues have little impact on customers' decisions to delay necessary energy-related improvements. Customers listed a variety of reasons for not making energy efficiency improvements and only 4 percent cited a knowledge barrier as one of their reasons.

Table 4-3.
Awareness and Knowledge of Energy Efficiency

	General Population
Mean knowledge score[1]	6.07
Percent of customers indicating they would like to make energy efficiency improvements to their home[2]	57%
Knowledge barrier score[3]	4%
Among customers who had already made some improvements in the last 2 – 3 years, percent who were interested in making more improvements	60%

1 Based on a 10-point agreement scale where 10 means strongly disagree. Three items were included: "There is very little I can do to reduce the amount of electricity", "I would like to know more about energy-efficient products/services", "Products that are energy-efficient don't work as well as standard efficiency."
2 Percent of respondent citing a knowledge related reason for not making energy-efficiency improvements they were interested in.
3 Percent citing knowledge issues when asked what disadvantages energy efficiency has.

Among the population of single-family homeowners, there appears to be a high level of knowledge and awareness of the benefits of energy efficiency (Table 4-4). Less than 1 percent of respondents said there are no benefits to energy efficiency. The main benefits cited by customers include saving money on their energy bill, conservation/environmental improvement, and increased comfort. The majority (59 percent) also said there are no drawbacks to energy efficiency. Those who thought of drawbacks listed high initial cost, higher purchase price for an energy efficient home, and inconvenience.

In summary, the main awareness and knowledge barrier appears to be the lack of information customers have when making a purchasing decision. As stated above, most customers feel they need at least a little more information about energy efficiency when purchasing an appliance, furnace, or air conditioner. This need for information is compounded by the fact that very few customers (only 16 percent) are aware of the Smarter Energy Line (at least by name), which is arguably one of the most convenient sources of energy efficiency information available to PG&E customers.

Although lack of awareness and knowledge appear to be a barrier to purchasing energy efficiency appliances, it is not a major barrier to making necessary energy-related home improvements. Only 4 percent who customers who stated they needed to make energy efficiency improvements to their home said they had not yet made those improvements due to a knowledge barrier.

Table 4-4.
Benefits and Drawbacks of Energy Efficiency

Benefits of Energy Efficiency	**General Population**
None	1%
Saving money on energy bill	86%
Conservation/environmental improvement	56%
Increased comfort	11%
Better peace of mind	3%
Better features than standard efficiency appliances	2%
Energy efficient appliances last longer	1%
Drawbacks of energy efficiency	
None	59%
Higher initial cost	16%
Higher initial cost for an energy efficient home	12%
Being energy efficient is inconvenient	9%
Energy-efficient appliances do not have the same features as standard appliances	7%
Comfort/safety concerns	4%
Don't know where to find Energy-efficient appliances	2%
Energy-efficient homes cost more to maintain	2%
Energy-efficient appliances cost more to repair/maintain	2%
Monetary savings are not significant	2%
Unsure of energy-efficient statistics/technology	1%

Multifamily Awareness and Knowledge

The findings from the multifamily survey respondents are summarized below.

- Almost three quarters (74 percent) of multi-family participants say they need more information about energy efficiency to make an appliance purchasing decision. A less, but still significant proportion, 61 percent, say they need additional information about energy efficiency to make a furnace or air conditioner purchasing decision.

- Multifamily participants feel it is easier to find information on appliance energy efficiency (giving an average easiness rating of 6.4 on a 10-point scale) than it is to find information on furnace or air conditioner energy efficiency (average rating 4.2 on 10-point scale).

- The utility was the most mentioned source for both appliance and furnace and air conditioner energy efficiency information. The manufacturer and the information on the product itself were also mentioned by several multifamily participants as a source of information for appliance efficiency. Contractors were listed as one of the most popular sources of information for furnace and air conditioner efficiency.

- Over one third (37 percent) of multifamily participants said they would like to make energy efficiency improvements to their buildings. Of those, 27 percent have not yet made those improvements due to knowledge issues (i.e., don't know what to do, don't know how).

- Over two-thirds (69 percent) of multifamily participants said there are no drawbacks to energy efficiency. Benefits of energy efficiency listed by the most multifamily participants are saving money on energy bills and conservation/environmental improvement.

4.3 INTEREST AND CONCERN

Interest in energy-efficiency products and services were computed for each respondent based on their agreement with five attitude statements that focused on interest in energy efficient products or actions. The interest score is an average based on a 1 to 10 scale. A high interest score indicates a high level of interest in energy efficient products and actions. The score of 6.79 indicates that customers appear to be very interested in energy efficiency although there is room for improvement (Table 4-5).

Respondents were asked how likely (using a 10-point scale) they would be to energy efficiency options before they purchased a new appliance, furnace, or air conditioner. The score of 7.06 indicates that on average customers are very likely to research their energy efficiency options.

Respondents were also given two different communication scores based on whether they actively communicated about energy efficiency, home energy audits and the SEL (Table 4-5). The first general communication score is simply the percentage of customers who indicated they were involved in at least one form of communication about energy efficiency, either by initiating or participating in a discussion about energy efficiency, or telling people about the home energy audit or the SEL. The second communication score counts the total number of different ways people communicated about energy efficiency. For example, if a customer said he or she participated in conversations about energy efficiency, told others about the home energy audit that was completed in their home and recommended the home energy audit to friends, family and co-workers his or her score would be 3.0. The overall score for the general population of customers is expressed as an average.

Although a significant proportion of customers communicate about energy efficiency (48 percent) they only communicate in one or two ways (average score 1.06).

Table 4-5.
Interest in the Topic of Energy Efficiency

	General Population
Interest in energy efficiency[1]	6.79
Average likelihood of researching energy efficiency options before purchasing a new major appliance	7.06
Average likelihood of researching energy efficiency options before purchasing a furnace or air conditioner	6.97
General communication score (communicate about energy efficiency in some way)	48%
Average number of different ways customers communicate about energy efficiency	1.06

1 Based on a 10-point agreement scale where 10 means strongly agree. Five items were included: "I am not very concerned about the amount of energy used in my home", "My life is too busy to worry about making energy related improvements", "Conserving energy is an economic necessity for me", "Energy efficiency is a low priority compared to other things that need to be done in my home", "I am always looking for new ways or products that will help me to conserve energy in my home."

The combination of data illustrated in Table 4-6 indicate that people are generally quite interested in and concerned about energy efficiency. Based on the seven items included in the survey however, customers do not appear to be interested or concerned enough to communicate about energy efficiency often during daily interactions with others.

Single-family homeowners' interest in making energy efficiency improvements is very dependent on how energy efficient they think their home is (Table 4-6). Respondents were interested in making energy efficiency improvements gave the statement "My home is very energy-efficient" a mean rating of only 5.38 on the same 10-point scale. Customers who are not interested in making any improvement, however, give the same statement a mean rating of 7.37 on a 10-point scale.

Table 4-6.
Interest in Energy Efficiency Actions

	General Population
Average agreement with the statement "My Home is Very Energy Efficient"[1]	
Among customers who would like to make energy efficiency improvements to their home	5.38
Among customers who DO NOT want to make energy efficiency improvements to their home	7.37
Among customers who have made some energy efficiency improvements to their home in the past 2 to 3 years	6.27
Among customers who have NOT made energy efficiency improvements to their home in the past 2 to 3 years	6.28
Lack of interest barrier[2]	10%
Customers interested in having a home energy audit conducted in their home	40%
Average agreement with the statement "My Home is Very Energy Efficient"	
Among customers were interested in having a home energy audit	5.94
Among customers who were NOT interested in having a home energy audit	6.43

1 Agreement on a 10-point scale, where 1 meant strongly disagree and 10 meant strongly agree.
2 Customers who indicated they would like to make energy efficiency improvements but have not made those improvements due to a lack of interest (i.e., gave no specific reason, plan to move soon, don't have time).

A lack of interest score was calculated for respondents who indicated they would like to make energy efficiency improvements but had not yet made those improvements. It appears that only 10 percent of customers are delaying energy efficiency improvements due to a lack of interest.

Forty percent of respondents were interested in having an energy audit conducted on their home. This varied slightly depending on how energy efficient the respondent thought their home was. Customers who were interested in having a home energy audit perceived their home to be less efficient than those who were not interest in having the audit conducted.

Multifamily Interest and Concern

Multifamily interest and concern findings are summarized below.

- Multifamily participants are likely to research the energy efficiency of an appliance or furnace or central air conditioner before making a purchase (giving a mean rating of 7.2 and 6.3 respectively on a 10-point likelihood scale).

- Forty percent of multifamily participants strongly agree with the statement, "My building is very energy efficient" (giving a rating of 8, 9, or 10 on a 10-point agreement scale).
- Thirty-nine percent of multifamily participants said they would be willing to pay $300 for an energy audit of their building. An additional 27 percent would be willing to pay $25 or more for an energy audit.
- 82 percent of multifamily participants have initiated discussions with co-workers about energy efficiency, 67 percent have initiated discussions with others, and 70 percent have participated in discussions about energy efficiency.

4.4 ATTITUDES

Attitude towards energy efficiency was computed for each respondent based on their agreement with several statements that addressed attitudes towards energy efficient products or actions. The attitude score is an average based on a 1 to 10 scale. A high score indicates a positive attitude towards energy efficient products and actions. Based on this score, customers appear to have a positive attitude towards energy efficiency (although as with the knowledge and interest score there is room for improvement) (Table 4-7).

A second attitude score was calculated for customers who indicated they would like to make energy efficiency improvements. This score was based on the reasons they gave for not making the improvements and is expressed as a percentage of customers. A high percentage would indicate that a substantial portion of customers are not making energy efficiency improvements because of negative attitude issues. Twenty-eight percent of customers are not making desired energy efficiency improvements due to a negative attitude about energy efficiency.

Table 4-7.
Attitude Towards Energy Efficiency

	General Population
Positive Attitude Towards Energy Efficiency Score[1]	6.78
Negative attitude towards making energy efficiency improvements[2]	28%

1 Based on a 10-point agreement scale where 10 means strongly agree. Four items were included: "It is possible to save energy without sacrificing comfort by improving the efficiency of my home", "Instead of building new power plants, customers should use less electricity", "Energy efficient products are too expensive", "Products that are energy efficient don't work as well as standard efficiency products".

2 Percent of the respondents who indicated they would like to make energy efficiency improvements but have not made them for reasons related to a negative attitude toward energy efficiency.

A factor analysis was conducted on the battery of statements that represent different customers' views about purchasing energy efficient products. Factor analysis is a statistical technique that groups items based on their inter-correlation so that items that are highly inter-correlated "load"

together on one factor. This technique is used to identify the underlying dimensions in a set of items and to understand which types of items load together.

The factor analysis was conducted on 13 statements in the survey that primarily address attitudes. Two of the items were dropped from this analysis because they were not highly inter-correlated on any one factor. The results of the factor analysis of the remaining 11 items show that several different dimensions underlie customers' opinions about energy efficient products and actions, and these dimensions operate somewhat independently of each other. This is illustrated by the high loading on one factor and generally lower loadings on the other factors suggesting that this dimension is relatively unique.

Table 4-8.
Summary of Factor Analysis

Items	Factor 1	Factor 2	Factor 3	Factor 4
Too Busy to Care				
Energy efficiency is a low priority compared to other things that need to be done	.73	.006	-.002	.21
My life is too busy to worry about making energy-related improvements	.65	.27	-.005	-.11
I am not very concerned about the amount of energy used in my home	.64	-.001	.001	-.12
Take Responsibility				
It is possible to save energy by improving the energy efficiency of my home	-.12	-003	-.006	.74
Instead of building new power plants customers should use less electricity	.12	-.008	.18	.68
Motivated by Savings				
My home is very energy efficient	.11	-.26	.78	-.19
I am always looking for new ways to conserve energy in my home	-.31	.22	.60	.31
Conserving energy is an economic necessity for me	-.001	.34	.59	.21
Lack Good Information				
Energy efficient products are not always available in the stores where I shop	.004	.70	-.002	-.14
Energy efficient products are too expensive	.19	.61	.002	-.003
I would like to know more about energy efficient products and services	-.31	.49	.20	.34

Factor 1 is made up of three items that have high loadings. These items express a feeling among households that life is busy and energy efficiency is a low priority compared to the multitude of

daily responsibilities. This dimension is labeled "Too Busy to Care". Customers who have high scores on this dimension lack an interest in energy efficiency due to their busy lifestyles.

Factor 2 is the "Lack Good Information" dimension. It includes three items that load highly. This factor captures the idea that some customers still do not have good information about initial cost versus operating cost and where to find energy efficient products.

Factor 3 illustrates the dimension that the potential savings of energy efficiency actions makes them a worthwhile endeavor. The "Motivated by Savings" factor includes three items that have high loadings. Customers who score high in this area have already made energy efficient improvements, have realized savings, and therefore are motivated to search out additional energy efficient actions.

Factor 4, "Take Responsibility," includes two items that load highly. Customers who score high on this dimension seem to feel that people need to take responsibility for their energy actions and it is every person's responsibility to conserve energy.

Based on the factor analysis results, each respondent was then assigned a score for each of the four factors. For example, the Factor 1 (Too Busy to Care) score of a respondent is the average of the responses the respondent gave to the three components (see Table 4-15) that correlated with Factor 1. Table 4-9 below shows the distribution of these four factors among all respondents. The number in each cell of the table represents the percentage of respondents with a certain level of strength toward an factor. The highlighted cells indicate the magnitude of barriers to adoption of energy efficient products and services: strong "Too Busy to Care" and "Lack Good Information" and weak "Motivated by Savings" and "Take Responsibility."

Table 4-9.
Factor Analysis Barriers
(highlighted)

Level of Strength (range on 10-point scale)	Factor 1: Too Busy to Care	Factor 2: Lack Good Information	Factor 3: Motivated by Savings	Factor 4: Take Responsibility
Strong (8-10)	6%	15%	29%	33%
Medium (4-7)	52	68	67	59
Weak (1-3)	42	17	5	8
Total	100%	100%	100%	100%

About 6 percent of the respondents indicated strongly they were too busy to care about energy efficiency issues. Over one-seventh expressed strongly that they did not have good information about how to get energy efficiency products and services. About 5 percent of the respondents indicated that their motivations to search out energy efficient products and services were weak.

About 8 percent of the respondents showed little interest in taking responsibility to conserve energy. In sum, the biggest barrier is the lack of information. The inhibiting effects of the other three factors: the feeling that one is not responsible for energy conservation, having a lifestyle that is too busy to care about energy efficiencies and the lack of motivations to save energy, seem weaker.

Multifamily Attitude Issues

Multifamily participants were asked to rate their agreement or disagreement to a battery of attitudinal statements about energy efficiency. For the purposes of this analysis a rating of an 8, 9 or 10 indicated a strong level of agreement to the question. A summary of the statements that a large proportion of participants strongly agreed with is summarized below.

- 81 percent of multifamily participants strongly agree with the statement "Conserving energy is an economic necessity for me".
- 74 percent of multifamily participants strongly agree with the statement "It is possible to save energy by improving the energy efficiency of my building".
- 70 percent of multifamily participants strongly agree with the statement "I am always looking for ways to conserve energy in my building".
- 67 percent of multifamily participants strongly agree with the statement "I would like to know more about energy efficient products and services".

4.5 OTHER BARRIERS

When the results of the analysis illustrated in this chapter is analyzed as a whole, two other barriers to implementing energy efficient actions become apparent. These are financial barriers and time barriers.

4.5.1 Financial Barriers

Three different data points indicate there are financial barriers to implementing energy efficiency products and services. These include (1) a listing of the drawbacks of energy efficiency (2) reasons given for not making necessary energy efficiency improvements, and (3) the factor analysis:

- *Drawbacks to energy efficiency.* When asked to list the drawbacks to energy efficiency, 16 percent of customers indicated the higher initial cost of energy efficient appliances, 12 percent said the higher initial sale price of energy efficient homes, 2 percent said that energy efficient homes are more costly to maintain, and 2 percent said that energy efficient appliances are more costly to repair and maintain.

- *Reasons for not making energy efficiency improvements.* Customers who said they would like to make some energy efficient improvements to their home were asked why they had not yet made those improvements. 62 percent said they could not afford the improvements and 4 percent said the cost was not worth the benefits.

- *Factor Analysis.* The "Lack Good Information" dimension includes the item "Energy efficient products are too expensive".

This combination of data clearly illustrates that at least some customers feel that there are financial barriers to implementing energy efficiency actions.

4.5.2 Time Barriers

The same three data points described above can also be used to illustrate the presence of time barriers to implementing energy efficiency actions. These data are summarized below.

- *Drawbacks to energy efficiency.* 9 percent of customers indicated that one of the drawbacks to energy efficiency is the fact that being energy-efficient is inconvenient.

- *Reasons for not making energy efficiency improvements.* 17 percent of customers who said they would like to make some energy efficient improvements to their home said they had not yet made those improvements because they did not have the time.

- *Factor Analysis.* The "I'm Too Busy" dimension clearly indicates that being energy efficient is considered a time-consuming task that some customers are simply too busy to tackle.

By itself, the time barrier does not appear to be significant in comparison to the other barriers identified in this chapter. But it is most likely an underlying dimension in several of the major barriers to implementing energy efficiency actions insufficient information about and lack of interest in energy efficient products and services.

4.6 INFORMATION AND COMMUNICATION

A sizable proportion of PG&E's single-family homeowners communicate with others about energy efficiency (Table 4-10). Forty-three percent of respondents reported initiating conversations about energy efficiency outside of their immediate family, and the same proportion said they participated in energy efficiency discussions that were started by others.

It is interesting to note that although the utility was listed as a main resource for energy efficiency information (Table 4-2), only 16 percent of customers are aware of the Smarter

Energy Line by name[1] and only 12 percent have called the SEL (Table 4-11). Customers do not appear to associate calling the utility with calling the SEL, even though it is extremely likely that if they received information on energy efficiency from the utility the flow of that information was initiated by a call to the SEL.

In general, customers who reported contacting the SEL became aware of it through a PG&E source, either from information about the 1-800 number included in their PG&E bill, a message on the back of their bill, or in the PG&E newsletter "Spotlight" (Table 4-2).

Table 4-10.
Percent Who Communicated about Energy Efficiency

	General Population
Initiated conversations about energy efficiency	43%
Participated in conversations about energy efficiency initiated by others	43%
Called the Smarter Energy Line (SEL)†	12%

† Only customers who were aware of the SEL were asked this question.

[1] Respondents were asked if they had heard of the SEL. If they replied "No," the SEL was defined and they were asked again. 16 percent answered "No" to *both* questions.

Table 4-11.
Knowledge of and Communication about PG&E's Smarter Energy Line

Percent of General Population Aware of the Smarter Energy Line	16%
Among those aware of the SEL[1]	
How heard about the SEL?	
Information inside PG&E bill	37%
Message on back of the PG&E bill envelope	23%
PG&E Newsletter "Spotlight"	21%
Newspaper, magazine ad	10%
Received information in mail	7%
TV, radio advertisement	3%
Information tag posted on appliances	3%
Friend, family, co-worker	2%
Internet	2%
Other	5%
Among those who called the SEL[1]	
Outcome of SEL call[2]	
Sent materials on energy efficient products	73%
Referred to another program or service	33%
Offered to complete a home energy audit over the phone	33%
Communicated about the SEL call[2]	
Mentioned call to others	57%
Recommended SEL to friends, family, co-workers[3]	56%
Showed materials received to people outside the immediate family	38%

[1] Only the 16 percent of the general population who had heard of the SEL or were aware of the SEL were asked these question.
[2] Only people who had heard of the SEL or were aware of the SEL and reported calling the SEL were asked this questions.
[3]Only people who reported mentioning the SEL call to others were asked this question.

Of those who contacted the SEL, the majority (73 percent) said they received information about energy efficient products. A third were offered the home energy telephone audit and a third were referred to another program or service.

People who contacted the SEL hotline tended to market it via word of mouth. Over half of the respondents who contacted the SEL said they mentioned the call to others (57 percent) and of those 56 percent recommended the SEL to friends, family and co-workers. Thirty-eight percent shared the materials they received with people outside their immediate family.

According to the general population of single-family homeowners, PG&E is the main provider of home energy audits (Table 4-12). Eighty-eight percent of customers who had heard of a home energy audit listed PG&E as a provider of this service. Eighty percent of those who knew about audits had one completed by PG&E.

Forty-eight percent of the customers who had an audit completed mentioned the service to people outside their immediate family and 75 percent recommended the audit to others. The audit report is generally not shared with others. Only 6 percent of customers who had an audit completed and still had their report said they showed the report to anyone outside of their immediate family.

4.7 EFFICIENCY OF APPLIANCES AND HOUSING STOCK

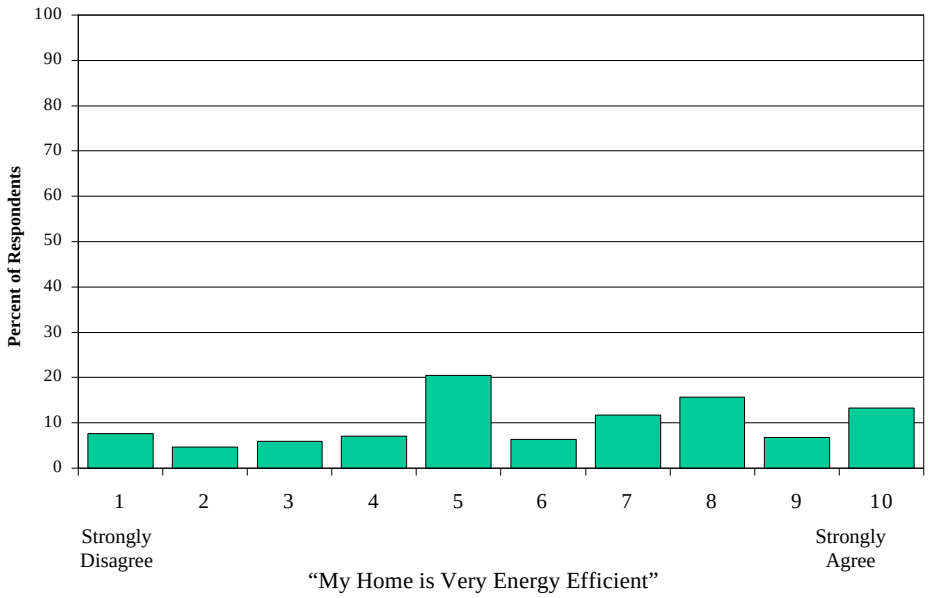
Figure 4-1 illustrates customers' perception of their home's energy efficiency. Only 40 percent of customers agree with the statement "My home is very energy efficient" (giving a rating of 8, 9, 10 on a 10-point agreement scale).

Table 4-12.
Knowledge of and Communication about Home Energy Audits

Percent of General Population Aware of Energy Audits	69%
Among those aware of energy audits	
Who provides home energy audit?	
PG&E	88%
Contractors	17%
Other utility	12%
Sales people	5%
Government/state agency	4%
Independent service company	3%
Other	3%
Among those who had an energy audit completed	
Who conducted their home energy audit?	
PG&E	80%
Contractors	5%
Other utility	6%
Government/state agency	3%
Private independent company	3%
Other	3%
Communicated about the home energy audit	
Mentioned audit to others	48%
Recommended audit to friends, family, co-workers[1]	75%
Showed report to people outside of the immediate family[2]	6%

1 Only customers who said they mentioned the audit to others were asked this question.
2 Only customers who said remembered receiving a report and said they still had the report were asked this question.

Figure 4-1.
Customer's Perception of the Efficiency of their Home



Sixty-eight percent of the general population of single-family homeowners have done something to improve the energy efficiency of their home in the past two to three years (Table 4-13). The majority of these improvements include purchasing a more energy-efficient appliance, installing new windows, installing insulation, self-regulating their own energy use, adding weatherstripping or caulking, and installing compact fluorescent or energy-saving light bulbs.

Table 4-13.
Reported Energy Efficiency of Homes

	General Population
Have made improvements in the energy efficiency of my home in the past 2 to 3 years	68%
Types of improvements made	(Percent of those who reported making improvements)
Purchased more efficient appliance	58%
Installed new windows	26%
Installed insulation	18%
Regulated my own energy use	16%
Added weatherstripping or caulking	14%
Installed CFL or energy saving light bulbs	9%
Installed water heater or pipe wrap	5%
Installed new doors	5%
Put in screens/shades to block sun	4%
Built/buying an energy efficient home	4%
Installed programmable thermostat	3%
Installed new roof	3%
Installed ceiling fans	2%
Regular maintenance/cleaning of appliances	2%
Installed low flow showerheads/faucet aerators	2%
Other	1%

4.8 GENERAL CHARACTERIZATION OF RESIDENTIAL CUSTOMERS

In order to completely understand the general population of customers reported on in this chapter their demographic characteristics and appliance holdings were examined.

4.8.1 Demographics

Over one-half of the general population of single family homeowners surveyed live in residences that are less than 30 years old and less than 2000 square feet in size (Table 4-14). Households are typically made up of two adults or less (80 percent) and only 40 percent of households have children under the age of 18 living at home.

Table 4-14.
Household Characteristics

	General Population	
Age of home	Percent	Cumulative Percent †
Less than 5 years	9%	9%
5 to 9 years old	8%	17%
10 to 19 years old	21%	38%
20 to 29 years old	19%	56%
30 to 39 years old	16%	72%
40 to 49 years old	11%	83%
50 years or older	16%	100%
Size of home		
Less than 500 sq. ft.	>1%	>1%
500 to 1,499 sq. ft	26%	26%
1,500 to 1,999 sq. ft	33%	59%
2,000 to 2,499 sq. ft.	20%	79%
2,500 or more sq. ft.	21%	100%
Number of adults living in household		
One	19%	19%
Two	61%	80%
Three	11%	91%
Four	5%	96%
Five	4%	100%
Number of children under 18 in household		
None	60%	60%
One	17%	77%
Two	15%	92%
Three	5%	97%
Four	2%	99%
Five	1%	100%

† Totals may not equal 100 due to rounding.
Source: Customer survey implemented for this study.

The majority of respondents were 35 years old or older and had a high school or college education (Table 4-15). Household incomes were generally $50,000 or more. Fifty-three percent of respondents were male and 47 percent were female.

Table 4-15.
Respondent Characteristics

	General Population	
	Percent	Cumulative Percent
Age of respondent		
18 – 24 years old	3%	3%
25 – 29 years old	4%	7%
30 – 34 years old	7%	14%
35 to 44 years old	24%	38%
45 to 54 years old	22%	60%
55 to 64 years old	16%	76%
65 to 74 years old	16%	92%
75 years old or older	8%	100%
Education level of respondent		
Grade school	1%	1%
Some high school or less	2%	3%
High school graduate (or GED)	22%	25%
Some business, technical or junior college	2%	27%
Completed business, technical or junior college	4%	31%
Some college	25%	56%
Completed 4 yr. College	26%	82%
Some graduate school	7%	89%
Completed graduate school	11%	100%
Annual household income for 1998		
Less than $10,000	3%	3%
$10,000 to $20,000	7%	10%
$20,000 to $30,000	8%	16%
$30,000 to $40,000	10%	26%
$40,000 to $50,000	13%	39%
$50,000 to $75,000	23%	62%
$75,000 to $100,000	17%	79%
Over $100,000	21%	100%

4.8.2 Appliance Holdings

The best source available for information on the types of appliances PG&E customers currently have in their homes is the 1997 REMS Impact Evaluation. The data summarized in this section are from that report and were collected in the fall of 1998 from a random sample of PG&E customers who did not participate in the REMS program.

Natural gas is the fuel of choice for heating and water heating (Table 4-16). However, the majority of customers use electric clothes dryers, ranges, and ovens. Only 31 percent have electric central air conditioning, and only 3 percent use electric window or room air conditioning. Almost all customers have a refrigerator and a clothes washer; the majority have a dishwasher and over a third have stand-alone freezers. A small proportion of customers have dehumidifiers, saunas, and swimming pools.

Table 4-16.
Appliance Holdings

	General Population
Natural gas heating	78%
Electric heating	9%
Natural gas water heater	83%
Electric water heating	9%
Natural gas clothes dryer	33%
Electric clothes dryer	58%
Natural gas range	38%
Electric range	53%
Natural gas oven	29%
Electric oven	49%
Electric central air conditioning	31%
Electric room or window air conditioning	3%
Refrigerator	98%
Clothes washer	95%
Dishwasher	76%
Stand-alone freezer	39%
Dehumidifier	6%
Sauna	15%
Swimming pool	10%

Source: 1997 REMS Impact Evaluation

CHAPTER 4. BASELINE MARKET CHARACTERIZATION

Tables

Figures

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CHAPTER 5
MARKET EFFECTS

5.1 INTRODUCTION

The Scoping Study[1] discusses many possible barriers to energy efficiency. The REMS program tackles some of these directly and other more indirectly. The most important ones that REMS directly addresses are information-related and specifically related to the information on energy efficiency that is available to residential customers.

In this report, we have treated information barriers as made up of several aspects and not as one-dimensional (e.g., "People do not know enough about energy efficiency"). Three main areas are covered — customer awareness and knowledge of energy efficiency issues; their interest and concern about these issues; and their attitudes towards various energy efficiency issues. Obviously, these knowledge-related aspects are interrelated, and many of the measurement methods we used covered all aspects at once. However, by dividing the analysis into these aspects, we hope to present a clear and reasonably precise story of the potential market effects of the REMS program.

Demonstrating market effects involves three related evidences: (1) that a market change has occurred; (2) that the program created the observed market change (*attribution*); and (3) that the change will last in the absence of program intervention (*sustainability*). We summarize the attribution evidence in its own separate section because many of these arguments are common to more than one information-related market change. The same is true for sustainability — evidence that the market changes are likely to last over time — which is also summarized in its own section. When evidence for either attribution or sustainability are related to the specific market change under discussion, we address that evidence in the discussion.

The following section will provide an introduction to the organization we will use for examining the market effects. Following that is an introduction to the logic of the analysis, which discusses the options we had for attempting to prove the existence of market effects. The remaining sections present the evidence for market changes, evidence for attributing those changes to the REMS program, and evidence that the changes are likely to last.

[1] Eto, et. al. 1996.

5.1.1 An Overview of the Testable Information Issues

Information programs like REMS achieve their goals by changing what people know, the way they think, and what they believe. In this study, three information-related issues were testable: customer awareness and knowledge, their interest and concern in efficiency issues, and their attitudes towards energy efficiency. These three issues are expressed below as barriers to energy efficiency actions.

The Awareness and Knowledge Barrier – When this barrier is operating, people do not have not enough information to act on efficiency issues. They may or may not recognize their lack of knowledge. This barrier resembles a continuum rather than a distinct state. The following stages are involved:

1. Aware of the issue but have little knowledge
2. Aware of some options and know something about the options but not enough to feel comfortable
3. Aware of most or all options and know a fair amount about them
4. Expert

The nature of the continuum leads us to the following overall hypothesis:

> **Hypothesis: REMS will raise the awareness and knowledge of residential customers on the lower end of the continuum, which should then lead them to make energy-efficient purchases and actions.**

The Interest and Concern Barrier —People with this barrier do not care enough about energy efficiency to act. They do not necessarily lack knowledge and are likely not to care if they do. This barrier has two main components:

- Lack of concern about energy (independent of knowledge)
- Too busy to think about it, too wealthy to care, too little consumption to care (e.g., small apartment dweller)

This leads to the following hypothesis:

> **Hypothesis: REMS will help residential customers see the value in saving energy, even if it benefits society in general and not them specifically (e.g., for the wealthy and small users). The increase in value they ascribe to energy issues will cause them to change their behaviors and purchasing patterns.**

The Attitude Barrier —People with this barrier think acting on efficiency issues would not be in their best interest. They may not think they lack knowledge and they probably do not care to learn. This barrier has two main components:

- Belief that efficient means uncomfortable, unreliable, short-lived, or expensive.

- Belief that "efficient" technologies will end up costing more money either because they are too expensive up front or because the advertised savings will not appear.

This leads to the following hypothesis:

> **Hypothesis: REMS will educate residential customers on the positive characteristics of energy-efficient equipment and behaviors, improving their negative attitude, which in turn will cause them to change their behaviors and purchasing patterns.**

The importance of these three knowledge-related issues and their distinct nature can be seen in this commonly-accepted truism: For people to take voluntary conservation actions, they must first be aware that energy efficiency is an issue; they must then understand how they can act to improve efficiency; they must then care enough about the topic to implement the action; and last, they must believe their actions will have the desired effect.

5.1.2 Introduction to the Logic of the Analysis

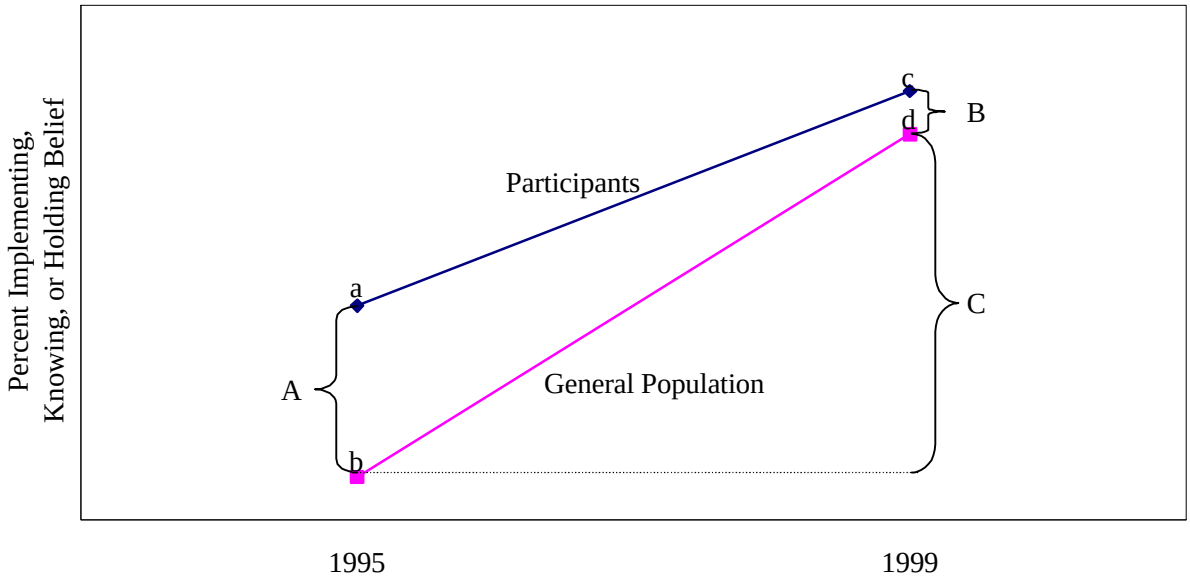
We used three types of analyses when looking for evidence a change had taken place — time series analysis, gap analysis, and threshold or diffusion of innovation effect. We also use a correlation analysis to present evidence for attributing market changes to the REMS program.

The simplest and most direct evidence of market change comes from a ***time series analysis***. Changes over time in an attribute of the general population[1] provide evidence that a market change has occurred. This is illustrated in Figure 5-1 as the change from point b to point d for the general population. If the change "C" is positive (that is to say if d is greater than b), and the attribute in question is a positive attribute, then a positive market change has occurred. (By "positive" attribute we mean one where an increase is a sign of increased energy efficiency behavior. For example, the installation rate of pipe wraps would be a positive attribute, whereas the skepticism about the validity of savings estimates would be a negative attribute.)

Time series analysis is valid and accurate when the methods used to collect the historical and current data are comparable. When data collection methods differ enough to make time series analysis suspect but the same attribute is being measured, the data can still be used to measure market changes by using what we call ***gap analysis***. If the size of the gap between participants and the general population in an energy efficiency attribute has declined over time, this provides evidence of a market change. This is illustrated in Figure 5-1 where the gap between participants and the general population has shrunk from A in 1995 to B in 1999.

[1] The data from participants and nonparticipants was combined to form the group referred to as the "General Population" of customers throughout this report. 1998 REMS participants were oversampled for the survey, therefore the data were weighted in order to accurately reflect the proportion of participants in the entire population of PG&E customers.

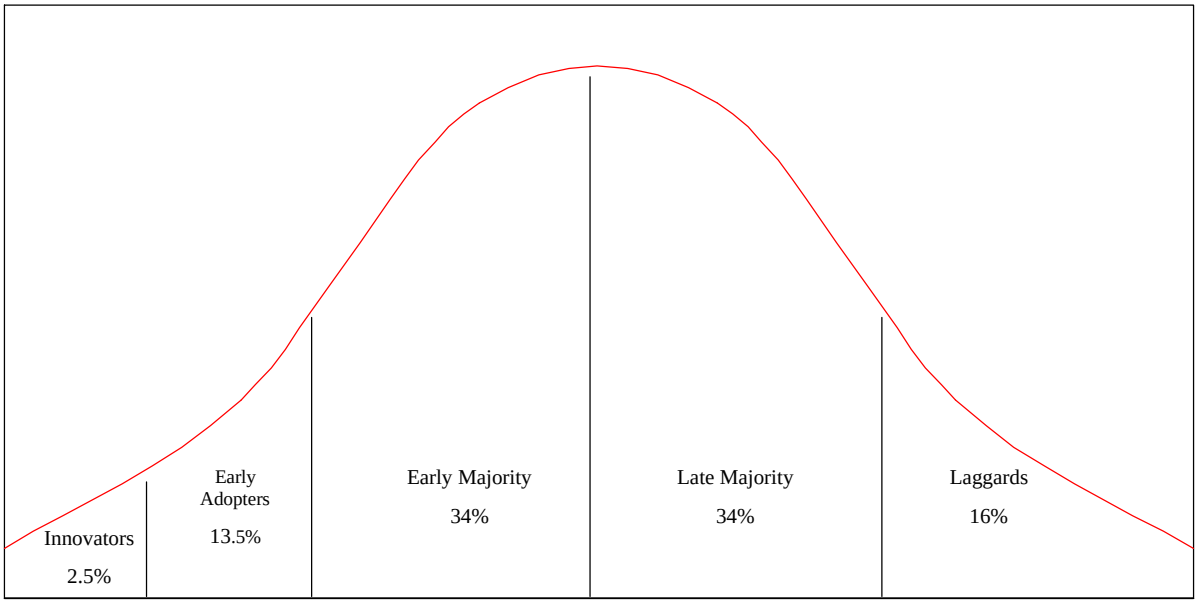
Figure 5-1
Analysis Logic



A third analysis used in this study is based on the diffusion of innovation literature. For most of our applications, this argument takes the following form: If an attribute has become common enough in the general population, it is likely to persist over time on its own momentum (that is, absent any further program intervention). We will refer to this as the ***threshold*** or ***diffusion of innovation*** argument. The persuasiveness of this argument is based not on the direct measurement of a change over time but on the expectation that in the future the attribute in question will behave in a manner consistent with the observed behavior of *other* attributes over time (usually from some other field entirely).

The bell-shaped curve has traditionally been used to illustrate the distribution of adoption for a new attribute (Figure 5-2). The adoption of the attribute results from interpersonal communication —people who adopted the attribute talk about it with others. As more and more adopters discuss the attribute with others, others will be influenced to adopt the attribute themselves, and the bell-shaped curve begins to level off and decline. Thus the proportion of the general population who have not adopted the attribute becomes smaller and smaller. Figure 5-2 illustrates the five categories of adopters defined by the diffusion of innovation literature.

Figure 5-2
Categories of Adopters



Source: Rogers

According to the literature, there is a point in the adoption process where the threshold level of diffusion has been reached. This is when the bell-shaped curve has reached its peak and interpersonal networks have become activated. "After this point, it is often impossible to stop the further diffusion of a new idea, even if one wished to do so." (Rogers).

This threshold level includes three categories of adopters —the innovators, early adopters and early majority. Once the early majority has adopted an attribute (50 percent of the general population) "critical mass" has occurred and the attribute's further rate of adoption is self-sustaining. In other words, the threshold level of adoption is 50 percent.

Finally, a fourth type of argument is used for attributing market effects to the influence of the REMS program, which we will call the ***correlation*** argument. The REMS program is only one of many factors that could be contributing to the creation of individual market effects. There were other energy efficiency activities going on in PG&E's territory at the same time, including other PG&E programs, the EPA Energy Star program, and educational efforts of manufacturers, distributors, retailers, and non-profit organizations, to name a few. In many cases it would be difficult if not impossible to separate out the influence of individual efforts in any precise way. However, because we know that more time, money, and effort was expended under some programs than under others, it seems reasonable to allocate credit for creating market effects based on the rough **correlation** between the level of program activities and market effects.

5.2 AWARENESS AND KNOWLEDGE ISSUES

The REMS program is designed to overcome several barriers associated with awareness and knowledge including low awareness of the long-term benefits of energy efficiency and low awareness or understanding of energy-efficient products.

This section looks at four potential market effects related to awareness and information:

- Increased awareness of home energy surveys and the Smarter Energy Line
- Increased awareness of potential energy efficiency improvements
- Improved general knowledge about energy efficiency issues
- Decreasing proportion of customers citing an information-related disadvantage of energy efficiency.

Hypothesized Market Effect: If REMS is educating the general population about energy efficiency, then the percent of this population who know that audits are available and who are aware of the SEL should be high.

Most respondents had heard of home energy surveys (described in some detail by the interviewer) (Table 5-1). Not surprisingly, participants are much more aware of audits than is the general population. The percentages are above the diffusion of innovation threshold level for all groups.

The evidence of market effects based on awareness of the SEL is more problematic, however. Awareness of the SEL is low, even among current-year REMS participants. Other-year participants had the highest level of awareness of both the home energy audit and the SEL.

Table 5-1
Percent Aware of Home Energy Surveys and the SEL

	Aware of Home Energy Surveys †	Aware of SEL
General Population	69%	16%
Current-Year Participants	90%	19%
Other-Year Participants	100%	20%

† Had heard of audits (not necessarily REMS audits).

Although awareness of the name “Smarter Energy Line” was low among all groups of customers, the evidence exists that customers are calling their utility for energy efficiency information. As discussed in the Market Characterization chapter, “the utility” was listed as one

of the top sources for appliance, furnace, and central air conditioner energy efficiency information.

One possible explanation for the lack of recognition of the name is that customers may not associate calling the SEL with calling their utility. They may be calling the utility for information, not realizing that the number is actually the Smarter Energy Line. If that is the case, name recognition not lack of awareness is more likely to be the problem with the SEL.

> **Hypothesized Market Effect: If REMS is educating the whole market about energy efficiency, then the percent of the general population who know of energy efficiency improvements they would like to make should be increasing.**

Both the 1999 REMS survey and the surveys carried out for the 1996/7 PG&E Residential Program Evaluation asked respondents whether there were any improvements they would like to make to their homes to save energy. As Table 5-2 shows, the percent answering "yes" increased 8 percent from 1996/7 to 1999. Using the time series argument, the 8 percent increase in the general population compared to a 0.9 percent increase for participants in the same time period provides evidence that the market is moving toward more awareness of energy efficiency. The gap analysis argument could also be used as evidence. The difference between the general population and current-year participants in 1996/7 was 4.2 percent and it declined to only 2.9 percent three years later, providing evidence that the general population is moving in the same direction as the participants.

Table 5-2
Percent Who Know of Efficiency Improvements They Would Like to Make

	1996/7	1999	Change
General Population	49.1%	57.1%	+8.0%
Current-Year Participants	53.3%	54.2%	+0.9%
Other-Year Participants		51.4%	

(This data also provides evidence of more *interest* in and *attitude* toward energy efficiency, as we will discuss in subsequent sections. We will use this data in each section, not to double-count effects but to provide supportive evidence that effects of a specific nature exist.)

Hypothesized Market Effect: If REMS information dissemination activities are improving the general understanding of energy efficiency, then the proportion of customers who do not make energy efficiency improvements due to a lack of knowledge should be declining.

Respondents in the 1999 and 1996/7 surveys who knew of energy efficiency improvements they would like to make were asked to name their reasons for not making the improvements. The proportion of the general population who mentioned a knowledge issue as the reason for not making an improvement has actually *risen* since the 1996/7 survey (Table 5-3). In fact, it has risen more than for participants. By both the gap and the time series arguments, the expected effects are not evident. One possible explanation for this anomalous result is that the program could be making people aware enough of energy efficiency options that they realize they need more information.

Table 5-3
Percent Who Mention Lack of Knowledge as a Reason for not Making Efficiency Improvements

	1996/7	1999	Change
General Population	0.5%	7.9%	+7.4%
Current-Year Participants	1.1%	3.9%	+2.8%
Other-Year Participants		6.6%	

Hypothesized Market Effect: If REMS information dissemination activities are improving the general understanding of energy efficiency, the proportion of customers citing an information-related disadvantage of energy efficiency should be declining.

Respondents in 1996/7 and 1999 were asked to name the disadvantages of energy efficiency. Like the above knowledge-related question, the proportion of customers who mentioned a knowledge-related issue as a disadvantage of energy efficiency has risen slightly over this time period (Table 5-4). However, since the percentages are so small, this does not provide strong evidence one way or the other.

Table 5-4
Percent Who Mention Knowledge Issue as a Disadvantage of Energy Efficiency

	1996/7	1999	Change
General Population	0.9%	2.5%	+1.6%
Current-Year Participants	1.5%	2.4%	+0.9%
Other-Year Participants		4.0%	

Awareness and Knowledge Conclusion. The high awareness of the audits and the high and growing knowledge of energy efficiency improvements that respondents want to make provide strong evidence that awareness and knowledge have improved. The negative evidence from an increase in customers who do not make energy efficiency improvements due to a lack of knowledge and in customers citing an information-related disadvantage of energy efficiency tempers that conclusion but the weakness of this evidence means that the balance of the evidence points toward the conclusion that awareness and knowledge have improved.

5.3 INTEREST AND CONCERN ISSUES

Residential customers who are not interested in energy efficiency or are not concerned with the benefits that energy efficiency offers (either to themselves or to society) are likely to underinvest in energy efficiency actions and technologies. These individuals do not necessarily lack knowledge of energy efficiency but do not care whether they are knowledgeable.

In this section, we will examine evidence that the REMS program has improved the general population's interest in and concern for energy efficiency issues.

This section looks at five potential market effects related to interest and concern:

- An interest and concern score based on five survey items
- Interest in making energy efficiency improvements to the home (examined in several different ways)
- Percent citing interest and concern issues as reasons for not making energy efficiency improvements
- Interest in home energy audits

- Proportion of customers taking energy efficiency actions after receiving information from PG&E

  Hypothesized Market Effect: If REMS is increasing the level of interest in and concern about energy efficiency, this increase should be evident in the general population.

We calculated an "interest and concern" score for survey respondents based on how much they agreed with the following five statements.

- I am not very concerned about the amount of energy used in my home (reverse scored).
- My life is too busy to worry about making energy related improvements (reverse scored).
- Conserving energy is an economic necessity for me.
- Energy efficiency is a low priority compared to other things that need to be done in my home (reverse scored).
- I am always looking for new ways or products that will help me to conserve energy in my home.

The general population received a score of 6.7 on a 10-point scale, which shows that they are somewhat interested and concerned about energy efficiency (Table 5-5). However, this score is not sufficiently high to make a strong argument that the level of interest and concern about energy efficiency issues is high in the general population.

Table 5-5
Interest and Concern Attitudes

	Level of interest and concern about energy efficiency †
General Population	6.70
Current-Year Participants	6.71
Other-Year Participants	7.12

† Interest score calculated on 10-point scale, where 1 meant strongly disagree and 10 meant strongly agree with five concern and interest items.

Since the score for current-year participants is just barely higher than for the general population, evidence does not exist that higher levels of participants' interest and or concern might diffuse throughout the general population. However, the higher score for other-year participants implies once again that the REMS program may have a delayed but increased effect.

There were no directly comparable questions in previous surveys, so we were not able to analyze this factor using time series analysis.

Hypothesized Market Effect: If REMS is effective, the general population will be increasingly interested in making energy efficiency improvements to their homes.

Both the 1999 survey and the 1996/7 PG&E Residential Program Evaluation surveys asked whether respondents knew of improvements they would like to make to save energy. The percent answering "yes" increased from 49.1 percent in 1996/7 to 57.1 percent in 1999, an 8 percent increase (Table 5-6).

As discussed in the previous section, these percentages provide evidence of awareness of energy efficiency, but they also provide evidence that the market is moving toward more *interest* in energy efficiency. The increase in the level of interest in making energy efficiency improvements supports the hypothesis that REMS has inspired people to be more interested in energy efficiency.

Table 5-6
Percent Who Are Interested in Making Energy Efficiency Improvements

	1996/7	1999	Change
General Population	49.1%	57.1%	+8.0%
Current-Year Participants	53.3%	54.2%	+0.9%
Other-Year Participants		51.4%	

Hypothesized Market Effect: If REMS has been effective, the conservation ethic has diffused into the general population to the point of being self-sustaining.

Since, as we see above, more than one-half of the population is interested in making energy efficiency improvements, society as a whole has reached the takeoff point for sustained interest, according to the diffusion argument.

Hypothesized Market Effect: If the REMS has been effective, customers who need it the most (those with low efficiency homes) have an increasingly high level of interest in making energy efficiency improvements.

A natural question in examining interest in energy efficiency is, "Are those customers living in inefficient homes interested in energy efficiency, or is REMS only reaching those who have already improved the efficiency of their home?"

To look at this question, we analyzed respondents who disagreed with the statement, "My home is very energy efficient" to see if interest in making energy efficiency improvements was high or low among these customers. We found that customers in the greatest need for energy efficiency

improvements also have the highest level of interest in making these improvements (Table 5-7). This level of interest is high enough to indicate that interest has reached the self-sustaining level among those who need to make changes. However, the reader must remember that we had no directly comparable historical information to look for changes over time.

Table 5-7
Percent Interested in Energy Efficiency Improvements
by Perceived Efficiency of the Home

	Low Efficiency Homes	All Other Homes
General Population	80.0%	52.5%
All Participants	83.5%	45.8%

Note: Efficiency of home is defined by participant's level of agreement (on a 1-10 scale) to this statement: "My home is very energy efficient."

Hypothesized Market Effect: If the REMS program is affecting the single-family homeowner market, then the proportion of this population who do not make necessary energy efficiency improvements due to a lack of interest and concern is declining.

Survey respondents were asked in both 1996/7 and 1999 why they had not made energy efficiency improvements they knew could be made. We identified respondents who named interest and concern issues to see if any changes in these barriers had occurred over time. We found that among the general population, interest and concern issues declined 2.6 percent from 1996/7 to 1999 (Table 5-8). This evidence supports the hypothesized market effect. However, the percent of current year participants increased over the same time – a counter-intuitive indicator which weakens the argument.

Table 5-8
Percent Who Have Not Made Improvements Due to Interest and Concern Issues

	1996/7	1999	Change
General Population	19.9%	17.3%	-2.6%
Current-Year Participants	18.5%	21.2%	+1.7%
Other-Year Participants		13.4%	

Hypothesized Market Effect: If REMS is effective, the general population is becoming more interested in energy efficiency information services such as home energy audits.

Only 40 percent of the general population who have never had a home energy audit were interested in having an audit. Of those who say they have an inefficient home, 38 percent were interested in an audit. It is a judgement call whether these rates are high or low. However, given that expressing interest might have been seen as the socially acceptable answer during the survey, a rate of 40 percent seems low, providing evidence *against* concluding that this market effect has occurred.

Hypothesized Market Effect: If the REMS program is effectively reaching the population of single-family homeowners, the proportion of customers taking energy efficiency actions after receiving information from PG&E should be increasing.

In the 1996/7 survey, customers who said they had received energy efficiency information from PG&E or another source were asked if they had taken an action based on this information. In the 1999 survey, a similar question was asked of all respondents: Have you recently done anything to improve the energy efficiency of your home?

A subset of 1999 respondents was created to have similar groups for comparison purposes. Under the assumption that people who received a home energy audit or called the SEL received energy efficiency information, the subset included respondents who said they had a home energy audit (either from PG&E or another provider) or called the SEL.

The proportion of 1996/7 survey respondents who took an action based on the information they received was compared to the proportion of the 1999 subset who had recently done something to improve the energy efficiency of their homes (Table 5-9). In the 1999 survey, 78 percent had implemented actions, a 22 percent increase from 1996/7.

It is possible that this increase is somewhat inflated due to the slightly different wording of the questions. It is also possible that there were respondents to the 1996/7 survey who had recently taken an energy-efficient action, but answered “no” to the question because the information they received did had not influenced their decision. Although it may be somewhat inflated, 21 percent is a sizeable increase, providing support to the hypothesized market change.

Table 5-9
Percent Who Received Energy Efficiency Information
and Recently Did Something to Improve the Energy Efficiency of Their Home

	1996/7	1999	Change
General Population	57%	78%	+21%

Interest and Concern Conclusion

The REMS program has made substantial headway in mitigating interest and concern barriers. Of the seven pieces of evidence examined, two provided strong positive evidence of interest and concern market effects, three provided moderate positive evidence, and one provided weak positive evidence. Only one piece of evidence was negative and it was weak evidence.

The strong evidence included the finding that 80 percent of the general population with inefficient homes have identified efficiency improvements they would like to make and the finding of a 21 percent increase in actions among those receiving information from PG&E.

Moderate evidence includes the finding that the general population interest score is moderately positive (6.7 on a 10 point scale). There has been an 8 percent increase in the portion of the general population who want to make energy efficiency improvements. This increase raises the interest level to 57.1 percent, which is higher than the diffusion threshold.

Weak, but positive evidence comes from the 2.6 percent decrease in the proportion of people who do not make energy efficiency improvements due to interest and concern issues. This is moderated by a 1.7 percent increase for participants.

Weak and negative evidence comes from the finding that only 40 percent of the general population expressed interest in having an audit.

5.4 ATTITUDE ISSUES

Some residential customers have a negative attitude toward energy efficiency, which leads them to discount the value of energy efficiency improvements and actions and thereby leads them to underinvest in efficiency actions. They may believe that efficient technologies are more likely to be unreliable, short-lived, or too expensive. They may believe that buying efficient technologies or implementing efficiency measures will decrease their comfort or the utility they get from an appliance. They may doubt the projected energy and cost savings from efficient technologies, believing that “efficient” technologies will end up costing them more money either because they are too expensive up front or because the advertised savings will not appear. (Of course, some believe this correctly, but this is not a barrier in the typical use of the term.)

People with a negative attitude may or may not lack accurate knowledge about energy efficiency, however, they probably do not think they lack knowledge and probably do not care to learn.

In this section we will examine evidence that the REMS program has improved the general population’s attitude toward energy efficiency.

Hypothesized Market Effect: If the REMS has been effective in distributing information on the benefits of energy efficiency, the general population's attitude towards energy efficiency should have increased.

We calculated an "attitude" score for survey respondents based on how much they agreed with the following statements, using a 10-point agreement scale where 10 was "strongly agree":

- It is possible to save energy without sacrificing comfort by improving the energy efficiency of my home.
- Instead of building power plants, customers should use less electricity.
- Energy efficient products are too expensive. (reverse score)
- Products that are energy efficient do not work as well as standard efficiency products. (reverse score)

Although the average score for the general population is fairly high at 6.78, there is still much room for improvement (Table 5-10). The fact that participants and the general population have similar scores implies one of two conclusions: either REMS does not have much of an impact on participants' attitudes, or its impact has diffused to the general population.

Since there is no comparable historical data, it is impossible to gauge from this whether positive attitudes are increasing or decreasing among participants and the general population. This analysis should repeated in the future in order to test for that change.

Table 5-10
Attitude Toward Energy Efficiency

	Attitude toward energy efficiency
General Population	6.78
Current Year Participants	6.71
Other Year Participants	6.65

(Score on a 1-10 scale where maximum positive attitude equals 10.)

Hypothesized Market Effect: If the REMS has been effective, the proportion of the general population who want to make energy efficiency improvements should be increasing, which provides evidence that people have a more positive attitude towards energy efficiency.

Both the 1999 and 1996/7 surveys asked if there were improvements people would like to make to save energy. The percent answering "yes" increased from 49.1 percent in 1996/7 to 57.1 percent in 1999, and 8 percent increase (Table 5-11). As we discussed in earlier sections, this provides evidence of awareness, interest, and concern about energy efficiency. It also provides evidence that the market is moving toward a better attitude toward energy efficiency – people would not believe they could make changes that would save energy if they had a lousy attitude toward energy efficiency.

The increase in the level of interest in making energy efficiency improvements provides evidence that REMS has inspired a better attitude toward energy efficiency.

Table 5-11
Percent Who Are Want to Make Energy Efficiency Improvements

	1996/7	1999	Change
General Population	49.1%	57.1%	+8.0%
Current Year Participants	53.3%	54.2%	+0.9%
Other Year Participants		51.4%	

Hypothesized Market Effect: If REMS has been effective, the proportion of the general population who do not make energy efficiency improvements due to a negative attitude towards energy efficiency should be declining.

Survey respondents were asked in both 1996/7 and 1999 why they had not make energy efficiency improvements they knew could be made. The only issue named by significant numbers of respondents in both surveys that addresses attitude is the response "I cannot afford the improvements." Almost two thirds of the general population who knew of an efficiency improvement that they would like to make said they did not make the change because they could not afford the expense (Table 5-12). This increased 4 percent from 1996/7. A similarly high percentage of the participants also cited the same reason, again growing from 1996/7. According to this comparison the expected market effect did not occurred, in fact the attitude became more prevalent.

Table 5-12
Percent who have not made improvements because they could not afford the expense

	1996/7	1999	Change
General Population	57.0%	61.0%	+4.0%
Current Year Participants	62.2%	65.4%	+3.2%
Other Year Participants		64.1%	

(Percent of those answering the "Why" question.)

Hypothesized Market Effect: If REMS is effective in disseminating information about the benefits of energy efficiency, the proportion of people who think there are disadvantages with energy efficiency should be declining.

Respondents were asked what disadvantages they saw with energy efficiency. Although a sizeable proportion said none, 36.3 percent of the general population mentioned at least one disadvantage (Table 5-13). Although over a third of the general population feel there are disadvantages associated with energy efficiency, this proportion has decreased slightly (3.7 percent) over the past few years. This supports the hypothesis that the perception that there are disadvantages to energy efficiency is declining.

Table 5-13
Percent who mention any disadvantages of energy efficiency

	1996/7	1999	Change
General Population	40.0%	36.3%	-3.7%
Current Year Participants	48.3%	40.7%	-7.6%
Other Year Participants		43.0%	

Attitude Conclusion

Three of the four pieces of evidence provided moderately positive evidence of improvements in the general population's attitude toward energy efficiency. The fourth piece of evidence provided weak negative evidence. Thus, on balance, the evidence points to improvements in the past few years in the general population's attitude toward energy efficiency.

The general population's attitude score, based on several questions, was 6.78 on a 10 point scale, indicating a moderately positive attitude. The 8 percent increase in the level of interest in making energy efficiency improvements provides evidence that REMS has inspired a better attitude toward energy efficiency. Finally, the proportion of people who think there are disadvantages to energy efficiency declined 3.7 percent from 1996/7. The negative evidence came from the finding that 61 percent of the general population who knew of an efficiency improvement that they would like to make said they did not make the change because they could not afford the expense.

5.5 ATTRIBUTION EVIDENCE

The previous sections presented evidence for the existence of market effects. This section will present evidence that the REMS program was responsible for creating the observed market effects. (The following section will do the same for the sustainability evidence.)

The evidence that the REMS program is responsible for the market changes is presented in three general sections:

- The extent of customer communication with others about energy efficiency issues and the REMS program
- An argument from correlating changes with program activities
- General attribution evidence

5.5.1 Communication About Energy Efficiency Issues

Interpersonal communication can be classified as an attribution issue – the more participants talk about their experiences with the program and share their new knowledge of energy efficiency, the more likely the general population is to absorb and adopt that information, creating market transformation.

The customer survey included several questions that examined patterns of communication on energy efficiency issues. Since there were no comparable questions in earlier surveys, we could not examine communication behavior using time series analysis. However, we could compare the current communications patterns of participants, past participants, and the general population, using the diffusion of innovation theory to provide evidence of market change.

Hypothesized Market Effect: If many participants talk with others about energy efficiency and their experiences with the REMS program, then REMS will have an effect on the broader market.

Several communication questions in the 1999 survey examined whether participants and the general population of single-family homeowners communicated to others outside their families about energy efficiency issues. The proportion who reported being involved in at least one of seven possible communications is shown in Table 5-14.

Table 5-14
Percent Who Communicated about Energy Efficiency

	Communicated about Energy Efficiency †
General Population	48%
Current-Year Participants	50%
Other-Year Participants	70%

† Answered "Yes" to at least one of the following questions: (1) initiated or (2) participated in a conversation about energy efficiency issues; (3) talked about or (4) showed an energy audit to others; (5) showed, or (6) talked about or (7) recommended the SEL to people outside of the family.

One-half of the current-year participants had participated in at least one of these conversations about energy efficiency. Whether this should be considered a "high" level of communication is a matter of interpretation, but this percentage is clearly not small. Ideally, **all** participants would be enthusiastic about the program and their new knowledge and would be talking about that with others.

Other-year participants were more likely than current-year participants to have had these conversations. This result might indicate that REMS starts a seed of interest that over time flowers into more communication with others.

Slightly less than one-half of the general population had talked with someone outside their family about energy efficiency. This is close to the 50 percent threshold usually used in the diffusion of innovation literature. At 50 percent, the innovation is considered self-sustaining regardless of further program effort.

Based on the diffusion argument, it appears that the early adopters – current-year and other-year participants – are more likely to have communicated with someone about an energy efficiency issue. The general population is somewhat behind the early adopters, but by no means so far behind that the hypothesis of the REMS program effect is out of the question.

Slightly more than one-quarter of current-year participants and less than half of other-year participants had talked with someone outside their family specifically about the REMS program (Table 5-15). While there is no clear criteria for categorizing this type of communication, our interpretation is that the numbers for current-year participants are too small to provide much support to the hypothesis (if many participants talk with others about energy efficiency and their experiences with the REMS program, then REMS will have an effect on the broader market).

Table 5-15
Percent Who Communicated about REMS Program

	Participants
Current-Year Participants	26.3%
Other-Year Participants	45.6%

(1) talked about or (2) showed an energy audit to others; (3) showed, or (4) talked about or (5) recommended the SEL to people outside of the family

It is interesting that other-year participants communicated much more about the program than current-year participants. This provides further evidence that the program may result in delayed, but increased communication over time.

Communication Conclusion. The fact that 50 percent of participants talk about energy efficiency with others provides a moderate amount of support to the hypothesis that REMS information is being disseminated to the general population. But this has to be weighed against the fact that only slightly more than one-quarter had talked about their experiences with REMS in particular. The finding that just under one half of the general population had talked about energy efficiency provides only weak support to the conclusion that a threshold of communication has been reached that will be self-sustaining.

5.5.2 Correlation Argument

Hypothesized Market Effect: The REMS program was the most visible and active energy efficiency program in the residential sector in PG&E's territory, therefore it was responsible for a significant portion of any relevant energy efficiency market changes observed.

PG&E did between 60,000 and 100,000 direct mail energy audits a year between PY94 and PY98 (Figure 5-3 and Table 5-16). During the same time, SEL answered between 170,000 and 260,000 phone calls. There were other energy efficiency activities going on in PG&E's territory at the same time, including other PG&E programs, the EPA Energy Star program, and educational efforts of manufacturers, distributors, retailers, and non-profit organizations, to name

a few. There is no simple way to calculate how much influence each of these organizations and activities had on any observed market effects, however, given the significant level of activity of the REMS program, it appears logical to conclude that it had a significant role in creating some of the market effects.

Other evidence supporting this conclusion can be seen in the sources survey respondents cited for where they look for information and where they received information. When asked where they would look for information on appliance energy efficiency, the utility was the fourth most common answer from the general population, after Consumer Reports, the Internet, and information on the product (Table 5-17). When asked where they would look for information on furnace and air conditioner energy efficiency, the utility was also the fourth most common answer, tied with the Internet but behind contractors and sales people (Table 5-18). When asked how they heard about the home energy audit, four of the top six answers were PG&E sources, including the most common response (Table 5-19).

Given the level of REMS activity in PG&E's service territory, and the survey responses discussed above, there is a moderate amount of support for the conclusion that the REMS program deserves credit for the relevant market effects observed.

Figure 5-3
Number of Audits and SEL Calls by Year

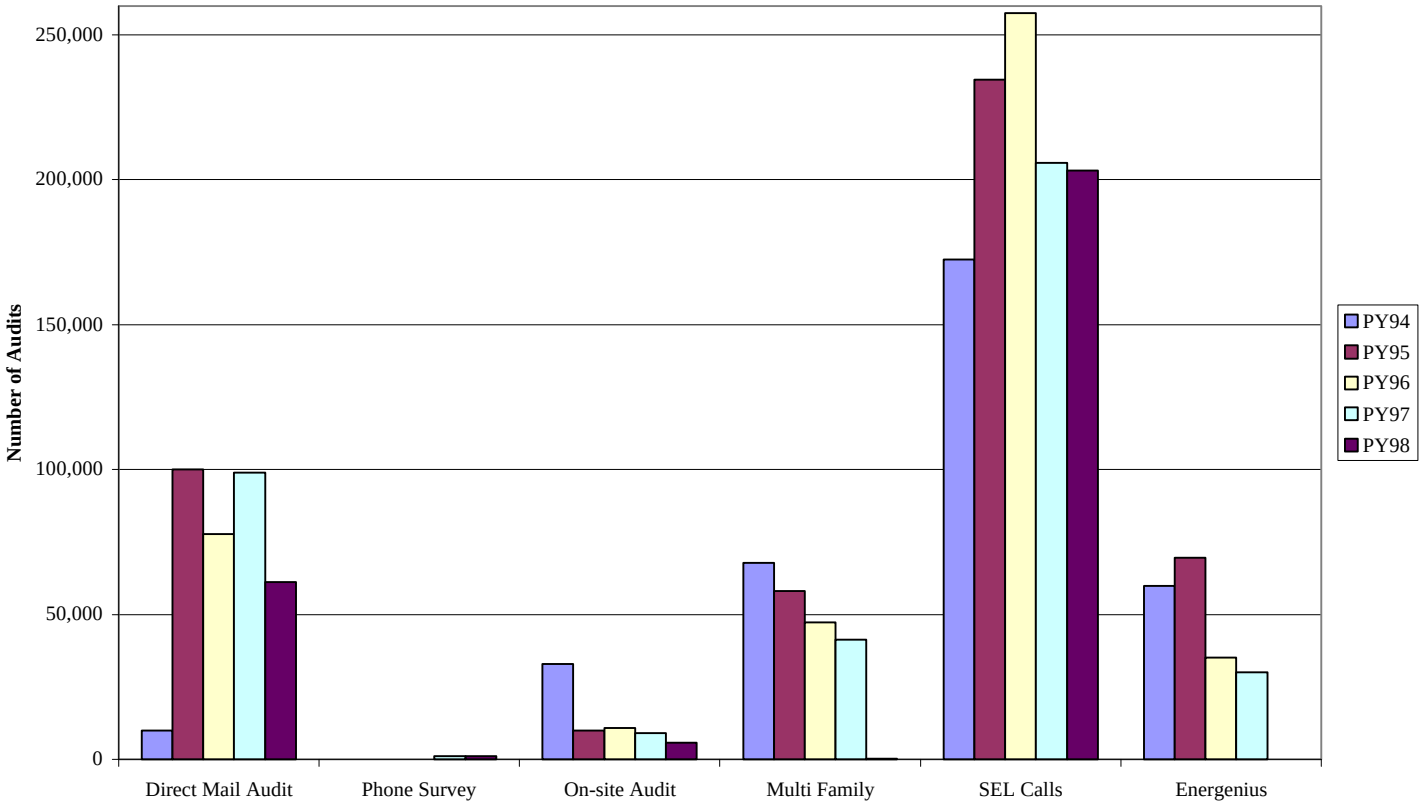


Table 5-16
Number of Audits and SEL Calls by Year

Number of Audits	PY91	PY92	PY93	PY94	PY95	PY96	PY97	PY98
Direct Mail Audit	23,243	104,360		9,964	100,000	77,846 †	99,081	61,284
Phone Survey				0	20	†	1,295	1,106
On-Site Audit	24,699			32,954	10,013 ‡	11,035	9,048	5,888
Multi Family				67,835	58,282	47,341	41,385	261
SEL Calls				172,470	234,430	257,524	205,857	203,189
ENERGENIUS				60,000	69,624	35,148	30,110	

Source: PG&E documents.
†Filing does not split mail and phone audits
‡Filing says 9,988 onsite audits in 1995.

Table 5-17
Information Sources for Appliances

Information Source	Percent of Responses	Percent of Cases
Look at Consumer Reports	20.2	41.0
Look on the Internet	19.1	38.7
Information label on product/Energy Guide	14.5	29.3
Ask utility	14.0	28.4
Ask contractor or salesperson	9.9	20.1
Library	5.7	11.6
Ask friends, family, co-workers	4.7	9.6
Manufacturer information	2.8	5.7
Look at technical magazines	2.7	5.4
TV/newspaper/magazine ads	2.4	4.9
Comparison shopping at stores	2.3	4.6
Do my own research	.7	1.4
Brochures	.4	.9
Yellow pages	.3	.7
Other	.2	.5
Total responses	100.0	202.6

Table 5-18. Information Sources for Furnaces and Air Conditioners

Information Source	Percent of Responses	Percent of Cases
Same sources as appliances	16.4	27.7
Ask contractor or sales person	13.7	23.3
Look at Consumers Reports	13.3	22.6
Ask utility	12.4	21.0
Look on the Internet	12.4	21.0
Tag/label comparison on product/Energy Guide	5.8	9.9
Ask friends, family, co-workers	5.5	9.3
Library	5.3	9.0
Do not know	4.4	7.4
Manufacturer information	4.1	6.9
Comparison shopping at stores	1.7	2.9
Look at technical magazines	1.6	2.7
Yellow Pages	1.2	2.1
TV/newspaper/magazine ads	.9	1.4
Brochures	.4	.6
Home shows	.4	.6
Community/consumer group	.2	.4
Other	.2	.4
Total responses	100.0	169.2

Table 5-19. Sources of Information on the Audit

Information Source	Percent of Responses	Percent of Cases
Read about it in PG&E bill	23.3	26.4
Through a friend, family, co-worker	13.8	15.7
Received information in the mail	13.6	15.4
Message on back of PG&E bill envelope	10.7	12.1
Phone call to/from utility	8.8	10.0
Read about it in PG&E newsletter SPOTLIGHT	6.3	7.1
Heard advertisement on TV, radio	6.4	7.2
Saw advertisement in newspaper, magazine	5.7	6.5
Other	4.4	5.0
Door-to-door solicitation	3.4	3.9
Through work/employer	2.4	2.7
Home shows	1.2	1.4
Total responses	100.0	113.4

5.5.3 General Attribution Evidence

Hypothesized Market Effect: If REMS is effective, then the home energy audit should be influencing people's decisions to make energy-related improvements.

Audit participants who recently made an energy related improvement were asked how much influence the energy audit had on their decision to make the improvement. On a 10-point influence scale with 10 being great influence, the average rating among participants ranged from 5.4 to 5.65 (Table 5-20). This provides only a weak support to the hypothesis.

Table 5-20
Influence of home energy audit on decision to make energy efficiency improvement

	Influenced by home energy audit to make energy efficiency improvement
Current Year Participants	5.40
Other Year Participants	5.65

(Score on a 1-10 scale where 10 equals greatest influence.)

Hypothesized Market Effect: If REMS is being effective through the SEL, then the SEL should be influencing people's decision to make energy efficiency improvements.

Participants who called the SEL and made a recent energy-related improvement were asked to rate the influence the SEL had on their decision to make the improvement. On a 10-point scale where 10 was great influence, the average rating was 7.15 for current year participants and 7.08 for other year participants (Table 5-21). While this is a fairly high rating, the number of participants who fit into this category is so small (n = 9) that the data should be considered inconclusive.

Table 5-21
Influence of SEL on Decision to Make Energy Efficiency Improvement

	Influenced by SEL to make energy efficiency improvement
Current Year Participants	7.15
Other Year Participants	7.08

(Influence score on 1-10 scale where 10 equals greatest influence.)

Hypothesized Market Effect: If REMS is going to continue to affect participants' behaviors, they must keep their audit report and refer to it often.

Sixty three percent of current year participants still have their audit report, but less than half of other year participants have kept theirs (Table 5-22). Most of those that still have their report have referred to it at least once. This provides evidence to support the conclusion that the audit materials are affecting behavior, at least in the short-term. As time goes by, fewer participants keep their report and can no longer use it as a resource.

Table 5-22
Use of Audit Materials

	Current Year Participants	Other Year Participants
Received written report	93.1%	97.2%
Still have the report	63.2%	42.4%
Refer to the report often	3.6%	1.8%
Refer to report once or twice	68.1%	66.7%

Hypothesized Market Effect: If REMS is going to continue to affect participants' behaviors, they must keep their SEL materials, refer to them often, and share them with others.

All current year SEL callers still have their material and while two-thirds have referred to it, few refer to it often (Table 5-23). The relatively large percent who have talked to others about the material gives support to the hypothesis. However, the small number of respondents in this analysis limits the strength of that conclusion.

Table 5-23
Use of SEL Materials

	Current Year Participants	Other Year Participants
Still have materials received from SEL	100% (9)	84.0% (4)
Refer to SEL materials often	3.6% (9)	1.8% (3)
Refer to SEL materials once or twice	68.1% (9)	66.7% (3)
Have shown materials to others	30.7% (9)	61.8% (3)
Have mentioned SEL to others	51.9% (14)	45.6% (7)
Have recommended SEL	92.7% (8)	80.9% (3)

Numbers in parenthesis are the *unweighted* number of respondents.
The percentages are the *weighted* responses.

Hypothesized Market Effect: If REMS is effective, participants will be very satisfied with the audit, which will lead them to implement more measures.

Audit participants are generally satisfied with their experience with the audit (Table 5-24), which supports the hypothesized market effect. However, it is important to note however that more than half of current year participants and 42 percent of other year participants listed categories other than "very satisfied."

Table 5-24
Satisfaction with Audit

	Current Year Participants	Other Year Participants
Very satisfied	46.9%	57.8%
Somewhat satisfied	42.8%	35.0%
Somewhat dissatisfied	6.2%	4.0%
Very dissatisfied	4.1%	3.2%

5.5.4 Attribution Conclusion

There is substantial evidence, but not necessarily strong evidence, that the REMS program deserves credit for creating the market effects discussed earlier in this chapter. Of the eight pieces of evidence examined, three provide moderate positive evidence of attribution and the remainder provide weak positive evidence. None of the evidence was strong, but none was negative either. The following summarizes the evidence:

- 70 percent of other year participants, 50 percent of current year, and 48 percent of the general population communicate with others about energy efficiency. This level seems adequate to support the hypothesis that participants' discussions with others about energy efficiency and their experiences with the REMS program will lead to broader effects in the market. Less than half of all participants and 26.3 percent of current year participants have communicated about the REMS program.

- 48 percent of the general population communicate with others about energy efficiency, which is just under the 50 percent threshold usually used in the diffusion of innovation literature to indicate self-sustained interest in energy efficiency.

- The REMS program was the most visible and active energy efficiency program in the residential sector in PG&E's territory. Also, the utility was the fourth most common answer from the general population for sources where they look for information on appliance, furnace, and AC energy efficiency. Together, this evidence supports allocating credit to REMS for a significant portion of any relevant energy efficiency market changes observed.

- 1998 Participants ranked the audit 5.40 on 10-point influence scale. Other-year participants ranked it 5.65. These modest rankings provide support to the conclusion that the home energy audit should be influencing people's decisions to make energy-related improvements.

- 1998 participants ranked the influence of the SEL fairly high (7.15 on a 10-point scale) as did other year participants (7.08). This supports the conclusion that the SEL is influencing people's decision to make energy efficiency improvements.

- Of 1998 participants, 63.2 percent still have their audit report, 72 percent refer to it once or more. Of other year participants, 42.4 percent still have report, 69 percent refer to it once or more. This supports the conclusion that the REMS is affecting behaviors.

- 100 percent of 1998 participants still have their SEL material, 72 percent refer to it at least once, and 31 percent have shown it to others. 84 percent of other year participants still have the material, 69 percent refer to it at least once, and 62 percent have shown to others. Large proportions have also mentioned SEL to others and recommended it. This

supports the conclusion that REMS is continuing to affect participants' behaviors and indirectly the general population.

- Almost 90 percent of the participants were somewhat or very satisfied with their audit. This supports the hypothesis that REMS is effective in encouraging participants to implement measures.

5.6 SUSTAINABILITY EVIDENCE

As we discussed in the previous section, this section will present evidence that the observed market effects will last through time.

Proving that market effects are sustainable is very difficult when the program is still in the field. It is usually impossible to set up a proper experimental situation which would show how the market would behave in the absence of program intervention. However, it is possible to examine some of the evidence to look for signs that support the conclusion that the market effects are likely to last through time.

> **Hypothesized Market Effect: If REMS has created permanent market effects, demand for energy efficiency services will increase to the point where other, non-utility vendors are offering more energy efficiency services.**

13.7 percent of the nonparticipant sample reported having had a home energy audit from a source other than PG&E. This provides some evidence that the private sector has started providing similar energy efficiency services.

> **Hypothesized Market Effect: If REMS has created permanent market effects, the level of interpersonal communication about energy efficiency will have passed a critical threshold so that it has become ingrained in the population and will stay as a societal value in the absence of program intervention.**

This is an argument based on interpersonal communication and diffusion of innovation. Over two-thirds of the general population have communicated with someone outside their immediate family about energy efficiency issues in the past two or three years (Table 5-25). This provides strong evidence that interpersonal communication has become a significant method of information dissemination about energy efficiency. The numbers in Table 5-25 are based on a variety of data points which address whether people actively communicate about energy efficiency and if they use friends, family, co-workers or other word of mouth avenues to find out information about energy efficiency.

The diffusion of innovation literature often uses 50 percent as a threshold value – any innovation that achieves more than 50 percent market penetration has achieved the self-sustaining level.

Using this criteria, interest in energy efficiency in the general population has achieved the self-sustaining level.

Table 5-25
Interpersonal communication

	Percent who communicate with others about energy efficiency
General Population	64.4%
Current Year Participants	65.1%
Other Year Participants	80.7%

Hypothesized Market Effect: If REMS has created permanent market effects, the level of energy efficiency activity will have passed a critical threshold so that it has become ingrained in the population and will stay as a societal value in the absence of program intervention.

As we saw in earlier sections, over two thirds of the general population (68 percent) have made energy efficiency improvements to their homes in the last 2 to 3 years. This, too, is above the diffusion threshold, providing evidence that energy efficiency *actions* are also ingrained in the population.

Of course, this argument does not address the issue of whether people are implementing *enough* energy efficiency actions, only that they are aware of it, consider it, and occasionally act.

Hypothesized Market Effect: If REMS is effective, it will produce a long-term trend toward an increased desire to make energy efficiency improvements and a level of awareness that is above the threshold needed to become self-sustaining.

In the general population of single-family homeowners, we found an 8 percent increase in the number of people who knew of energy efficiency improvements they wanted to make in their homes (increasing from 49.1 percent in 1996/7 to 57.1 percent in 1999). This trend supports the conclusion that the changes are permanent and we can speculate that the momentum behind this change is sufficient to perpetuate this trend into the future, even in the absence of any program intervention. These data also support the threshold argument: Since more than half the population is educated on the need for efficiency improvements, it can be argued that this level is high enough to make the awareness self-sustaining.

Hypothesized Market Effect: If REMS has created permanent market effects, the attitude of the general population will have improved to the point where it passes a critical threshold so that it has become ingrained in the population and will stay as a societal value in the absence of program intervention.

The percent of the general population who do *not* mention information barriers is fairly high (63.7 percent) and has risen over the past few years. While this supports the conclusion that a positive attitude towards energy efficiency has reached a threshold level and should be self-sustaining in society (using the diffusion of innovation argument), other evidence presented in this chapter shows an increase in negative attitudes toward energy efficiency. Therefore the argument is not well supported that the market is self-sustaining or is in the process of reaching that goal.

Sustainability Conclusion: Of the five pieces of evidence addressing sustainability, three provide moderately strong, positive evidence and the remaining two provide weak but positive evidence. Thus the argument that the market effects created by REMS will last over time is supported, but not strongly.

- 13.7 percent of the nonparticipant sample reported having had a home energy audit from a source other than PG&E, which provides evidence that demand for energy efficiency services has increased to the point where other, non-utility vendors are offering more energy efficiency services.

- Over two-thirds of the general population have communicated with someone outside their immediate family about energy efficiency issues in the past two or three years. This supports the conclusion that the level of interpersonal communication about energy efficiency has passed a critical threshold so that it has become ingrained in the population and will stay as a societal value in the absence of program intervention.

- 68 percent of the general population have made energy efficiency improvements to their homes in the last 2 to 3 years which is high enough to indicate that energy efficiency activity has passed a critical threshold and has become ingrained in the population and will stay as a societal value in the absence of program intervention.

- The number of people who knew of energy efficiency improvements they wanted to make in their homes, increasing 8 percent from 49.1 percent in 1996/7 to 57.1 percent in 1999. This supports the conclusion that REMS helped produce a trend toward an increased desire to make energy efficiency improvements and a level of awareness that is above the threshold needed to become self-sustaining.

- The percent of the general population who do not mention information barriers is fairly high (63.7 percent) and has risen over the past few years however other evidence shows an increase in negative attitudes toward energy efficiency. This provides only weak evidence that the attitude of the general population has improved to the point where it

passes a critical threshold so that it has become ingrained in the population and will stay as a societal value in the absence of program intervention.

5.7 SUMMARY

This chapter has presented evidence on a large number of variables to draw conclusions about market effects created by the REMS program. It first presented the possible market effects, then discussed evidence that they could be attributed to the REMS program and that their effects would last over time. On balance, the evidence is fairly strong that REMS has created a number of significant market effects. The attribution evidence is less strong but still significant. The sustainability evidence is all positive, but it is somewhat speculative and therefore supports a weaker conclusion.

The following table summarizes each of the pieces of evidence we discussed.

Table 5-26
Market Effects for the REMS Program

Market Effect	Positive/ Negative Evidence	Strength of Evidence	Summary
Awareness and Knowledge Issues			
The percent of the general population who know that audits are available and who are aware of the SEL should be high.	Audits Positive SEL Positive	Audits Strong SEL Weak	High awareness among participants and general population of audit, but very low awareness of the SEL, especially by name.
The percent of the general population who know of energy efficiency improvements they would like to make should be increasing.	Positive	Strong	Knowing of energy efficiency improvements they want to make has increased 8% in the general population, while remaining fairly constant among participants.
The proportion of customers who do not make energy efficiency improvements due to a lack of knowledge should be declining.	Negative	Weak	Proportion who mention lack of knowledge as a reason for not making improvements has risen, but it is still very small.
The proportion of customers citing an information-related disadvantage of energy efficiency should be declining.	Negative	Weak	Proportion has risen over time, but it is still very small.

Market Effect	Positive/ Negative Evidence	Strength of Evidence	Summary
Interest and Concern			
The general population's interest and concern about energy efficiency should be increasing.	Positive	Moderate	Mean interest score of general population 6.70 on 10-point scale.
The general population will be increasingly interested in making energy efficiency improvements to their homes.	Positive	Moderate	8% increase in general population who want to make improvements.
The conservation ethic has diffused into the general population	Positive	Moderate	57.1% of the general population want to make improvements, which is higher than the diffusion threshold.
Customers with low efficiency homes have an increasingly high level of interest in making energy efficiency improvements.	Positive	Strong	80% of the general population with inefficient homes have identified efficiency improvements they would like to make.
The proportion of people who don't make energy efficiency improvements due to interest and concern issues is declining	Positive	Weak	2.6% decrease in general population but 1.7% increase for participants.
The general population is becoming more interested in energy efficiency information services such as home energy audits.	Negative	Weak	Only 40% of general population expressed interest in having an audit.
The proportion of customers taking energy efficiency actions after receiving information from PG&E should be increasing.	Positive	Strong	21% increase in actions from 1996/7 to 1999.

Market Effect	Positive/ Negative Evidence	Strength of Evidence	Summary
Attitude			
The general population's attitude towards energy efficiency has increased.	Positive	Moderate	Mean score for the general population of 6.78 on a 10 point scale.
The proportion of the general population who want to make energy efficiency improvements should be increasing, which provides evidence that people have a more positive attitude towards energy efficiency.	Positive	Moderate	The 8% increase in the level of interest in making energy efficiency improvements provides evidence that REMS has inspired a better attitude toward energy efficiency.
The proportion of people who don't make energy efficiency improvements due to a negative attitude should be declining	Negative	Weak	61% of the general population who knew of an efficiency improvement that they would like to make said they did not make the change because they could not afford the expense.
The proportion of people who think there are disadvantages to energy efficiency should be declining	Positive	Moderate	3.7% decline in the general population.

Market Effect	Positive/ Negative Evidence	Strength of Evidence	Summary
Attribution			
Communication Issues If many participants talk with others about energy efficiency and their experiences with the REMS program, then REMS will have an effect on the broader market.	Positive	Moderate	70% of other year participants communicate about energy efficiency. 50% of current year, 48% of general population. Only modest support that energy efficiency information has reached the threshold that will produce self-sustained interest in energy efficiency. It fails to reach the 50% threshold usually used in the diffusion of innovation literature.
	Positive	Weak	Less than half of all participants and 26.3% of current year participants have communicated about the REMS program.
Correlation Argument The REMS program was the most visible and active energy efficiency program in the residential sector in PG&E's territory, therefore it was responsible for a significant portion of any relevant energy efficiency market changes observed.	Positive	Moderate	REMS had high levels of activity during the years under study. Also, the utility was the fourth most common answer from the general population for sources where they look for information on appliance, furnace, and AC energy efficiency.
The home energy audit should be influencing people's decisions to make energy-related improvements.	Positive	Weak	1998 Participants ranked the audit 5.40 on 10-point influence scale. Other Year participants 5.65.

Market Effect	Positive/ Negative Evidence	Strength of Evidence	Summary
The SEL should be influencing people's decision to make energy efficiency improvements.	Positive	Weak	1998 participants ranked the influence of the SEL fairly high (7.15 on a 10-point scale) as did other year participants (7.08) but the number of respondents was very low.
If REMS is going to continue to affect participants' behaviors, they must keep their audit report and refer to it often.	Positive	Weak	Of 1998 participants, 63.2% have report 72% refer to it once or more. Of other year participants, 42.4% still have report, 69% refer to it once or more. Thus, the effect appears to be short term.
If REMS is going to continue to affect participants' behaviors, they must keep their SEL materials, refer to them often, and share them with others.	Positive	Weak	100% of 1998 participants still have the material; 72% refer at least once; 31% shown to others. 84% of other year participants still have the material; 69% refer to it at least once; 62% have shown to others. Large proportions have also mentioned SEL to others and recommended it. Very small number of respondents to this series.
If REMS is effective, participants will be very satisfied with the audit, which will lead them to implement more measures.	Positive	Moderate	Almost 90% are somewhat or very satisfied. Only around half are very satisfied.

Market Effect	Positive/ Negative Evidence	Strength of Evidence	Summary
Sustainability			
Demand for energy efficiency services will increase to the point where other, non-utility vendors are offering more energy efficiency services.	Positive	Weak	13.7% of the nonparticipant sample reported having had a home energy audit from a source other than PG&E.
The level of interpersonal communication about energy efficiency will have passed a critical threshold so that it has become ingrained in the population and will stay as a societal value in the absence of program intervention.	Positive	Moderate	Over two-thirds of the general population have communicated with someone outside their immediate family about energy efficiency issues in the past two or three years.
The level of energy efficiency activity will have passed a critical threshold so that it has become ingrained in the population and will stay as a societal value in the absence of program intervention.	Positive	Moderate	67.7% of the general population have made energy efficiency improvements to their homes in the last 2 to 3 years.
REMS will produce a long-term trend toward an increased desire to make energy efficiency improvements and a level of awareness that is above the threshold needed to become self-sustaining.	Positive	Moderate	8% increase in the number of people who knew of energy efficiency improvements they wanted to make in their homes, increasing from 49.1% in 1996/7 to 57.1% in 1999.
The attitude of the general population has improved to the point where it passes a critical threshold so that it has become ingrained in the population and will stay as a societal value in the absence of program intervention.	Positive	Weak	The percent of the general population who do not mention information barriers is fairly high (63.7%) and has risen over the past few years however other evidence shows an increase in negative attitudes toward energy efficiency.

CHAPTER 5. MARKET EFFECTS

Tables

Figures

CHAPTER 6
MARKET SHARE ANALYSIS

6.1 INTRODUCTION

This chapter of the report summarizes changes in market share and, where possible, attribute those changes to the REMS program. Results from past survey data along with data contained in the program tracking databases were used to estimate market changes.

First, we examine evidence of market changes using measure installation rates or "take rates" from 1995 through 1998. The time-series approach allows us to examine changes over time in the implementation rates of participants and general population. Gap analysis allows us to examine the gaps between measure installation rates of participants and the general population between 1995 and 1998. (Please see Chapter 5, section 5.1.2 for a complete discussion of the logic of the time-series and gap analysis approaches.)

Data in the program tracking databases is analyzed next. We compared what was recommended to participants as a result of the audit to the actions taken by participants as reported in the surveys of 1997 and 1998.[1] We look at what participants implemented relative to what was recommended, what actions were taken beyond the audit recommendations, and how the implementation rates for the phone audit compare to those of the direct mail audit.

Finally, we look at the general population's implementation rates of energy-efficiency measures over time.

6.2 IMPLEMENTATION RATE ANALYSIS

The implementation rate analysis utilizes past survey data collected from both audit participants and the general population. The time series analysis uses only survey data collected in 1996 and 1998 because these surveys were very similar in structure. Survey data collected in 1999 is not included in the time-series analysis because the way in which the survey asked about the implementation of energy-efficiency measures could have deflated take rates due to differences in eliciting customer recall.[2] Because comparing results across time is open to criticism (since

[1] Data on recommendations is only available starting in program year 1997.

[2] The surveys implemented in 1996 and 1998 specifically asked respondents if they had implemented certain energy-efficiency measures. Respondents were "prompted" to recall if they had (or had not) taken any action for certain measures. In contrast, the 1999 survey asked respondents an open-ended question of what, if any,

the data was collected using different [although similar] methodologies), the gap analysis compares gaps between participant and general population implementation rates within the same study. Because the gap analysis controls for differences between studies, we were able to include the 1999 survey data.

Eight energy-efficiency measures were specifically asked about in all three of the surveys: installation of a high-efficiency air conditioner, installation of new windows, replacement of a refrigerator, replacement of a freezer, insulation of ceiling/floors/walls, installing low flow showerheads or aerators, installing a hot water heater wrap, and installing compact fluorescent lamps.

In addition to analyzing by the implementation rates at the individual measure level, they were also analyzed at an aggregated level of implementation of minor versus major energy-efficiency measures (Table 6-1). In other words, we also looked at the percentage of participants and the general population who implemented at least one major or minor measure. This aggregation allowed us to smooth out the variableness between the different measures and made it possible to more clearly discern market effects. A minor energy-efficiency measure is defined as one that is relatively easy and affordable for end-users to implement. A major energy-efficiency measure is more difficult and more costly to implement. Respondents were counted as having installed a major measure if they had installed a high-efficiency air conditioner, new windows, replaced a refrigerator, replaced a freezer or insulated ceilings/floors/walls. Those who installed low flow showerheads or aerators, a hot water heater wrap or compact fluorescent lamps were counted as those having implemented a minor measure.

Looking at major and minor measure implementation rates can also allow us to extrapolate beyond the eight measures specifically looked at here to similar types of measures such as duct insulation (major) or caulking (minor).

Table 6-1
Major and Minor Measures

Major Measure	Minor Measure
Install high-efficiency air conditioner	Install low flow showerheads
Installation of new windows	Install aerators
Replacement of a refrigerator	Install a hot water heater wrap
Replacement of a freezer	Install compact fluorescent lamps
Insulation of ceilings/floors/walls	

energy-efficiency measures they had implemented. Consequently, the respondents were not “prompted” to recall their action regarding certain energy-efficiency measures as in the previous surveys.

6.2.1 Results of the Times Series Analysis of Implementation Rates

The general population installation rates increased from 1995 to 1997 for both major and minor measures (Figure 6-1). The most likely explanation for this change is that the REMS program is creating a market effect in the general population.

Figure 6-1 shows minor measures have had the largest increase in implementation rates (34.7 percent from 20.3 percent to 55.1 percent) as opposed to slightly less than a 5 percent increase (4.6 percent from 25.1 percent to 29.7 percent) for major measures. It is intuitive that minor measures would be implemented more often since by definition they are easier and less costly to implement.

Figure 6-1
Time Series Analysis – Implementation Rates for Minor and Major Measures Among the General Population

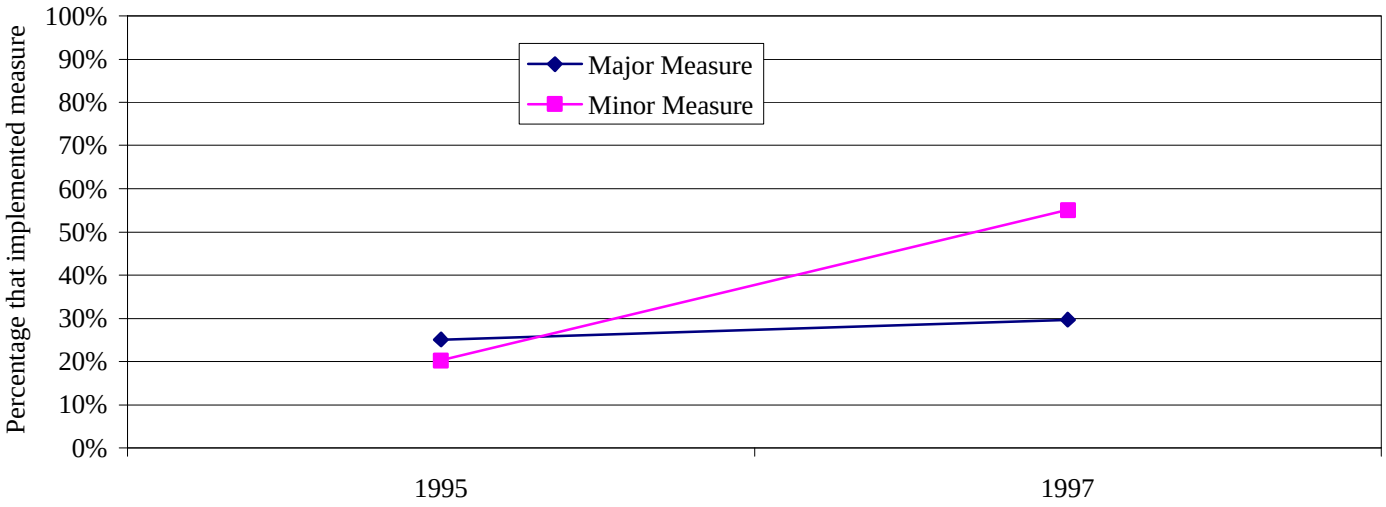


Table 6-2 shows the change in general population installation rates for each major measure individually. The implementation rates for major measures fluctuated a great deal, re-emphasizing the importance of aggregating the measures to get a clear picture of market effects. Only one of the measures had significant changes when looked at individually (replacing refrigerators).

Table 6-2
Time Series Analysis – Implementation Rates for Major Energy-efficiency Measures Among the General Population

Type of high efficiency equipment or measure taken:	High-efficiency Air conditioning	Insulated ceiling/walls/ floors	Installed new windows	Replaced refrigerator	Replaced freezer	Implemented at least one major measure
Program Year 1995						
Numeric count	43	104	169	157	23	253
Percent of sample	4.3%	10.3%	16.8%	15.6%	2.3%	25.1%
Program Year 1997						
Numeric count	14	64	89	62	6	181
Percent of sample	2.3%	10.5%	14.6%	10.2%	1.0%	29.7%
TIMES SERIES ANALYSIS						
1995-1997	-1.97%	0.17%	-2.18%	-5.41%*	-1.30%	4.57%*

* Significant at 95 percent confidence interval.

In contrast to the considerable variability for major measures, implementation rates for all three of the minor increased in the general population, all but one (water heater wrap) were statistically significant (Table 6-3).

Table 6-3
Time Series Analysis – Implementation Rates for Minor Energy-efficiency Measures

Type of high efficiency equipment or measure taken:	Water heater wrap	Low flow shower heads	Compact fluorescents	Implemented at least one minor measure
Program Year 1995				
Numeric count	144	152	105	205
Percent of sample	14.3%	15.1%	14.3%	15.1%
Program Year 1997				
Numeric count	99	143	172	336
Percent of sample	16.2%	23.4%	28.2%	55.1%
TIMES SERIES ANALYSIS				
1995-1997	1.9%	8.4%*	17.8%*	34.7%*

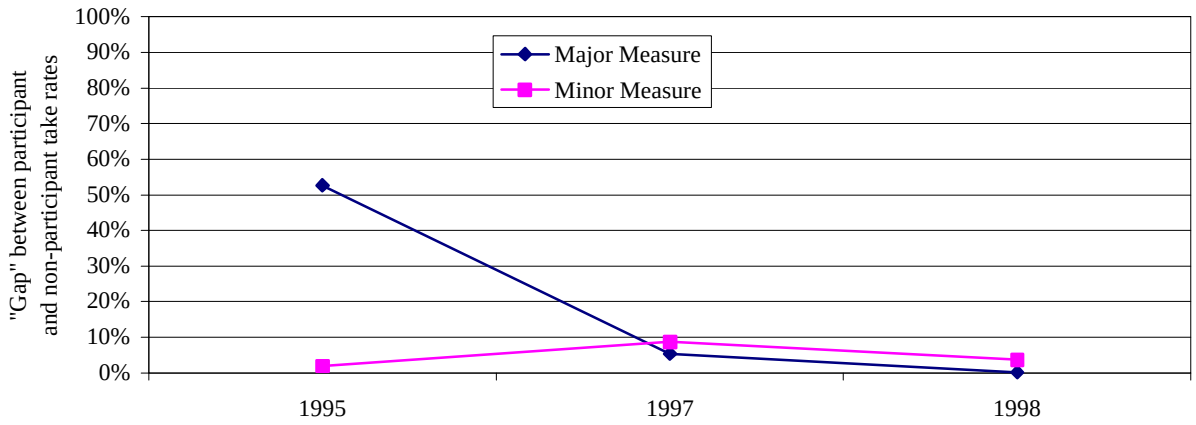
* Significant at 95 percent confidence interval.

6.2.2 Gap analysis approach

The gap analysis provides further evidence that positive market changes have occurred because the "gap" between participant implementation rates and general population implementation rates has decreased significantly for major measures. The growth of major measure installation rates was only 5 percent in the time series analysis, but the gap analysis shows that the difference between participant and general population major measure implementation rates has *decreased* considerably from 52.7 percent in 1995 to 5.4 percent in 1997 to 0.2 percent in 1998. (Figure 6-2) A decrease in the gap indicates that market effect has occurred.

However, the gap analysis for minor measures implementation rates is less clear. The difference between general population and participant implementation rates for minor measures increased from 1995 to 1997 from 1.9 percent to 8.7 percent. However, the gap decreased from 8.7 percent to 3.7 percent in 1998. The overall change of 1.9 percent in 1995 to 3.7 percent in 1997 is not statistically significant.

Figure 6-2
Gap Analysis – Implementation Rates for Minor and Major Measures



There are two possible explanations for the observed changes. First, changes in the REMS program could have led to a decrease in the installation rates for participants. Second the REMS program could be creating a market effect in the general population. Since the level of program effort did not drop significantly over time (see Figure 5-3: Number of Audits and SEL Calls by year in Chapter 5 Market Effects), the first explanation does not seem likely. This leaves us to conclude that the second explanation is the likely reason.

The fact that the gap between participant and the general population implementation rates for major measures has almost become non-existent suggests that for major measures the REMS program is having very strong market effects in the general population. For minor measures, although the gap analysis does not contradict the findings from the time series analysis that

suggest the REMS program is strongly affecting the market for these minor measures, it also does not provide further support for this conclusion.

Table 6-4 and Table 6-5 show the gap analysis for major and minor measures. For major measures, the difference between participant and general population implementation rates decreased for all measures but one – the insulation of ceilings/walls/floors. The only minor measure which did not decrease was water heater wraps.

Table 6-4
Gap Analysis – Implementation Rates for Major Energy-efficiency Measures

Type of high efficiency equipment or measure taken:	High-efficiency air conditioning system	Insulated ceilings/walls/ floors	Installed new windows	Replaced refrigerator	Replaced freezer	Imple-mented at least one major measure
Program Year 1995						
Participants:						
Numeric count	67	141	215	254	43	862
Percent of sample	6.0%	12.7%	19.4%	22.9%	3.9%	77.8%
General population:						
Numeric count	43	104	169	157	23	253
Percent of sample	4.3%	10.3%	16.8%	15.6%	2.3%	25.1%
Program Year 1997						
Participants:						
Numeric count	5	183	213	179	31	457
Percent of sample	0.4%	14.1%	16.4%	13.7%	2.4%	35.1%
General population:						
Numeric count	14	64	89	62	6	181
Percent of sample	2.3%	10.5%	14.6%	10.2%	1.0%	29.7%
Program Year 1998						
Participants:						
Numeric count	6	68	77	80	8	139
Percent of sample	1.9%	21.2%	24.0%	24.9%	2.5%	43.3%
General population:						
Numeric count	13	36	45	53	8	119
Percent of sample	4.7%	13.0%	16.3%	19.2%	2.9%	43.1%
GAP ANALYSIS						
1995	1.8%	2.4%	2.6%	7.4%	75.5%	52.7%
1997	-1.9%	3.6%	1.8%	3.6%	1.4%	5.4%
1998	-2.8%	8.1%	7.7%	5.7%	-0.4%	0.2%

Table 6-5
Gap Analysis – Implementation Rates for Minor Energy-efficiency Measures

Type of high efficiency equipment or measure taken:	Water heater wrap	Low flow shower heads	Compact fluorescents	Implemented at least one minor measure
Program Year 1995				
Participants:				
Numeric count	164	211	172	246
Percent of sample	14.8%	19.0%	15.5%	22.2%
General population:				
Numeric count	144	152	105	205
Percent of sample	14.3%	15.1%	10.4%	20.3%
Program Year 1997				
Participants:				
Numeric count	235	359	474	831
Percent of sample	18.0%	27.6%	36.4%	63.8%
General population:				
Numeric count	99	143	172	336
Percent of sample	16.2%	23.4%	28.2%	55.1%
Program Year 1998				
Participants:				
Numeric count	13	6	28	42
Percent of sample	4.0%	1.9%		13.1%
General population:				
Numeric count	1	3	16	26
Percent of sample	0.4%	1.1%	5.8%	9.4%
GAP ANALYSIS				
1995	0.5%	3.9%	5.1%	1.9%
1997	1.8%	4.1%	8.2%	8.7%
1998	3.7%	0.8%	-5.8%	3.7%

Table 6-6 summarizes the grouped major and minor measure implementation rates for 1995, 1997 and 1998 for both surveyed audit participants and the general population.

Table 6-6
Major and Minor Measure Implementation Rates
for Surveyed Participants and the General Population

	Surveyed Participants			General Population		
	1995	1997	1998	1995	1997	1998
Minor Measures	22.2%	63.8%	13.1%	20.3%	55.1%	9.4%
Major Measures	77.8%	35.1%	43.3%	25.1%	29.7%	43.1%

6.3 PROGRAM TRACKING DATA ANALYSIS

Program tracking databases were analyzed for the following program years:

- Direct mail audits – 1996 through 1998
- Onsite audits – 1996 through 1998
- Phone audits – 1997 through 1998 (very few phone audits were completed in 1996 and no tracking data was available for the few audits that were completed)

Table 6-7 summarizes the number of records analyzed for each type of audit by program year. These records pertain to the number of unique customer accounts contained in the relevant program tracking databases and not necessarily to the number of actual audits completed and/or claimed by PG&E in a given program year.

Table 6-7
Program Tracking Data Summary

(Number of Records Analyzed)

Type of Audit	Program Year		
	1996	1997	1998
Direct Mail	36,407	99,478	61,283
Onsite	17,195	9,048	5,888
Phone	-	1,027	958
Total	53,602	109,553	68,129

Table 6-8 shows the types of audit recommendations offered to all participants during program years 1996-1998. These data represent a summary of all audit delivery mechanisms (direct mail, onsite and phone). See Appendix G for a detailed summary of the types of recommendations offered to participants in each of the three audit delivery mechanisms.

Table 6-8
Type of Audit Recommendations (All Participants)

	Program Year		
	1996	1997	1998
Total Number of Records	53,602	109,553	68,129
Major Measures	**28%**	**30%**	**27%**
Install air conditioner	0%	0%	0%
Install new windows	1%	0%	0%
Replace refrigerator	12%	14%	12%
Replace freezer	14%	16%	13%
Add insulation	5%	3%	5%
Minor Measures	**61%**	**77%**	**89%**
Install showerheads, aerators	24%	28%	25%
Install water heater wrap	1%	0%	1%
Install CFLs	60%	75%	88%

6.4 IMPLEMENTATION RATE COMPARED TO PROGRAM TRACKING DATABASE

The program tracking databases for program years 1997 and 1998 were compared with survey data collected from 1997 and 1998 program participants, respectively. In this way, we could see how often a particular type of measure was recommended to participants versus how often participants indicated that they had installed the measure. See Table 6-9 for this comparison.

Table 6-9
Comparison of Recommended v. Installed Measures

	Percent of 1997 Participants Who:		*Percent of 1998 Participants Who:*	
	Received Recommendations to Install	Installed	Received Recommendations to Install	Installed
Minor Measures	61%	74%	64%	14%
Major Measures	34%	46%	26%	49%

Source: Data on measure recommendations summarized from program tracking databases (1997, 1998). Data on measure installations taken from self-reported telephone survey responses (1997, 1998).

As shown, of the participants surveyed in 1997, 61 percent received explicit recommendations from their auditor or the audit report to install minor measures and 74 percent reported installing minor measures. In 1998, two thirds of the participants (64 percent) received recommendations to install minor measures although very few (14 percent) reported installing minor measures. (It is worth repeating here that the methods used in the 1997 and 1998 surveys were distinctly different in ways that were likely to increase the level of installations identified in the 1997 survey as compared to the 1998 survey. The 1997 survey included questions about specific measures while the 1998 survey asked participants to identify measures they had implemented. It is probably to be expected that the 1998 participants would have better recall of major measures than minor ones.)

In addition, a comparison of the installation rates of participants in the program tracking database shown in Table 6-9 approximately match those from the implementation rate analysis summarized in Table 6-6. This provides further support for the findings of the implementation rate analysis.[3]

For major measures, we see 1997 and 1998 participants installing these measures much more frequently than they were explicitly recommended. This finding prompted taking a closer look at the data contained in the program tracking databases versus the responses obtained from participant surveys. See Table 6-10 for the results of this more detailed data comparison.

[3] The small differences in the installation rates reported in Table 7-9 and 7-6 (the largest difference was 10% between installation of major and minor measures in 1997) result from not all of the surveyed participants in the take rate analysis having matching records in the program database.

For example, the data shown in Table 6-10 can be interpreted as follows:

- Of the 1997 participants surveyed,
  - 9 percent did not receive any recommendations for minor measures *and* did not install any minor measures,
  - 17 percent received recommendations for minor measures *but* did not install any,
  - 30 percent did not receive any recommendations for minor measures *but* installed at least one,
  - 44 percent received recommendations for minor measures *and* installed at least one.

Table 6-10
Detailed Comparison of Recommended v. Installed Measures

	1997 Participants	1998 Participants
Minor Measures		
Nothing recommended, nothing installed	9%	28%
Something recommended, nothing installed	17%	58%
Nothing recommended, at least one thing installed	30%	6%
Something recommended, at least one thing installed	44%	8%
Major Measures		
Nothing recommended, nothing installed	36%	34%
Something recommended, nothing installed	18%	15%
Nothing recommended, at least one thing installed	30%	38%
Something recommended, at least one thing installed	16%	11%

Upon closer inspection, these data show that 44 percent of the 1997 participants installed minor measures that were specifically recommended to them by their auditor or in their audit report. Another 30 percent of the 1997 participants also installed minor measures but they did not receive explicit recommendations from their auditor or their formal audit report. This would suggest that perhaps the audit has had both a direct and an indirect influence on the actions taken by customers following their participation in the program. This trend is also evident for 1998 participants who installed minor measures, although overall very few 1998 participants reported installing minor measures (with or without explicit recommendations).

This trend is also evident for major measure installations. In 1997, 16 percent of the participants installed major measures that were recommended to them. However, almost twice as many installed major measures without explicit recommendations. Similarly, in 1998, 11 percent of the participants installed major measures that were recommended yet 38 percent installed major measures without specific recommendations. This would suggest that the indirect influence of the audit on major measure installations is potentially even greater than the direct influence.

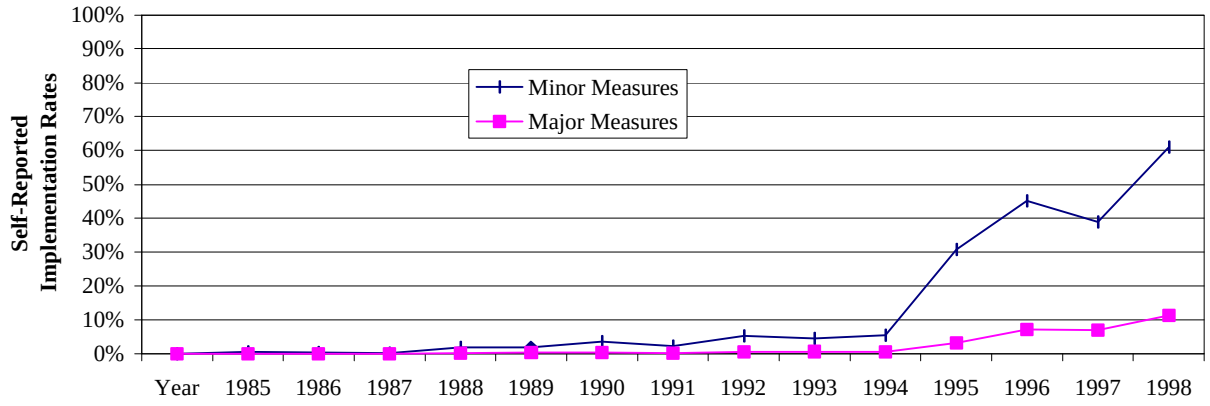
Overall, this evidence shows that the audit influences behavior beyond that which is explicitly recommended by the auditor or through the audit report. Therefore, if program planners limit their expectations of the program's value in any given year to only those measures that are explicitly recommended to participants they may be underestimating the true value of the program. In addition, as the program's indirect influence is likely to accumulate over a number of years, estimates of the program's impact based on recommendations alone may be similarly undervalued over time.

6.5 IMPLEMENTATION RATES OF THE GENERAL POPULATION OVER TIME

We also looked at the date of implementation of energy-efficiency measures by the general population over time. The survey with the general population implemented in 1998 asked respondents when they implemented various energy-efficiency measures. Again, we aggregated minor and major energy-efficiency measures and also looked at the implementation rates on the individual measure level.

As Figure 6-3 shows, the self-reported implementation of minor and major measures has increased from 1985 to 1998. The increase over time has been greater for minor measures than major measures, although both show steady trends of positive implementation rate growth. Again, the likely explanation of the greater growth for minor measures than major measures is that by definition minor measures are easier to implement.

Figure 6-3
Percentage of Self-Reported Implementation Rates Over Time from the REMS 1998 Impact Survey Among the General Population



Source: 1998 REMS Impact Survey

Some of the growth over time can probably be attributed to the fact that people recall measures they have implemented more recently than those that they implemented longer ago. However, the steady growth does indicate that real increase in implementation of measures over time has occurred. In addition, this finding is also supported by the upward trend in implementation rates found in the time series analysis. Therefore the increase in the general population self-reported implementation rates over time again suggests that positive market effects have occurred as a result of the REMS program.

Table 6-11 and Table 6-12 show the change in self-reported implementation rates for major and then minor measures over time. Every single measure shows an increase in implementation between 1985 and 1998.

Table 6-11
Self-reported Major Measure Implementation Rates Over Time
from the 1998 REMS Impact Survey Among the General Population

Measure or type of high-efficiency equipment installed:	Ducts	Insulated Ceiling, Walls, Floors	New Windows	Heat	Air con-ditioner	Refrig-erator	Clothes washer	Dryer	Dish-washer	Total	Percent Major Measures
1985										0	0.0%
1986										0	0.0%
1987										0	0.0%
1988		1								1	0.2%
1989			2							2	0.3%
1990		1	1							2	0.3%
1991			1							1	0.2%
1992		1	2							3	0.5%
1993	1	1	2							4	0.7%
1995	1	1				1				3	0.5%
1995	2	5	10	1		1	1			20	3.3%
1996	3	11	28			1		1		44	7.2%
1997	3	11	25			1	2		1	43	7.0%
1998	12	22	33				2			69	11.3%

Source: 1998 REMS Impact Survey

Table 6-12
Self-Reported Minor Measure Implementation Rates Over Time
from the 1998 REMS Impact Survey Among the General Population

Measure:	Water Heat Wrap	Pipewrap	Lowflow	Aerator	Turned Down Water heater	Caulking	Air leaks	Total	Percent Minor Measures
1985	1							1	0.2%
1986								0	0.0%
1987								0	0.0%
1988	1		1	1	1	1		5	0.8%
1989	1		2		1			4	0.7%
1990	2	2	1	1	2			8	1.3%
1991		1	2		3			6	1.0%
1992	3		3	2	4	2		14	2.3%
1993	3	1	6			1	1	12	2.0%
1995	2		6		3	1	1	13	2.1%
1995	20	10	16	8	13	9	3	79	13.0%
1996	18	13	29	8	17	31	5	121	19.8%
1997	7	6	23	3	15	33	7	94	15.4%
1998	21	10	27	8	32	40	14	152	24.9%

Source: 1998 REMS Impact Survey

Chapter 6. Market Share Analysis

Tables

Figures

CHAPTER 7
KEY FINDINGS AND RECOMMENDATIONS

This chapter will summarize the key findings from the baseline, market effects, and market share chapters. We conclude with some recommendations for future research.

7.1 BASELINE MARKET CHARACTERIZATION FINDINGS

The baseline characterization segregates the analysis into the three main types of barriers relevant to information programs such as REMS: awareness and knowledge, interest and concern, and attitudes toward energy efficiency. One of the primary factors in determining how effective REMS will be in influencing the general population and how likely the REMS market effects are to last is the amount of communication that participants and the general population do about energy efficiency. As a result, the baseline characterization summarizes how energy efficiency information is currently being communicated by participants and the general population. The following paragraphs present the most significant findings organized by the three barriers and communication.

7.1.1 Awareness and Knowledge

- The general population of PG&E customers believe they do not have an adequate amount of information about energy-efficiency to make an informed purchasing decision. Eighty-eight percent of customers said they needed at least a little more information in order to make a decision about appliance energy-efficiency. A similar proportion (90 percent) said the same was true for making a decision regarding furnace or central air efficiency. Somewhat fewer multifamily respondents felt the same way (74 percent for appliances and 61 percent for furnaces or ACs).

- The general population uses five main resources for information about the energy-efficiency of products which include Consumer Reports magazine, the Internet, the respondent's utility, the information label on the product/Energy Guide tag, and contractors or sales people.

- Customers received an average energy efficiency knowledge score of 6, where 10 is the best possible score, based on their agreement with three questions about energy efficiency.

- The majority of general population (57 percent) indicated they would like to make energy-efficiency improvements to their home. Just over a third (37 percent) of multifamily respondents felt the same.

- There appears to be a high level of knowledge and awareness of the benefits of energy-efficiency in the general population.

- The main benefits of energy-efficiency improvements cited by the general population and multifamily customers include saving money on their energy bill, conservation or environmental improvement, and increased comfort.

7.1.2 Interest and Concern

- An average score representing interest in energy-efficiency was computed based on agreement with five attitude statements. The average score was 6.8 where 10 would represent the highest possible interest, indicating that customers appear to be very interested in energy efficiency although there is room for improvement.

- The average likelihood of customers researching their energy-efficiency options was 7 on a 10-point scale.

- Based on a combination of interest and communication data, customers are generally quite interested in and concerned about energy-efficiency but do not appear to be interested or concerned enough to communicate about energy-efficiency often during daily interactions with others.

- Multifamily participants are more likely to talk about energy efficiency than the general population. Eighty-two percent of multifamily participants have initiated discussions with co-workers about energy efficiency, 67 percent have initiated discussions with others, and 70 percent have participated in discussions about energy efficiency.

7.1.3 Attitudes

- An attitude towards energy efficiency score was calculated for a respondents where a high score (with 10 being the maximum) indicates a positive attitude towards energy efficient products and actions. At 6.8, customers appear to have a generally positive attitude towards energy efficiency (although there is room for improvement).

- A second attitude score was calculated for customers who indicated they would like to make energy efficiency improvements. This score was based on the reasons they gave for not making the improvements and is expressed as a percentage of customers. A high percentage would indicate that a substantial portion of customers are not making energy efficiency improvements because of negative attitude issues. Twenty-eight percent of

customers are not making desired energy efficiency improvements due to a negative attitude about energy efficiency.

- Multifamily participants generally exhibit positive attitudes toward energy efficiency.

7.1.4 Information and Communication

As we discussed above, the higher the level of communication among the general population about energy efficiency, the more effective REMS can be in influencing the market and the more likely its impacts are to last through time. A sizable proportion of PG&E's single-family homeowners communicate with others about energy-efficiency. Forty-three percent of respondents reported initiating conversations about energy-efficiency outside of their immediate family, and the same proportion said they participated in energy-efficiency discussions that were started by others.

People who contacted the SEL hotline tended to market it via word of mouth. Over half of the respondents who contacted the SEL said they mentioned the call to others (57 percent) and recommended the SEL to friends, family and co-workers (56 percent). Thirty-eight percent shared the materials they received with people outside their immediate family.

Just under half (48 percent) of the customers who had an audit completed mentioned the service to people outside their immediate family and 75 percent recommended the audit to others. The audit report is generally not shared with others. Only 6 percent of customers who had an audit completed showed the report to anyone outside of their immediate family.

7.2 MARKET EFFECTS ANALYSIS FINDINGS

Demonstrating market effects involves three related evidences: (1) that a market change has occurred; (2) that the program created the observed market change (*attribution*); and (3) that the change will last in the absence of program intervention (*sustainability*). We presented the market effects evidence in separate sections according to those three topics. The market change evidence was further subdivided into three categories. The market barriers for an information program such as REMS are largely information-oriented. However, information barriers are not one-dimensional, that is there are many different aspects to information barriers. We separated the information barriers into three logical divisions that were amenable to analysis and were logically distinct: customer awareness and knowledge of energy-efficiency issues; their interest and concern about these issues; and their attitudes towards various energy-efficiency issues.

The market effects analysis presented evidence on a large number of variables to draw conclusions about market effects created by the REMS program. On balance, the evidence is fairly strong that REMS has created a number of significant market effects. The attribution evidence is less strong but still significant. The sustainability evidence is all positive, but it is

somewhat speculative and therefore supports a weaker conclusion. We will summarize the findings of each of these sections in the following paragraphs.

One of the most consistent findings was that prior year participants tended to have better or higher results than current year (1998) participants. Since the program did not change significantly in 1998, this supports the conclusion that the effects of the REMS program accumulate over time.

7.2.1 Awareness and Knowledge

The high awareness of the audits and the high and growing knowledge of energy-efficiency improvements that respondents want to make provide strong evidence that awareness and knowledge have improved. The negative evidence from an increase in customers who do not make energy-efficiency improvements due to a lack of knowledge and in customers citing an information-related disadvantage of energy-efficiency tempers that conclusion but the weakness of this evidence means that the balance of the evidence points toward the conclusion that awareness and knowledge have improved.

7.2.2 Interest and Concern

The REMS program has made substantial headway in mitigating interest and concern barriers. The strongest evidence was from a high interest among those with inefficient homes in implementing efficiency improvements, combined with a significant increase in actions among those receiving information from PG&E. Moderately strong evidence includes the finding that the general population interest score is moderately positive and there has been an 8 percent increase in the portion of the general population who want to make energy-efficiency improvements. This increase raises the interest level to 57.1 percent, which is higher than the diffusion threshold. Weak, but positive evidence comes from the decrease in the proportion of people who do not make energy-efficiency improvements due to interest and concern issues. Only one piece of evidence could be interpreted as negative and it was not strongly negative: the finding that only 40 percent of the general population expressed interest in having an audit.

7.2.3 Attitudes

On balance, the evidence points to improvements in the past few years in the general population's attitude toward energy-efficiency. An energy efficiency attitude score for the general population was fairly high and an 8 percent increase in the level of interest in making energy-efficiency improvements provides evidence that REMS has inspired a better attitude toward energy-efficiency. The proportion of people who think there are disadvantages to energy-efficiency declined over time, providing further support to that conclusion. However, 61 percent of the general population who knew of an efficiency improvement that they would like to make said they did not make the change because they could not afford to.

7.2.4 Attribution

All of the evidence examined supported a conclusion that the REMS program deserves credit for creating the market effects discussed above. However, none of the evidence, taken on its own, was very strong. Current and past year participants communicate enough with others about energy-efficiency and their experiences with the REMS program that there is reasonable support to the theory that REMS information makes it into the general population. The REMS program was the most visible and active energy-efficiency program in the residential sector in PG&E's territory and utility information was frequently cited as the source of information on energy-efficiency. Together, this evidence supports allocating credit to REMS for a significant portion of any relevant energy-efficiency market changes observed. There was also moderate support to the conclusion that the REMS is providing direct current and lasting impacts on participants. The participants are also sharing the information they received from REMS with others, providing a mechanism for creating market effects in the general population.

7.2.5 Sustainability

All of the sustainability evidence was positive, although not strong. There was some evidence that the private sector is experiencing demand for energy audits, which is evidence that they believe the market has a future. Several measures of behavior or attitude were found to be over the 50 percent threshold usually cited in the diffusion of innovation literature as the point at which innovations become self-sustaining. Those include communication about energy-efficiency issues, making energy-efficiency improvements, identifying other desirable energy-efficiency improvements, and an improving and positive attitude toward energy-efficiency.

7.3 MARKET SHARE ANALYSIS FINDINGS

The time series and gap analysis of the implementation rates for energy-efficiency measures suggest that the REMS program is creating positive market effects.

The time series analysis found that an increase in general population installation rates has occurred from 1995 to 1997 for both major and minor measures. Minor measures have had the largest increase in implementation rates (34.7 percent from 20.3 percent in 1995 to 55.1 percent in 1997) as opposed to slightly less than a 5 percent increase (4.6 percent from 25.1 percent in 1995 to 29.7 percent in 1997) in major measure implementation rates. It is intuitive that minor measures would have the largest increase since by definition they are easier and less costly to implement.

The gap analysis provides further evidence that positive market changes have occurred since the gap between participant implementation rates and the general population implementation rates have decreased significantly for major measures. Although the growth of general population major measure installation rates was only 5 percent in the time series analysis, the gap between

participant and general population major measure implementation rates has decreased considerably from 52.7 percent in 1995 to 5.4 percent in 1997 to 0.2 percent in 1998.

However, the gap analysis of implementation rates for minor measures did not provide discernable results. The difference between general population and participant implementation rates for minor measures increased from 1995 to 1997 from 1.9 percent to 8.7 percent. However, the gap decreased from 1997 to 1998 from 8.7 percent to 3.7 percent. The overall change from 1.9 percent in 1995 to 3.7 percent to 1997 is not statistically significant.

There are two possible explanations for the observed changes. First, changes in the REMS program could have led to a decrease in the installation rates for participants. Second the REMS program could be creating a market effect in the general population. Since the level of program effort did not drop significantly over time, the first explanation does not seem likely, leaving us to conclude that the second explanation is the likely reason.

Furthermore, the analysis of the implementation of energy-efficiency measures by the general population over time shows that the self-reported implementation of minor and major measures has increased from 1985 to 1998. The increase over time has been greater for minor measures than major measures, although both show steady trends of positive implementation rate growth.

7.4 RECOMMENDATIONS

This analysis used a variety of historical data to attempt to estimate changes over time, however, all such attempts are hampered when the data collected and the data collection methods of prior studies do not match current methods. This study defined an analysis method and baseline data that can be used in the future to effectively demonstrate changes over time. It will be important to build future evaluation efforts upon the methods and data in this effort to ensure that accurate and comprehensive results can be obtained.

Future market effects studies should continue to utilize both the time series and gap analysis approaches to implementation rate analysis. The time series analysis provides a good basis for looking at the growth (or lack of growth) over time of the implementation of energy-efficiency measures by the general population. However, it is also important to take the next step to compare differences between participant and general population implementation rates through gap analysis. It is important to take differences in studies' methodologies into account so that no year's implementation rates are either inflated or deflated in comparison to other years' implementation rates.

In addition, an aggregation of energy-efficiency measures into major and minor measures allows significant market trends to be discerned when there is a great deal of variableness and small changes on the individual measure level. However, it would be useful if future market effects studies could include more measures so that the aggregation of major and minor measures is more representative. Many important energy saving measures were not included in the

implementation rate analysis. Their inclusion would help develop a clearer and more accurate picture of market effects.

CHAPTER 7. KEY FINDINGS AND RECOMMENDATIONS

APPENDIX A
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APPENDIX B
LITERATURE REVIEW ANALYSIS

INTRODUCTION

In the 1990's traditional utility demand-side management (DSM) programs have evolved into market transformation programs. This evolution has resulted in a plethora of literature about developing and evaluating this new breed of utility intervention programs. Although many traditional DSM programs have relied heavily on rebates, the utility industry is changing and many rebate programs are being discontinued. Several of the current market transformation programs are now focusing on information and education as the main intervention strategy. This report reviews the literature on market transformation and applies the current theories to a discussion regarding strategies for developing and evaluating market transformation programs.

Components of a Market Transformation Program

Market transformation is defined by Eto, et. al (1996) as "a reduction in market barriers resulting from a market intervention, as evidenced by a set of market effects, that lasts after the intervention has been withdrawn". Although there is a wide variety of intervention strategies utilized in market transformation programs, the process for implementing a market transformation program typically includes the following components (Nadel and Latham, 1998):

- *Select measure* – Specific measures are selected based on the potential energy savings, the measure's cost effectiveness, and the likelihood for success in transforming the market. A set of related measures may be selected for a broad market transformation strategy or a single measure can be identified for a more narrowly focused initiative.

- *Analyze the market* – The market needs to be clearly defined and the current status of the market needs to be understood. This includes understanding the current market penetration of the program measure and the distribution channel through which the measure is delivered.

- *Define barriers* — If the measure is not being adopted to its fullest extent, barriers exist that are causing this lack of adoption. Creating an exhaustive list of market barriers is an essential component of any market transformation program design.

- *Develop activities that address barriers* — Once the barriers are defined, activities are developed that can effectively address those barriers. Program design should be directly linked to the goal of mitigating specific market barriers.

- *Implement a strategy to perform activities* –The organization conducting the program develops an implementation plan. This plan outlines how the various activities will be carried out, including a marketing plan, budgeting and tracking.

- *Evaluate the strategy* – Evaluation is necessary to assure decision makers that the program is worthwhile. It also provides important information for refining the program while it is in progress.

- *Exit* – The ultimate goal is to transform the market. When the market is transformed (i.e., barriers have been removed; adopting the measure is common practice) program planners can exit from their initiative.

MARKET TRANSFORMATION PROGRAMS ARE DESIGNED TO MITIGATE BARRIERS

"Removing market barriers so that a measure flourishes in the market is a textbook case of market transformation." (Nadel and Latham, 1998) As stated in the process described above, the crux of the market transformation program design is built around developing and implementing activities that will mitigate the market barriers which are limiting the adoption of the selected measure. Market barriers exist throughout the distribution chain. Therefore strategies for removing barriers need to go beyond the traditional DSM focus on the end user. A multi-faceted program includes activities that address key players in the distribution chain. For example, the program could include activities such as influencing the government to set mandatory minimum efficiency standards for manufacturers, offering stocking incentives to distributors, providing sales training for retailers and contractors, offering rebates to consumers, and disseminating information targeted to purchasers. In the past many DSM programs have relied heavily on providing market actors with financial incentives such as rebates. The reasons why this strategy is not particularly effective for market transformation programs and the increased interest of utilities in information and education programs is discussed below.

The Short Term Success of Incentives

Incentives and rebates to market actors are a successful intervention strategy if the program goal is to get a specific number of consumers to perform a single energy efficiency action, such as buying a high efficiency appliance. But incentives appear to only work in the short term. "Rebates achieve a one-time goal, but they don't change long-term consumer behavior." (Jennings, R. et al.1995).

For a true transformation of the market, a program must produce lasting market changes. Program planners are beginning to realize that the cost of incentives is no longer justified for many market transformation programs. "What is relatively new is the recognition that market transformation through customer rebates is quite expensive, and that it is also a highly uncertain way of achieving the objectives sought." (Feldman, S. 1994)

Mast, et. al (1998), point out several types of market barriers that are not affected by incentives:

- Information or search costs
- Performance uncertainties
- Asymmetric information and opportunism
- Transaction costs
- Hidden costs
- Access to financing
- Bounded rationality
- Organization practices or custom
- Misplaced or split incentives
- Product or service unavailability
- Externalities
- Nonexternality mispricing
- Inseparability of product features
- Irreversibility

Other intervention activities, particularly those that focus on providing information and education to purchasers, need to be included in programs designed to remove these barriers.

Importance of Information and Education

With the substantial decrease in customer rebates, utility program planners are turning to education and information programs as an intervention strategy. "As the electric utility industry in North America moves to a more competitive structure, funding for incentive based energy conservation programs is likely to decline, perhaps substantially. In the face of limited funding, the alternatives of information, marketing and education activities will become increasingly important." (Tiedemann and Nelson, 1998). The importance of information and education, however, is far reaching and goes beyond simple economics. According to energy conservation field specialist, Philip Scherzer, of SESCO , Inc. "Customer education must be considered a crucial part of any comprehensive energy conservation program. It improves the customers' understanding of energy consumption and usage and allows for them to understand the reasons for installing certain energy efficient measures. The information imparted to them also increases their ability to effectively purchase and use additional conservation products in the future." (Scherzer, P. 1996).

Education and information activities focus on changing a person, rather than a home or a building. "Whatever the condition of the home, the behavior of the occupants is the most powerful determinant of how much energy is consumed." (Harrigan, 1994). By changing people's attitudes and behaviors toward energy efficiency, information and education programs not only influence program participants they ultimately affect the entire market. "It is important to remember that no matter how long energy conservation companies work, we will never be able to treat every home in the world, therefore we must work towards creating an energy

efficient society. Through use of customer education we will eventually be able to cause a cultural shift towards reduced energy consumption." (Scherzer, P. 1996).

Example Market Transformation Programs that Include Education and Information

The focus of utility program planners may have recently changed to favor information and education over financial incentives, but information and education programs are not a new concept. Several successful market transformation programs have incorporated education and information activities into their program design. Examples of these programs are described below.

- *Electric Motors in British Columbia*: This program included educational information to customers and dealers on the economics and availability of high efficiency motors.

- *Energy Star Office Equipment.* Some types of Energy Star office equipment had a standby feature that wasn't enabled when the equipment was shipped. Therefore although the equipment was being sold, the energy benefits were not being obtained. Efforts were made to convince manufacturers to ship the equipment with the feature enabled and to educate consumers on the proper use.

- *High Efficiency Furnaces in Wisconsin, T8 Lamps Used with Electronic Ballasts and Improved-Efficiency Exit Signs.* These programs combined rebates and information activities. This combination influenced local contractors and retailers to increase stocking and helped show that efficient equipment can be both reliable and cost-effective. This led to economies of scale and lower prices in the market (Nadel and Latham, 1998).

- *WashWise.* This program used rebates and marketing materials to educate customers on the benefits of high efficiency clothes washers. "For 1998, WashWise has four flights of targeted paid advertising and is shifting from an emphasis on the rebate to a focus on the conservation ethic – encouraging consumers to look at the "second price tag" which includes the cost of operation and maintenance." (Gordon, et al., 1998).

- *Energy Star Purchasing Toolkit.* The toolkit provides purchasers with information about energy-efficient products. "By providing concise, comprehensive information in one source, this toolkit helps purchasers answer questions of how to specify energy-efficient products, where to find them, and how to figure cost-benefit analysis." (Dolin and Raynolds, 1998).

- *Penelec's Time-of-Use Program.* Educational videos and home visits were added to Pennsylvania Electric Company's time of use program. Customers who participated achieved energy savings of 16.4% compared to 8.4% for a control group. (Harrigan, 1994)

- *NMPC' Weather Assistance Program.* Niagara Mohawk Power Corporation (NMPC) supplemented a weatherization assistance program with three in-home education sessions. Customers who received the education component achieved 10% more savings than those who just received the measures. (Harrigan, 1994).

EVALUATING MARKET TRANSFORMATION PROGRAMS

Evaluating a market transformation program should begin with a market characterization and baseline study. Additional data then needs to be collected which identifies any changes in the market since the program has been implemented. This data can include participant and nonparticipant comparisons, sales data, and market success indicators (e. g., increased consumer awareness of a high efficiency product). Two challenges in evaluating a market transformation program are attributing any market changes to the program and proving that the market changes are sustainable once the program intervention has been removed.

Market Characterization and Baseline Evaluation

Most of the current literature about evaluating market transformation programs states that in order to understand a program's effect on the market, quantitative baseline data characterizing the market *before* the program was implemented needs to be obtained. This data should ideally include estimates of the overall market size and market share of the technologies and practices targeted by the program (Research Into Action, et. al. 1998).

Unfortunately, many programs currently under the market transformation umbrella were not designed with market transformation guidelines in mind. In these situations a market characterization study that helps prioritize market barriers and hypothesize market effects is an essential first step. A second "market effects" study would then be conducted to see if any of the hypothesized market effects have occurred and whether these effects can be attributed to the program. (Mast, B. et. al, 1998). A market effects study can and should use previously collected data in lieu of baseline data. Although using previously collected data is cost-effective, compromises often have to be made when interpreting the results of the comparison.

Data Collection

Several types of data can be useful measures for evaluating a program's effect on the market. These include participant and nonparticipant comparisons, interviews with other market actors, sales data, and market success indicators. Each of these data collection activities is discussed below.

- *Participant and Nonparticipant Comparisons.* In order to say that the program had an effect on the overall market, data collection efforts need to include samples of both participants and nonparticipants (Mast, B. et al, 1998). If differences are found between

the two groups the argument can be made that the program has impacted participants. The nonparticipant data can then be compared to the baseline data to determine if the overall market has changed as well.

- *Interviews with Other Market Actors.* A market transformation study is designed to impact participants, nonparticipants and other market actors. Therefore, while data from participants and nonparticipants may be an important piece of data, it should not be the only piece of data collected. Interviews with other market actors, such as contractors, retailers, builders, distributors and manufacturers can help provide sufficient data to examine program market effects for the market as a whole.

- *Sales Data.* An important piece of data for evaluating market transformation programs is market share data for energy efficient measures. If the market share of energy efficient measures targeted by the program increased during program implementation and continued to increase after the program ended, the market would therefore be transformed.

  There are several challenges, however, in obtaining this data. It is expensive and it is difficult to get market share data segmented by efficiency level. Also, in order to attribute the increased market share to the program, equivalent data from a comparison area would need to be obtained. The cost of collecting this data is prohibitive (Regional Economic Research, Inc. 1999) For these reasons, a useful, cost-effective sales data tracking system has yet to be designed.

- *Market Success Indicators.* Success of market transformation programs is based on much more than a measure of the units sold. Success indicators need to include those that suggest the behavior of the various market actors is changing. “Rather than measuring the resource acquired or number of efficient units sold, we might identify market success indicators that suggest that the behavior of market actors is changing.” (Kunkel and Lutzenhiser, 1998) Examples of market success indicators include:

  - Changes in the awareness of benefits of energy efficiency services
  - Changes in attitudes and behavior of customers toward the use of energy efficiency services
  - Changes in attitudes and behaviors of providers toward the availability and delivery of energy efficiency services
  - Changes in the attitudes and behaviors of manufacturers toward the production and availability of energy efficiency services.
  - Changes in the availability, pricing and affordability of energy efficiency services in the retail market.

— Changes in the laws and codes that facilitate the sale and use of energy efficiency services (Hagler Bailly, 1998).

Evaluation Challenges — Attribution

Determining whether a specific program intervention has caused a market effect is a particular challenge for program evaluators. "Attributing progress to specific interventions and specific sponsors is very difficult, because many factors contribute to the market development of a measure and separating out the impact of specific interventions and sponsors is hard, if not impossible to do." (Nadel and Latham, 1998). Several types of events can cause changes in energy efficiency awareness, attitudes and behaviors independent of market transformation intervention strategies. Examples include:

- Deregulation of electric markets in the US causing an increased level of interest in energy issues.
- Multiple programs causing cumulative changes that are difficult to separate.
- Broad changes in economic conditions changing consumer's discretionary income and any associated purchasing behavior. (Hagler Bailly Consulting, 1999).

The current literature gives an overview of several useful strategies for dealing with the problem of attribution. These strategies include quasi-experimental design, collecting qualitative data from a variety of sources, adjusting for naturally occurring market activity, and a technique using discrete choice modeling.

Quasi-Experimental Design. Conducting research using some form of experimental or quasi-experimental design is typically used for measuring and attributing change. True experiments are not possible for most market transformation program evaluations because of the inability to randomize the offering of programs to customers. Quasi-experimental designs use control groups selected to provide an appropriate matched comparison group. The use of statistical controls (some of which are discussed below) should be used to adjust for differences between the control groups and the groups who were exposed to market transformation programs. (Hagler Bailly Consulting, 1999)

Collecting Qualitative Data from a Variety of Sources. Although qualitative data are not particularly useful for estimating market penetration or the amount and value of market effects, it can be used to make reliable claims of attribution. Collecting qualitative data from a variety of sources can clarify if a measured effect is really a change that occurred in the market independent of the program or whether that effect was actually caused by the program. (Research Into Action, 1999).

Adjusting for Naturally Occurring Market Activity. If data are collected from both program participants and nonparticipants the first step in analyzing program attribution is

to determine whether there is a difference in the rate of the market effect between the baseline (B) and the two groups (O'Meara and Flanagan, 1994). If there is a difference, the rate of the market effect that is attributable to the program (P = percent of participants) needs to be adjusted by the rate of the market effect that would naturally occur in the market (NP = percent of nonparticipants).

$$(P - NP)\text{-}B = \text{Adjusted rate attributable to the program}$$

Discrete Choice Models. Parikh and Dimit developed a technique using discrete choice models to estimate the impact of information programs in mitigating specific market barriers. "To help distinguish informational program-induced changes in customers' perceptions of market barriers from what would have naturally happened, discrete choice models are used to stimulate market barrier perceptions with and without exposure to the programs." (1998). In this process, potential market barriers are identified and data are collected from program participants and nonparticipants to see if there is a reduction in any of the barriers. Discrete choice models are used to test whether or not the reduction is the result of the program. "Essentially, the market barriers perceived by exposed customers are compared with a comparison group, correcting for simultaneity of the exposure and market barrier perceptions. Variance of the estimates can be approximated."

Sustainability

Implied in the definition of market transformation is the concept that a change has occurred that is not easily reversed. Therefore in order to effectively evaluate if a market has been transformed, the issue of sustainability needs to be addressed. "Market transformation involves ongoing and lasting change such that the market does not regress to lower levels of efficiency at some later time." (Gellar and Nadel, 1994).

Based on a review of several market transformation studies, Research Into Action et. al, states that some of the likely conditions for sustainable market effects are:

- New market entrants
- Position and momentum in the diffusion process
- Institutional adoption
- Physical and market structure transformation, and
- The development of profitable private market entities to facilitate continued market transformation (1998)

Bronfman agrees that the transition from a utility-based intervention to a market-based intervention illustrates a sustainable market effect. "The true test of market transformation evaluation is the long-term behavior of the market in the absence of a MT program, or rather in the integration of programs into private sector practices." (1998).

One problem with proving that a market effect is in fact sustainable is the time it takes to show that a transformed market is unlikely to regress. Identifying a measurable change in any of the aforementioned sustainable market effects could potentially take several years.

Research Into Action, et. al, argues that sustainability can be proven from a single point measurement provided that the focus of the research is clearly stated. "Potential sustainable effects should be measured and assessment made as to the likelihood that the transformation will be permanent." (1998).

CONCLUSIONS

The following conclusions can be drawn from this review of the current literature on market transformation:

- *The Utlimate Goal of a Market Transformation Program is to Mitigate Barriers.* The crux of a market transformation program design is built around developing and implementing activities that remove the barriers which are limiting the adoption of the selected measure.

- *Incentives and rebates only work in the short term.* For a true transformation of the market, a program must produce lasting market changes.

- *The advantages of information and education programs go beyond simple economics.* Information and education programs are less expensive than incentive-based programs. Information and education programs are also more effective in transforming the market because they focus on changing a person, rather than a home or a building. By changing people's attitudes and behaviors information and education programs ultimately affect the entire market.

- *Several market transformation programs have used information and education as a successful intervention strategy.* In NMPC's Weather Assistance Program, customers who received the educational component achieved 10% more savings than those who just received the measures.

- *Quantitative baseline data characterizing the market needs to be obtained before program implementation.* This data should ideally include estimates of the overall marekt size and market share of the the technologies and practices targeted by the program.

- *Many programs currently under the market transformation umbrella were not designed with market transformation guidelines in mind.* In the absence of baseline data, a market characterizations sutdy that helps prioritize market barriers and hypothesize market effects is an essential first step. A second "market effects" study should then be conducted to see if any of the hypothesized market effects have occurred and whether

these effects can be attributed to the program. A market effects study can and should use previously colleted data in lieu of baseline data.

- *Several types of data can be useful measures for evaluating a program's effect on the market.* These include participant *and* nonparticipant comparisons, interviews with other market actors, sales data, and market success indicators.

- *Attribution is a particular challenge for program evaluators.* Several strategies have been identified for dealing with the problem of attribution. These include quasi-experimental design, collecting qualitative data from a variety of sources, adjusting for naturally occuring market activity and a technique using discrete choice modeling.

- *In order to effectively evaluate if a market has been transformed, sustainability needs to be proven.* Although sustainability is typically evidenced by long-term behavior, some experts argue that it can be proven from a single point of measurement.

APPENDIX C
SURVEY INSTRUMENTS

SINGLE-FAMILY CUSTOMER SURVEY

MULTIFAMILY CUSTOMER SURVEY

SINGLE-FAMILY CUSTOMER SURVEY

PG&E REMS
MARKET EFFECTS SURVEY

INTRODUCTION

Hello, my name is _____ and I'm calling on behalf of your electricity company, PG&E. May I speak with _____[INSERT RESPONDENT'S NAME]?

[WHEN CORRECT RESPONDENT IS ON THE PHONE]

PG&E is conducting a brief study about how their customers use energy and would very much appreciate your input. I want to assure you that this is not a sales call and what we discuss will be kept entirely confidential.

IF CONCERNED ABOUT TIMING:
This should only take about 15 minutes of your time. [CONTINUE OR ARRANGE FOR CALLBACK]

If respondent wants to verify the validity of the study, instruct them to contact Mary Lou Sutton at PG&E (415) 973-2651.

If respondent wants more information on energy efficiency related topics, instruct them to contact PG&E's Smarter Energy Line (800) 933-9555.

SCREENER

S1. Before we get started, I'd like to know – do you own or rent your home?

1 Own
2 Rent [GO TO TERMINATE]

S2. Do you own a single family home or some other type of structure?

[Instruction: by "Single Family", we mean to exclude apartment buildings, condominiums, and other such multiple-tenant structures.]

1 Single family home [CONTINUE]
2 Something else [GO TO TERMINATE]

TERMINATE: I see. Well, at this time, we need to hear from single family home owners. Thank you for your time, that is all the questions I have. [TERMINATE.]

KNOWLEDGE & ATTITUDES

1. I want to read to you some statements people have made about their opinions on a variety of energy-related issues. Using a 10-point scale, with 1 meaning you "strongly disagree" with the statement and 10 meaning you "strongly agree," please tell me how much you disagree or agree with each of the following statements. [ROTATE STARTING POINT]

Strongly Disagree									Strongly Agree
1	2	3	4	5	6	7	8	9	10

A I am not very concerned about the amount of energy used in my home.
B My life is too busy to worry about making energy related improvements.
C There is very little I can do to reduce the amount of electricity I am now using.
D It is possible to save energy without sacrificing comfort by improving the efficiency of my home.
E Instead of building new power plants, customers should use less electricity.
F My home is very energy efficient.
G Conserving energy is an economic necessity for me.
H Energy efficient products are too expensive.
I I would like to know more about energy efficient products and services.
J Energy efficiency is a low priority compared to other things that need to be done in my home.
K Products that are energy efficient don't work as well as standard efficiency products.
L Energy efficient products are not always available at the stores where I shop.
M I am always looking for new ways or products that will help me to conserve energy in my home.

INFORMATION SOURCES & INFORMATION FLOWS

2 Now, let's suppose you were going to buy a new, major **appliance** for your home – like a refrigerator or clothes washer. Other than shopping around and talking to salespeople, how likely is it that you would do some research on your own to figure out what your energy efficiency options might be? On a scale of 1 to 10, where 1 is "Not at all likely" and 10 is "Extremely likely," how likely would you be to do some research on your own?

Not at all Likely									Extremely Likely
1	2	3	4	5	6	7	8	9	10

3. Suppose you were going to purchase a new, major appliance *tomorrow*. How much more information would you need to adequately evaluate claims made by the salesperson about the energy efficiency of different models? Would you think you'd need…

1 No more information
2 A little more
3 A fair amount more, or
4 A lot more information?

5. On a scale of 1 to 10, where 1 is "Extremely difficult" and 10 is "Extremely easy," how difficult or easy do you think it is to find information on appliance energy efficiency?

Extremely Difficult									Extremely Easy
1	2	3	4	5	6	7	8	9	10

5a. Where would you look for information on appliance energy efficiency? [PROBE "Anything else?"] *[RECORD FIRST AND OTHER MENTIONS]*

NOTE: [AVOID USING THE CATEGORY "DO MY OWN RESEARCH". PROBE FOR HOW THEY DO THEIR OWN RESEARCH USING THE OTHER RESPONSE CATEGORIES LISTED BELOW. IF RESPONDENT SAYS THEY DO RESEARCH AT THE LIBRARY, CODE THIS AS AN OTHER AND TYPE IN "LIBRARY".]

1 Ask contractor or sales person
2 Ask friends, family, co-workers
3 Ask utility
4 Look at Consumer Reports
5 Look at technical magazines
6 Look on the Internet
7 Do my own research
8 Other (specify)
9 Don't know

6. OK, now let's suppose you were going to buy a new **furnace or central air conditioner** for your home. Other than calling a contractor or talking with a salesperson, how likely would you be to do some research on your own to figure out what your energy efficiency options might be? On a scale of 1 to 10, where 1 is "Not at all likely" and 10 is "Extremely likely," how likely would you be to do some research on your own?

Not at all Likely									Extremely Likely
1	2	3	4	5	6	7	8	9	10

7. Again, suppose you were going to purchase a new furnace or central air conditioner *tomorrow*. How much more information would you need to adequately evaluate claims made by the salesperson about the energy efficiency of a new furnace or central air conditioner? Would you think you'd need…

1 No more information
2 A little more
3 A fair amount more, or
4 A lot more information?

9. On a scale of 1 to 10, where 1 is "Extremely easy" and 10 is "Extremely hard," how hard or easy do you think it is to find information on furnace or air conditioner energy efficiency?

Extremely Easy									Extremely Hard
1	2	3	4	5	6	7	8	9	10

9b. Where would you look for information on furnace or air conditioner energy efficiency? *[RECORD FIRST AND OTHER MENTIONS]*

NOTE: IF RESPONDENT IS CONCERNED ABOUT THE REDUNDANCY IN QUESTIONS (THIS QUESTION AND Q5A) SAY "WE ARE TRYING TO FIND OUT IF YOUR SOURCES OF INFORMATION FOR FURNACE AND AIR CONDITIONER ENERGY EFFICIENCY IS DIFFERENT FROM YOUR SOURCES OF INFORMATION FOR APPLIANCE ENERGY EFFICIENCY." IF RESPONDENT SAYS THEIR SOURCES OF INFORMATION ARE THE SAME AS WHAT THEY SAID FOR APPLIANCES (Q5A) USE ANSWER CATEGORY 08.

1 Ask contractor or sales person
2 Ask friends, family, co-workers
3 Ask utility
4 Look at Consumer Reports
5 Look at technical magazines
6 Look on the Internet
7 Library
8 Same sources as appliances (Q5a)
9 Other (specify)

INTERPERSONAL COMMUNICATION

OK, now I'd like to talk about more general experiences you may have had related to energy efficiency issues.

10. First, in the past two or three years, have you started any discussions on energy efficiency related topics with others **outside** of your immediate family?

1 Yes
2 No

11. Have you participated in discussions that were initiated by others?

1 Yes
2 No

ENERGY EFFICIENCY ACTIONS & INTENTIONS

12. In the past two to three years, have you done anything to improve the energy efficiency of your home? Keep in mind, this could include things we already discussed – such as a major appliance purchase, home improvement project, or other things you've done to save energy at home.

    1 Yes
    2 No [SKIP NEXT QUESTION]

13. What have you done? [DO NOT READ, RECORD ALL ANSWERS] PROBE: Anything else?

    1 Purchased a more efficient appliance [ASK Q13a]
    2 Installed new windows
    3 Installed new doors
    4 Added insulation [ASK Q13b]
    5 Installed a programmable thermostat
    6 Added weatherstripping or caulking
    7 Installed low flow showerheads and/or faucet aerators
    8 Installed compact fluorescent or energy efficient lighting
    9 Installed water heater or pipe wrapping
    10 Other [SPECIFY]

13a. [ASK IF Q13=1] You mentioned you purchased a more energy efficient appliance. What type of appliance did you purchase? [DO NOT READ – RECORD ALL MENTIONS]

    1 Furnace
    2 Air conditioner
    3 Water heater
    4 Washer
    5 Dryer
    6 Refrigerator
    7 Freezer
    8 Dishwasher
    9 Stove
    10 Other [SPECIFY]

13b. [ASK IF Q13=4] You mentioned you added insulation to your home. Where did you install the insulation? [DO NOT READ – RECORD ALL MENTIONS]

1 Attic or ceiling
2 Walls
3 Basement
4 Water heater
5 Hot water pipes
6 Ducts
7 Other [SPECIFY}

14. Are there any improvements that you would like to make to your home that would help save energy and save you money on your energy bill?

[IF YES TO Q12 – ADD "that you haven't already done?"]

1 Yes
2 No [SKIP NEXT QUESTION]
3 Do not know [SKIP NEXT QUESTION]

15. Why haven't you made these improvements? [RECORD FIRST AND OTHER MENTIONS]

1 No reason [PROBE→ Why do you feel that way?]
2 Can't afford improvements
3 The cost is not worth the benefits
4 Don't know what to do
5 Plan to move soon
6 It's too difficult/don't know how
7 Don't have the time
8 Too hard to find out about/get information on
9 Other [SPECIFY]

BENEFITS AND DRAWBACKS

The next set of questions are about your opinions on the benefits of energy efficiency – that is, owning an energy efficient home, owning energy efficient appliances, and generally practicing energy efficient "behaviors".

16. What, in your opinion, are the benefits of energy efficiency? Are there any others? [DON'T READ LIST. RECORD FIRST AND ALL OTHER MENTIONS.]

1 Saving energy [ASK Q16a]
2 Saving money on energy bill
3 Conservation/improving the environment
4 Rebates, loans, and other types of financial incentives available for energy efficient homes/appliances
5 Increased comfort
6 Increased value of home, higher resale value
7 Better features than standard efficiency appliance
8 Other *(Specify: _____)*
9 Don't know

16a. [ASK IF Q16=1] In what way would saving energy be a benefit? [DO NOT READ – RECORD ALL MENTIONS]

1 Save money on energy bill
2 Conservation/environmental improvement
3 Other (Specify: _____)

17. What **disadvantages** do you feel there are with energy efficiency? PROBE: Any others?

1 None
2 Higher initial cost/price for energy efficient home
3 Higher initial cost/price for energy efficient appliances
4 Energy efficient appliances are not available/hard to find in the market place
5 Don't know where to find/purchase energy efficient appliances
6 Energy/monetary savings from energy efficiency is not significant
7 Being "energy efficient" (practicing energy efficient behavior) is inconvenient
8 Energy efficient homes cost more to maintain/operate
9 Energy efficient appliances cost more to repair/operate
10 Energy efficient appliances do not have the same features as standard appliances
11 Other *(Specify: _____)*
12 Don't know

AUDIT AWARENESS & INFLUENCE

18. Have you ever heard of a home energy survey? This is where someone might ask you questions about your home and then follow up with specific recommendations for things you could do to save energy in your home. This could be done by mail, over the phone, or in person. Have you ever heard of this service?

    1 Yes
    2 No [SKIP TO Q32]

19. Who do you think provides this kind of service? Anyone else?
    [RECORD FIRST AND OTHER MENTIONS]

    1 PG&E
    2 Other utility
    3 Contractors [ASK Q19a]
    4 Salespeople [ASK Q19b]
    5 Other [SPECIFY]

19a. [ASK IF Q19=3] What kind of contractor do you think provides this kind of service?
    [DO NOT READ – RECORD ALL MENTIONS]

    1 Heating/Air conditioning contractor
    2 Insulation contractor
    3 Plumbing contractor
    4 Some other type of contractor [SPECIFY]

19b. [ASK IF Q19=4] What kind of store would these salespeople work for?
    [DO NOT READ – RECORD ALL MENTIONS]

    1 Hardware store
    2 Home improvement store (i.e. Menards, Home Depot, etc.)
    3 Department store (i.e., SEARS, Target, etc.)
    4 Some other type of store [SPECIFY}

20. How did you find out about the home energy survey?

1 Message on back of PG&E bill envelope
2 Read about it in PG&E newsletter, SPOTLIGHT
3 Learned about it while visiting PG&E's web site
4 Read about it in PG&E bill (unspecified)
5 Received information in the mail (other)
6 Through a friend, family, co-worker
7 Saw advertisement in newspaper, magazine
8 Heard advertisement on TV, radio
9 Internet
10 Other [SPECIFY]

21. Have you ever had a home energy survey completed for your home?

1 Yes
2 No [SKIP TO Q32]

22. Who conducted the survey?

1 PG&E
2 Other utility
3 Contractors [SKIP TO Q22a]
4 Other [SPECIFY]

22a. What type of contractor conducted the survey?

1 Heating/Air conditioning contractor
2 Insulation contractor
3 Plumbing contractor
4 Some other type of contractor [SPECIFY]

23. In what year did you have this done?

____ Year

[IF AT LEAST ONE ENERGY EFFICIENCY IMPROVEMENT MADE AND SURVEY WAS AFTER 1995, ASK:]

24. Earlier, we discussed energy efficiency improvement(s) you have made to your home over the past two to three years. On a scale of 1 to 10, where 1 means "Not at all influential" and 10 means "Extremely influential," how influential was the home energy survey in your decision to make this/these energy efficiency improvement(s)?

Not at all Influential									Extremely Influential
1	2	3	4	5	6	7	8	9	10

25. Did you receive a written report or list of energy efficiency improvements that you could make to save energy in your home?

1 Yes
2 No [SKIP TO Q29]

26. Do you still have this report?

1 Yes
2 No [SKIP TO Q29]

27. How frequently, if at all, have you referred to this report since you first got it? Have you…

1 Referred to it quite often
2 Referred to it once or twice, or
3 Not referred to it at all?

28. Have you shown the report to anyone outside your immediate family?

1 Yes
2 No

29. Outside of your immediate family, have you mentioned to anyone that you had a home energy survey completed?

1 Yes
2 No [SKIP NEXT QUESTION]

30. Have you recommended the home energy survey to any of your friends, family or co-workers?

1 Yes
2 No

31. Overall, how satisfied were you with the home energy survey you received? Were you…

1 Very satisfied
2 Somewhat satisfied
3 Somewhat dissatisfied
4 Very dissatisfied

[ASK IF HAVEN'T HAD A SURVEY, OTHERWISE SKIP NEXT QUESTION]

32. Would you be interested in having an energy survey of your home?

[INSTRUCTIONS: If they ask how, tell them they can call 800-933-9555.]

1 Yes
2 No

SEL AWARENESS & INFLUENCE

33. Have you ever heard of the Smarter Energy Line?

1 Yes [SKIP NEXT QUESTION]
2 No

PG&E offers a toll-free telephone service, called the Smarter Energy Line, where customers can call to learn about their energy use and get energy saving recommendations.

34. Before today, were you aware of the Smarter Energy Line?

1 Yes
2 No [SKIP TO Q45]

35. How did you become aware of PG&E's Smarter Energy Line? PROBE: How else? [RECORD ALL MENTIONS]

1 Message on back of PG&E bill envelope
2 Read about it in PG&E newsletter, SPOTLIGHT
3 Learned about it while visiting PG&E's web site
4 Read about it in PG&E bill (unspecified)
5 Received information in the mail (other)
6 Through a friend, family, co-worker
7 Saw advertisement in newspaper, magazine
8 Heard advertisement on TV, radio
9 Internet
10 Other [SPECIFY]

36. Have you ever called the Smarter Energy Line?

1 Yes
2 No [SKIP TO Q45]

37. When you called the Smarter Energy Line, did PG&E …

A. send you materials or brochures on energy efficiency products or home improvement projects? Yes/No
B. refer you to another program or service for further assistance? Yes/No
C. offer to complete a home energy audit over the telephone? Yes/No
D. Do anything else? Yes/No
What? _____

[IF AT LEAST ONE ENERGY EFFICIENCY IMPROVEMENT MADE, ASK:]

38. Earlier, we discussed energy efficiency improvement(s) you have made to your home over the past two to three years. On a scale of 1 to 10, where 1 means "Not at all influential" and 10 means "Extremely influential," how influential was the information you received from the Smarter Energy Line in your decision to make this/these energy efficiency improvements?

Not at all Influential									Extremely Influential
1	2	3	4	5	6	7	8	9	10

[IF WRITTEN MATERIALS, BROCHURES MENTIONED, ASK:]

39. Do you still have the materials you received from the Smarter Energy Line?

1 Yes
2 No [SKIP TO Q42]

40. How frequently, if at all, have you referred to these materials since you first received them? Have you…

1 Referred to them quite often
2 Referred to them once or twice, or
3 Not referred to them at all?

41. Have you shown the materials to anyone outside your immediate family?

1 Yes
2 No

42. Outside of your immediate family, have you mentioned to anyone that you contacted the Smarter Energy Line?

1 Yes
2 No [SKIP NEXT QUESTION]

43. Have you recommended the Smarter Energy Line to any of your friends, family or co-workers?

1 Yes
2 No

44. Overall, how satisfied were you with your experience with the Smarter Energy Line? Were you…

1 Very satisfied
2 Somewhat satisfied
3 Somewhat dissatisfied
4 Very dissatisfied

[ASK IF HAVE **NOT** CONTACTED THE SEL]

45. On a scale of 1 to 10, where 1 is "Not at all interested" and 10 is "Extremely interested," how interested would you be in contacting PG&E's Smarter Energy Line for information about energy efficiency related topics?

Not at all Interested									Extremely Interested
1	2	3	4	5	6	7	8	9	10

DEMOGRAPHICS – PART ONE

Finally, I would like to ask you a few questions about your household.

46. About how old is your home? (PROBE: Is it…)

1 Less than 5 years old
2 5 to 9 years old
3 10 to 19 years old
4 20 to 29 years old
5 30 to 39 years old
6 40 to 49 years old
7 50 years or older

47. What size is your home? (PROBE: Is it…)

1 Less than 500 square feet
2 500 to 1,499 square feet
3 1,500 to 1,999 square feet
4 2,000 to 2,499 square feet
5 2,500 or more square feet?

48. Including yourself, how many adults 18 years of age or older live in this home?

_____ adults

49. How many children under the age of 18 years of age live in this home?

None [SKIP TO DEMOGRAPHICS PART 2]
_____ children

50. Are any of your children in grades 1 – 8 in school?

1 Yes
2 No [SKIP TO DEMOGRAPHICS PART 2]

ENERGENIUS AWARENESS & INFLUENCE

51. Are you aware of a school program called Energenius? The program is sponsored by PG&E and helps students understand how they use energy and how they can take actions to save energy, conserve natural resources and stay safe.

1 Yes
2 No [SKIP TO NEXT SECTION]

52. Have your children participated in the Energenius program?

1 Yes
2 No [SKIP TO NEXT SECTION]

53. On a scale of 1 to 10, with 1 meaning "not at all useful" and 10 meaning "extremely useful", how useful do you feel this program is in educating children about energy efficiency?

Not at all Useful									Extremely Useful
1	2	3	4	5	6	7	8	9	10

[IF 1 – 5]

54. Why do you think this program wasn't very useful?

_____

55. As a result of your child/children participating in the Energenius program, have you made any changes at home that would effect the way your household uses energy? Keep in mind any of the energy efficiency improvements we discussed earlier.

1 Yes
2 No [SKIP TO NEXT SECTION]

56. What types of energy-related changes have you made? [DO NOT READ]

1 Purchased a more efficient appliance
2 Installed new windows
3 Installed new doors
4 Added insulation
5 Installed a programmable thermostat
6 Added weatherstripping or caulking
7 Installed low flow showerheads and/or faucet aerators
8 Installed compact fluorescent or energy efficient lighting
9 Installed water heater or pipe wrapping
10 Other [SPECIFY]

DEMOGRAPHICS – PART TWO

57. Which of the following broad age categories best describes your age? Are you between…

1 18-24 years of age
2 25-29 years of age
3 30-34 years of age
4 35-44 years of age
5 45-54 years of age
6 55-64 years of age
7 65-74 years of age
8 75 or more years of age

58. What is the highest level of education you have completed? (Probe: Is it…)

1 Grade school
2 Some high school or less
3 High school graduate (or GED)
4 Some business or technical school or junior college
5 Completed business or technical school or junior college
6 Some college
7 Completed 4-year college
8 Some graduate school
9 Completed graduate school

59. Which of the following broad categories reflects your total annual household income for 1998? Was it…

1 Less than $10,000
2 $10,000 to under $20,000
3 $20,000 to under $30,000
4 $30,000 to under $40,000
5 $40,000 to under $50,000
6 $50,000 to under $75,000
7 $75,000 to under $100,000
8 Over $100,000
9 Refused

60. [DO NOT READ] Respondent Gender

1 Male
2 Female

That's all of the questions I have for you!
Thank you very much for your time and input into our study. Have a great day!

MULTIFAMILY CUSTOMER SURVEY

PG&E REMS
MULTI-FAMILY SURVEY

INTRODUCTION

Hello, may I speak with _____. My name is _____ and I'm calling on behalf of your electricity company, PG&E. [WHEN CORRECT RESPONDENT IS ON THE PHONE] PG&E is conducting a brief study about how landlords and property managers use energy in the common areas of their buildings and would very much appreciate your input. I want to assure you that this is not a sales call and what we discuss will be kept entirely confidential. This should only take about 15 minutes of your time. [CONTINUE OR ARRANGE FOR CALLBACK]

SCREENER

S1. Before we get started, I'd like to verify– are you the landlord or property manager for the building located at [insert address(es) of property – if more than one property respondent only needs to be the landlord or property manager of one property]?

1 Yes
2 No [GO TO TERMINATE]

TERMINATE: I see. Well, at this time, we need to hear from landlords or property managers of specific buildings. Thank you for your time. That is all the questions I have. [TERMINATE.]

KNOWLEDGE & ATTITUDES

1. I want to read to you some statements people have made about their opinions on a variety of energy-related issues. Using a 10-point scale, with 1 meaning you "strongly disagree" with the statement and 10 meaning you "strongly agree," please tell me how much you disagree or agree with each of the following statements. [ROTATE STARTING POINT]

Strongly Disagree									Strongly Agree
1	2	3	4	5	6	7	8	9	10

A I am not very concerned about the amount of energy used in the common areas of my Building(s).
B My life is too busy to worry about making energy related improvements.
C There is very little I can do to reduce the amount of electricity I am now using in the common areas of my building(s).
D It is possible to save energy without sacrificing comfort by improving the efficiency of my building(s).
E Instead of building new power plants, customers should use less electricity.
F My building(s) is/are very energy efficient.
G Conserving energy is an economic necessity for me.
H Energy efficient products are too expensive.
I I would like to know more about energy efficient products and services.
J Energy efficiency is a low priority compared to other things that need to be done in my building(s).
K Products that are energy efficient don't work as well as standard efficiency products.
L Energy efficient products are not always available at the stores where I shop.
M I am always looking for new ways or products that will help me to conserve energy in the common areas of my building.

INFORMATION SOURCES & INFORMATION FLOWS

2. Now, let's suppose you were going to buy a new ***major appliance*** such as a clothes washer or some new light fixtures for the common areas of your building. Other than shopping around and talking to salespeople, how likely is it that you would do some research on your own to figure out what your energy efficiency options might be? On a scale of 1 to 10, where 1 is "Not at all likely" and 10 is "Extremely likely," how likely would you be to do some research on your own?

Not at all Likely									Extremely Likely
1	2	3	4	5	6	7	8	9	10

3. Suppose you were going to purchase a new, major appliance or new lighting for the common areas of your building ***tomorrow***. How much more information would you need to adequately evaluate claims made by the salesperson about the energy efficiency of different models or fixtures? Would you think you'd need…

   1 No more information
   2 A little more
   3 A fair amount more, or
   4 A lot more information?

4. Where would you look for information on appliance or lighting energy efficiency? [DO NOT READ – RECORD ALL MENTIONS]

   1 Library
   2 Friends and relatives
   3 Utility
   4 Store
   5 Contractor
   6 Consumer Reports
   7 Internet
   8 Trade magazines
   9 Maintenance staff
   10 Other [specify]

5. On a scale of 1 to 10, where 1 is "Extremely difficult" and 10 is "Extremely easy," how difficult or easy do you think it is to find information on the energy efficiency of an appliance or lighting?

Extremely Difficult									Extremely Easy
1	2	3	4	5	6	7	8	9	10

6. OK, now let's suppose you were going to buy a new **furnace or central air conditioner** for the common areas of your building. Other than calling a contractor or talking with a salesperson, how likely would you be to do some research on your own to figure out what your energy efficiency options might be? On a scale of 1 to 10, where 1 is "Not at all likely" and 10 is "Extremely likely," how likely would you be to do some research on your own?

   Not at all Extremely

Likely									Likely
1	2	3	4	5	6	7	8	9	10

7. Again, suppose you were going to purchase a new furnace or central air conditioner for the common areas of your building tomorrow. How much more information would you need to adequately evaluate claims made by the salesperson about the energy efficiency of a new furnace or central air conditioner? Would you think you'd need…

1 No more information
2 A little more
3 A fair amount more, or
4 A lot more information?

8. Where would you look for information on furnace or air conditioner energy efficiency? [DO NOT READ – RECORD ALL MENTIONS]

1 Library
2 Friends and relatives
3 Utility
4 Store
5 Contractor
6 Consumer Reports
7 Internet
8 Trade magazines
9 Maintenance staff
10 Other [specify]

9. On a scale of 1 to 10, where 1 is "Extremely easy" and 10 is "Extremely hard," how hard or easy do you think it is to find information on furnace or air conditioner energy efficiency?

Extremely Easy									Extremely Hard
1	2	3	4	5	6	7	8	9	10

INTERPERSONAL COMMUNICATION

OK, now I'd like to talk about more general experiences you may have had related to energy efficiency issues.

10. First, have you started any discussions on energy efficiency related topics with people you work with?

    1 Yes
    2 No

11. Have you started any discussions on energy efficiency related topics with other people?

    1 Yes
    2 No

12. Have you participated in discussions that were initiated by others?

    1 Yes
    2 No

ENERGY EFFICIENCY ACTIONS & INTENTIONS

13. In the past year, have you done anything to improve the energy efficiency of the common areas of your building? Keep in mind, this could include things we already discussed – such as a major appliance purchase, a renovation project, or other things you've done to save energy in the common areas of your building.

    1 Yes
    2 No [SKIP NEXT QUESTION]

14. What have you done? [DO NOT READ, RECORD ALL ANSWERS]
PROBE: Anything else?

1 Purchased a more efficient appliance [ASK Q14a]
2 Installed new windows
3 Installed new doors
4 Added insulation [ASK Q14b]
5 Installed a programmable thermostat
6 Added weatherstripping or caulking
7 Installed low flow showerheads and/or faucet aerators
8 Installed compact fluorescent or energy efficient lighting
9 Installed water heater or pipe wrapping
10 Other [SPECIFY]
11 Don't know
12 Refused

14a. You mentioned you purchased a more energy efficient appliance. What type of appliance did you purchase?
[DO NOT READ - RECORD ALL MENTIONS]

1 FURNACE
2 AIR CONDITIONER
3 WATER HEATER
4 WASHER
5 DRYER
6 REFRIGERATOR
7 FREEZER
8 DISHWASHER
9 STOVE
10 OTHER [SPECIFY]
11 DON'T KNOW
12 REFUSED

14b. You mentioned you added insulation to your building. Where did you install the insulation?
[DO NOT READ - RECORD ALL MENTIONS]

1 ATTIC OR CEILING
2 WALLS
3 BASEMENT
4 WATER HEATER
5 HOT WATER PIPES
6 DUCTS
7 OTHER [SPECIFY]
8 DON'T KNOW
9 REFUSED

15. Are there any other improvements that you would like to make to the common areas of your building that would help save energy and save you money on your energy bill?

1 Yes
2 No [SKIP NEXT QUESTION]
8 Don't know [SKIP NEXT QUESTION]
9 Refused [SKIP NEXT QUESTION]

16. Why haven't you made these improvements? [RECORD FIRST AND OTHER MENTIONS]

1 Nothing [PROBE: Why do you feel that way?]
2 Can't afford improvements
3 The cost is not worth the benefits
4 Don't know what to do
5 Plan to sell building soon
6 It's too difficult/don't know how
7 Don't have the time
8 Other [SPECIFY]

BENEFITS AND DRAWBACKS

The next set of questions are about your opinions on the benefits of energy efficiency – that is, owning an energy efficient building, owning energy efficient appliances, and generally practicing energy efficient "behaviors".

17. What, in your opinion, are the benefits of energy efficiency? Are there any others? [DON'T READ LIST. RECORD FIRST AND ALL OTHER MENTIONS.]

1 Saving energy
2 Saving money on energy bill
3 Conservation/improving the environment
4 Rebates, loans, and other types of financial incentives available for energy efficient buildings/appliances
5 Increased comfort
6 Increased value of property, selling tool for prospective tenants
7 Better features than standard efficiency appliance
8 Other *(Specify: _____)*
9 Don't know

17a. In what way would saving energy be a benefit?

1 Save money on energy bill
2 Conservation/environmental improvement
3 Other *(Specify: _____)*
4 Don't know
5 Refused

18. What *disadvantages* do you feel there are with energy efficiency? PROBE: Any others? [INSTRUCTIONS: If they do not understand the question say "Are there any disadvantages associated with owning an energy efficient building, owning energy efficient appliances, practicing energy efficient behavior, or other such things?"]

1 None
2 Higher initial cost/price for energy efficient building
3 Higher initial cost/price for energy efficient appliances
4 Energy efficient appliances are not available/hard to find in the market place
5 Don't know where to find/purchase energy efficient appliances
6 Energy/monetary savings from energy efficiency is not significant
7 Being "energy efficient" (practicing energy efficient behavior) is inconvenient
8 Energy efficient building(s) cost more to maintain/operate
8 Energy efficient appliances cost more to repair/operate
10 Energy efficient appliances do not have the same features as standard appliances
11 Rent is higher at energy efficient properties
12 Other *(Specify: _____)*
13 Don't know
14 Refused

AUDIT AWARENESS & INFLUENCE

19. Have you ever heard of an "energy audit"? This is where someone would come and inspect the common areas of your building, ask you questions about your energy use and then follow up with specific recommendations for things you could do to save energy. Have you ever heard of this service?

1 Yes
2 No [SKIP TO Q36]

20. Who do you think provides this kind of service? Anyone else? [RECORD FIRST AND OTHER MENTIONS]

1 PG&E
2 Other utility
3 Contractors [ASK Q20a]
4 Salespeople [ASK Q20b]
5 City government
6 Other [SPECIFY]

20a. What kind of contractor do you think provides this kind of service?
[DO NOT READ - RECORD ALL MENTIONS]

1 HEATING/AIR CONDITIONING CONTRACTOR
2 INSULATION CONTRACTOR
3 PLUMBING CONTRACTOR
4 SOME OTHER TYPE OF CONTRACTOR [SPECIFY]
5 DON'T KNOW
6 REFUSED

20b. What kind of store would these salespeople work for?
[DO NOT READ - RECORD ALL MENTIONS]

1 HARDWARE STORE
2 HOME IMPROVEMENT STORE (i.e., MENARDS, HOME DEPOT, etc.)
3 DEPARTMENT STORE (i.e., SEARS, Target, etc.)
4 SOME OTHER TYPE OF STORE [SPECIFY]
5 DON'T KNOW
6 REFUSED

21. How did you find out about the energy audit?
[DO NOT READ – RECORD ALL MENTIONS]

1 Message on back of PG&E bill envelope
2 Read about it in PG&E newsletter, SPOTLIGHT
3 Learned about it while visiting PG&E's web site
4 Read about it in PG&E bill (unspecified)
5 Received information in the mail (other)
6 Through a friend, family, co-worker
7 Saw advertisement in newspaper, magazine
8 Heard advertisement on TV, radio
9 Internet
10 Call or letter from PG&E
11 Other [SPECIFY]

22. Have you ever had an energy audit completed any of the buildings that you own or manage?

1 Yes
2 No [SKIP TO Q36]

23. Who conducted the audit?

1 PG&E
2 Other utility
3 Contractors [PROBE, what kind of contractor]
4 Other [SPECIFY]

23a. What kind of contractor conducted the audit?
[DO NOT READ - RECORD ALL MENTIONS]

1 HEATING/AIR CONDITIONING CONTRACTOR
2 INSULATION CONTRACTOR
3 PLUMBING CONTRACTOR
4 SOME OTHER TYPE OF CONTRACTOR [SPECIFY]
5 DON'T KNOW
6 REFUSED

24. In what year did you have this done?

_____ Year

[IF AT LEAST ONE ENERGY EFFICIENCY IMPROVEMENT MADE AND AUDIT WAS AFTER 1995 ASK:]

25. Earlier, we discussed energy efficiency improvement(s) you have made to the common areas of your building in the past year. On a scale of 1 to 10, where 1 means "Not at all influential" and 10 means "Extremely influential," how influential was the energy audit in your decision to make this/these energy efficiency improvement(s)?

Not at all Influential									Extremely Influential
1	2	3	4	5	6	7	8	9	10

26. Did you receive a written report or list of energy efficiency improvements that you could make to save energy in the common areas of your building?

1 Yes
2 No [SKIP TO Q30]

27. Do you still have this report?

1 Yes
2 No [SKIP TO Q30]

28. How frequently, if at all, have you referred to this report since you first got it? Have you…

1 Referred to it quite often
2 Referred to it once or twice, or
3 Not referred to it at all?

29. Have you shown the report to anyone you work with?

1 Yes
2 No

30. Other than the people you work with, have you mentioned to anyone that you had an energy audit completed?

1 Yes
2 No [SKIP NEXT QUESTION]

31. Have you recommended the energy audit to any of your friends, family or other landlords/property managers?

1 Yes
2 No

32. Overall, how satisfied were you with the energy audit you received? Were you…

1 Very satisfied [SKIP NEXT QUESTION]
2 Somewhat satisfied
3 Somewhat dissatisfied
4 Very dissatisfied

For most people, the audit consisted of a walk-through inspection of your common areas by a PG&E employee, who later mailed you a detailed energy report that included an energy balance, energy saving recommendations, and technical information. PG&E's average cost for this service is $300.

33. If PG&E charged for the service, would you have been willing to pay that amount?

1 Yes
2 No

34. [If NO] Would you have been willing to pay anything?

1 Yes
2 No

35. [If YES] How much?

$_____

SEL AWARENESS & INFLUENCE

36. Have you ever heard of the Smarter Energy Line?

1 Yes [SKIP NEXT QUESTION]
2 No

PG&E offers a toll-free telephone service, called the Smarter Energy Line, where customers can call to get access to information about energy use and energy saving recommendations for their homes or for buildings they own or manage.

37. Before today, were you aware of the Smarter Energy Line?

1 Yes
2 No [SKIP TO Q48]

38. How did you become aware of PG&E's Smarter Energy Line? PROBE: How else? [RECORD ALL MENTIONS]

1 Message on back of PG&E bill envelope
2 Read about it in PG&E newsletter, SPOTLIGHT
3 Learned about it while visiting PG&E's web site
4 Read about it in PG&E bill (unspecified)
5 Received information in the mail (other)
6 Through a friend, family, co-worker
7 Saw advertisement in newspaper, magazine
8 Heard advertisement on TV, radio
9 Internet
10 Other [SPECIFY]

39. Have you ever called the Smarter Energy Line for information about the buildings you own or manage?

1 Yes
2 No [SKIP TO Q48]

40. When you called the Smarter Energy Line, did PG&E …

A. send you materials or brochures on energy efficiency products or renovation projects? Yes/No
B. refer you to another program or service for further assistance? Yes/No
C. offer to complete an energy audit? Yes/No
E. Do anything else? Yes/No
What? _____

[IF AT LEAST ONE ENERGY EFFICIENCY IMPROVEMENT MADE, ASK:]

41. Earlier, we discussed energy efficiency improvement(s) you have made to the common areas of your building(s). On a scale of 1 to 10, where 1 means "Not at all influential" and 10 means "Extremely influential," how influential was the information you received from the Smarter Energy Line in your decision to make this/these energy efficiency improvements?

Not at all Influential									Extremely Influential
1	2	3	4	5	6	7	8	9	10

[IF WRITTEN MATERIALS, BROCHURES MENTIONED, ASK:]

42. Do you still have the materials you received from the Smarter Energy Line?

1 Yes
2 No

43. How frequently, if at all, have you referred to these materials since you first received them? Have you…

1 Referred to them quite often
2 Referred to them once or twice, or
3 Not referred to them at all?

44. Have you mentioned to anyone you work with that you contacted the Smarter Energy Line?

1 Yes
2 No [SKIP NEXT QUESTION]

45. Have you shown the materials to anyone other than the people you work with?

1 Yes
2 No

46. Have you recommended the Smarter Energy Line to any of your friends, family or other landlords/property managers?

1 Yes
2 No

47. Overall, how satisfied were you with your experience with the Smarter Energy Line? Were you…

1 Very satisfied
2 Somewhat satisfied
3 Somewhat dissatisfied
4 Very dissatisfied

[ASK IF HAVE **NOT** CONTACTED THE SEL]

48. On a scale of 1 to 10, where 1 is "Not at all interested" and 10 is "Extremely interested," how interested would you be in contacting PG&E's Smarter Energy Line for information about energy efficiency related topics?

Not at all Interested									Extremely Interested
1	2	3	4	5	6	7	8	9	10

DEMOGRAPHICS

Finally, I would like to ask you a few questions about the building located at [insert address]

[If they manage more than one building and remembered the audit, ask about the building audited most recently. If they do not remember the audit, ask about their largest building.]

49. About how old is this building? (PROBE: Is it…)

1 Less than 5 years old
2 5 to 9 years old
3 10 to 19 years old
4 20 to 29 years old
5 30 to 39 years old
6 40 to 49 years old
7 50 years or older

50. What is the square footage of your building?

_____ sq. feet

51. How many units does this building have?

_____ units

52. Do tenants pay for their own heat or is it included in their rent?

1 Tenants pay their own heat
2 Heat is included in their rent
3 Other (specify_____)

53. What percent of your building is currently occupied/rented?

_____ % occupied/rented

54. [DO NOT READ] Respondent Gender
1 Male
2 Female

That's all of the questions I have for you!
Thank you very much for your time and input into our study. Have a great day!

If respondent wants to verify the validity of the study, instruct them to contact Marylou Sutton at PG&E (415) 973-2651.

If respondent wants more information on energy efficiency related topics, instruct them to contact PG&E's Smarter Energy Line (800) 933-9555.

APPENDIX D
CALL DISTRIBUTION REPORT

Table D-1
Call Distribution Report

	Non-Participants	Percent	Participants	Percent	Total	Percent
Starting Sample (part of the sample)	1160		898		2058	
Fax/data line	11	0.9%	15	1.7%	26	1.3%
Ineligible - deceased	1	0.1%	1	0.1%	2	0.1%
Temporarily disconnected/technical phone problems	130	11.2%	80	8.9%	210	10.2%
Disconnected number	59	5.1%	26	2.9%	85	4.1%
Ineligible - not a PG&E customer	6	0.5%	1	0.1%	7	0.3%
Ineligible - not a single family homeowner	193	16.6%	88	9.8%	281	13.7%
Business number	53	4.6%	25	2.8%	78	3.8%
Adjusted sample	713	61.5%	663	73.8%	1376	66.9%
Refusals:	140	19.6%	94	14.2%	234	17.0%
Hard refusal	67	9.4%	49	7.4%	116	8.4%
Partial - refusal	30	4.2%	16	2.4%	46	3.3%
Soft refusal	29	4.1%	8	1.2%	37	2.7%
Partial - callback	14	2.0%	21	3.2%	35	2.5%
Language barrier/non-English	34	4.8%	12	1.8%	46	3.3%
Unavailable for duration of study	16	2.2%	11	1.7%	27	2.0%
R incapable (elderly, ill)	17	2.4%	6	0.9%	23	1.7%
Active sample	231	32.4%	192	29.0%	423	30.7%
Completed surveys	275		348		623	
Response rate	38.57%		52.49%		45.28%	

	# of completes	Goal
Phone audit completes	83	75
Multi-family completes	27	25
Onsite audit completes	76	75
Direct mail completes	120	100
SEL completes	42	50
Non-participant completes	275	275
TOTAL	623	600

Appendix E
1998 REMS PROGRAM DESCRIPTION

PG&E's 1998 Residential Energy Management Service Program (REMS) is a multi-faceted program designed to provide the residential sector with information on energy efficiency. The 1998 REMS includes single family energy audits[1], which can be done over the phone through the Smarter Energy Line (SEL), by mail, or on-site by PG&E personnel. In addition the 1998 REMS includes multifamily property energy management on-site audits and Energenius, a series of educational materials on energy efficiency, safety, and the environment for students in grades 1–8. An additional component of the 1998 REMS includes providing energy efficient product information to residential customers and to vendors, manufacturers and sales personnel who produce or sell energy efficient technologies for the residential market. This information is distributed primarily through the SEL. A brief description of each of these components is included in the following sections after an outline of the barriers and market effects targeted by the program. (A more detailed and complete program description can be found in Appendix E. It is supplemented in Appendix F which provides additional information to characterize the participants in the 1998 REMS program. It provides additional background to understand the structure of the market and the types of customers who participate in REMS. It also provides some feedback to program planners on how customers heard of REMS and on customer satisfaction.)

The customer audits, energy education and information services, SEL, and Energenius, which make up the 1998 REMS program, are designed to mitigate a variety of barriers to purchasing energy efficient products and produce several market effects eventually resulting in a transformed marketplace. Table 3.1 lists the most important barriers targeted by the 1998 REMS program and the desired market effects related to reducing those barriers.

E.1 COMPONENTS OF THE 1998 REMS

E.1.1 Single Family and Multi-Family Audits

Successful distribution of energy efficiency awareness and information is necessary for the development of a more economically efficient market which is required to assure the sustainability of unsubsidized energy efficient products and services. Through single family audits provided via mail, phone and on-site, the program strives to encourage customer energy

[1] REMS documents occasionally refer to their energy audits as "surveys." To avoid confusion with other types of surveys discussed in this document, we used the term audit.

use and awareness and provide information as to the most cost effective energy improvements that can be made. These education and information efforts will help reduce barriers and increase customers' willingness to make energy efficient improvements to their homes.

Table E-1.
Market Barriers Addressed by 1998 REMS and the Intended Market Effects

Market Barriers	***Market Effects***
Low awareness of or understanding of energy efficient products	Increased customer knowledge of their home/facility, how it uses energy, and how to make it more energy efficient
Low awareness of the benefits of energy efficiency	Increased consumer demand for energy efficient products and services
Information or search costs Hassle costs	Reduced information or search costs
Asymmetric Information Technical limitations in assessing options/ understanding technology	Increased customer trust of new technologies Increased demand on manufacturers and trade allies for energy efficient products
Lack of motivation to choose environmentally preferable alternative	Increased awareness of long term benefits of new technologies
Disconnect in customers taking responsibility for their energy use and how it affects the environment	More efficient management of home energy consumption
Availability of information at the time they are making a purchase decision	Increased implementation of efficiency products due to better decision making
Bounded rationality Performance uncertainties	Faster market penetration of new technologies
Organization practices	Reshaping of organization practices
A reduction in all market barriers	Sustainability

The Multifamily Property EMS provides energy education to owners and property managers of residential multi-family buildings through on-site audits. It's objective is to help customers implement energy efficiency projects, select energy efficient equipment, and control energy use. Energy education improves customer knowledge, creates technology transfer options and reduces several market barriers, while assisting customers' to make the best energy efficiency decisions.

E.1.2 Products and Services

The SEL is the initial point of contact for many of the direct mail and on-site single family energy audits. The entire phone audit is completed through the SEL. The various type of audits and how they are performed is discussed in more detail in the implementation section.

Single family audits are delivered through the Energy Savings Plan (ESP) program and may be performed through on-site visits, telephone (through the SEL), or direct mail. Single family audits focus on the largest energy users in each home, as well as recommended behavioral practices and measures that may be incorporated to reduce energy costs.

The MFP activities range from answering customer questions over the telephone to providing detailed energy reports that include an energy balance, energy saving recommendations and technical information. The technical information can increase the customer's technical understanding of energy efficiency technologies, systems, designs and practices. Multi-family tenants also have access to energy savings information available on PG&E's Web site that is focused toward apartment living.

A sample of 1998 program participants were surveyed by PG&E and asked to select which types of listed energy efficiency information they would find valuable. The results are as follows:

Table E-2
Value of REMS Information

Audit Program	General Energy Saving Tips	Energy Efficiency Equipment	Energy Use Analysis	Distributors/ Installers in Area
Direct Mail	63.8%	50.9%	35.6%	20.6%
Phone	78.0%	61.5%	46.8%	33.9%
On-Site	70.4%	46.1%	44.0%	27.2%
Multi-Family	59.3%	40.7%	37.0%	29.6%

Source: PG&E 1998 CEE Satisfaction Survey

E.1.3 Target Markets

Any singe family individually metered residential dwelling in PG&E's service territory is eligible for the single family audit.

The eligible multifamily complex contains five or more dwelling units and includes both individually and master-metered apartments, condominiums, and mobile home parks. The program focuses on property managers and owners of buildings with the greatest energy savings potential and an expressed interest to implement the energy management recommendations. Emphasis is on providing energy solutions that meet each customers' situations.

Multi-facility property management companies are targeted by energy representatives to increase program effects. The representatives look for facilities that match the specifications for the residential Standard Performance Contract and provide information to the applicable customers.

E.1.4 Benefits

Benefits of the single family and multi-family audit programs include:

- Reducing information and hassle costs

- Focusing on educating residential customers about how to use their energy wisely to reduce overall consumption and costs
- Offering a variety of delivery methods to residential customers such as on-site audits, telephone audits and direct mail audits
- Facilitating downstream market transformation by providing consumer education.

E.1.5 Implementation

The single family and multi-family audits are marketed primarily through the SEL, direct mail, division field representatives, and PG&E's Web site. Marketing materials include bill inserts, the Spotlight newsletter and brochures. In 1998, the program was featured in articles in the March and October issue of Spotlight. Spotlight is included with the PG&E bill and is sent to all PG&E customers.

A customer interested in the audit program may call PG&E's SEL and speak with a certified energy advisor for 10 to 15 minutes about his or her home's energy usage. The energy advisor performs an in-depth analysis of the customer's energy usage. Each customer is sent a package of information which includes a graph of their 12 month billing history (electric and gas), a pie chart showing the operating cost of their appliances, and customized recommendations on how to cut energy expenses.

For a more detailed energy analysis, a customer may receive a Do-It-Yourself Home Energy Audit in a mailing or may request one from the SEL. The Home Energy Audit includes questions on the customers home and lifestyle including their heating, cooling, water heating, laundry, refrigerators, freezers, food preparation, spas hot tubs and pools, lighting and other appliances. The customer completes the audit, mails it back to PG&E and in a few weeks receives an evaluation of his or her energy use and recommendations on how to save on energy expenses. An Internet version of the home energy audit is expected to be added to PG&E's website in the future.

On-site audits are also available to single family and multi-family customers. A PG&E Division Representative performs the audit of the customers' home or building. The customer is mailed an evaluation of his or her energy use and recommendations on how to save on energy expenses.

E.1.6 Accomplishments

The goals for the single family audits for 1997 were 10,130 on-site audits and 100,000 direct mail/phone audits. Actual program accomplishments were 9,048 on-site audits and 100,376 direct mail/phone audits. The goal for the MFP REMS in 1997 was 33,874 multifamily buildings audited. Actual program accomplishments were 41,385 buildings audited. The 1998 program

goals were 71,000 single family audits. Actual program accomplishments were 1,106 phone audits, 61,284 direct mail audits and 5,887 on-site audits.

Table 3-3
Participation Goals and Accomplishments

	1997 Goal	1997 Actual	1998 Goal	1998 Actual
Single Family				
Mail	100,000	100,376	60,000	61,284
Phone	combined	combined	5,000	1,106
On-site	10,130	9,048	6,000	5,887
Total	110,130	109,424	71,000	68,277
Multifamily	33,874	41,385	30,000	35,525

Source: PG&E program documents.

The planning estimates for 1998 net energy impacts were not available at the time of this report. The planning estimates for 1997 net energy impacts for both components of the REMS program were as follows:

Table 3-4
1997 Planning Estimates of Energy and Demand Savings

kW	1,900
kWh	10,549,400
Therms	1,444,700

Source: PG&E program documents.

The approximate costs of the 1998 program are as follows:

Table 3-5
1998 REMS Costs

	Cost
Phone	$270,337
Direct Mail	$976,605
On-Site	$1,036,470
Satisfaction	163,509
Total	$2,446,921

Source: PG&E personal communication.

A sample of 1998 program participants were surveyed by PG&E about their satisfaction with the audit and their likelihood to implement energy report recommendations. Customer satisfaction ratings for the audit programs are high, with the on-site and multi-family audits receiving the highest satisfaction ratings. The mean scores based on a 1 to 5 satisfaction scale are as follows:

Table 3-6
PG&E Satisfaction Survey Results

	Mean †
Direct Mail	3.95
Phone	4.19
On-site	4.20
MF	4.20

† Mean satisfaction on a scale of 1 to 5.
Source: 1998 CEE Satisfaction Survey Analysis

According to the CEE satisfaction survey, conducted by the Customer Opinion Research group at PG&E, although over half of the multi-family and on-site audit respondents have already implemented the energy report recommendations, only 22% of direct mail respondents and 27% of phone respondents have implemented the recommendations. However, 49% of phone respondents said they were very likely to implement the recommendations within the next 6 months.

Table 3-7
Implementation of Recommendations

Audit Program	% Already Implemented	% Very Likely to Implement within 6 months
Direct Mail	22.1%	35.9%
Phone	27.1%	48.6%
On-Site	51.1%	27.4%
Multi-Family	57.7%	23.1%

Source: 1998 CEE Satisfaction Survey Analysis

E.2 RESIDENTIAL ENERGY EDUCATION AND INFORMATION SERVICES

This component of the REMS provides energy efficient product information to residential customers and to vendors, manufacturers, and sales personnel who produce or sell energy efficient technologies for the residential market. Included in these efforts is information on home energy efficiency loans and the statewide CHEERS program. The SEL is the primary vehicle for distributing the information for this component of the REMS program.

E.2.1 Products and Services

Energy education and information services provided by PG&E include an overall educational awareness campaign, an educational video series focusing on end use applications, informational videos providing program and related product information, and information fact sheets on various energy efficient products.

E.2.2 Target Markets

The program targets all residential customers, contractors and vendors.

E.2.3 Implementation

The overall educational awareness campaign uses various media channels to reach residential market segments and targeted markets. Included in this campaign is dissemination of an educational video series focusing on end use applications and informational videos providing program and related product information. The videos have been sent to manufacturers and retailers, the League of California Cities and all libraries in the greater Bay area. Information sheets were given to vendors and contractors for customer product education and this information was provided directly to customers from PG&E's SEL and/or on-site audits and PG&E's Web site.

The two videos currently available to residential customers are High Performance Windows and Horizontal Axis Washing Machines. The following information fact sheets are available:

- Learn where your energy is going (both for single family homes and apartments)
- Home Cooling
- Windows
- Weatherization
- Lighting
- Home Heating
- Heat Pump
- Water Heater
- Home Environmental
- Indoor Air Quality

In 1998, fact sheets, program information, the SEL, and specific energy efficient end uses were highlighted in each issue of Spotlight.

E.2.4 Benefits

According to program documents, the benefits of the energy education and information services program include:

- Reducing information costs for customers.
- Providing a low cost way to inform residential customers about energy efficient technologies, services and behaviors they can implement.
- Informing residential customers and vendors of new products and technologies, and building awareness of programs such as the PG&E Comfort Home program.

E.2.5 Accomplishments

The SEL fielded 202,000 calls in 1998. Quarterly surveys of customers who called the SEL indicate that satisfaction with the SEL is high. Means scores of overall satisfaction (on a 1 to 5 scale) are as follows:

Table 3-8
Satisfaction with the SEL

	Mean †
Q1 – 1998	3.65
Q2 – 1998	4.05
Q3 – 1998	4.19
Q4 – 1998	4.06

† Mean satisfaction on a scale of 1 to 5.
Source: PG&E Smarter Energy Line Fourth Quarter 1998 Measurement Results

E.3 ENERGENIUS

The Energenius Educational Series is designed to promote energy efficiency strategies among young people by appealing to their natural playfulness and curiosity about their environment. Energenius programs can be used by educators in sequence or separately to help students understand how they use energy in their expanding world and how they can take positive action to save energy, conserve natural resources, and stay safe. The Energenius program appeals to students by providing them with colorful posters, handouts, rewards and awards, group learning games and lively videos that empower them to do good in their lives. Educators are attracted to the program because it provides: (1) energy and environmental lessons that interest their students, (2) fully field-tested materials that relate to standard-setting education frameworks, (3) clear detailed lesson plans and (4) materials that take the drudgery out of preparing for class.

E.3.1 Products and Services

The primary school program (grades 1 – 3) focuses on how changing habits can save energy. The intermediate school program (grades 4 – 6) focuses on energy efficient retrofits and the sources of energy. The safety programs for both levels cover indoor and outdoor safety related to energy use.

For middle/junior high school (6 – 8), the program includes an energy analysis of the student's home and their personal energy usage. This program uses computer software as a tool for performing this analysis.

The Energenius programs are:

- Energenius Habits (grades 1 – 3)
- Energenius Measures (grades 4 – 5)
- Energenius Primary Safety (grades 1 – 3)
- Energenius Intermediate Safety (grades 4 – 6)
- Energenius Bill Buster (grades 6 – 8)

E.3.2 Target Markets

The program targets schools and students within PG&E's service territory.

E.3.3 Implementation

The Energenius program materials are marketed to appropriate grade levels and school districts through direct mail and PG&E's Web site. Educators and schools within PG&E's service territory can order Energenius programs.

E.3.4 Benefits

According to the PG&E website, the benefits of the Energenius program include:

- Developing energy efficiency behaviors at a young age
- Building partnerships with communities and school districts
- Providing schools with supplies to enhance various curriculum studies
- Helping educate parents and students about safety, energy efficiency, the environment and new products

- Reducing customer information costs by educating parents and children about energy efficiency.

E.3.5 Accomplishments

The 1998 program goal was to deliver 30,000 student energy education packets. 56,934 student packets were delivered in 1998 representing approximately 2,651 classrooms. The cost of the Energenius program in 1998 was $155,358. The overall program mean satisfaction score for 1998 (on a 1 to 5 scale) was 4.0.

E.3.6 Data Collected in the Home Energy Audits

The information collected during the three types of audits is illustrated in Table 3-9.

Table 3-9
Data Collected in REMS Audits

Data Collected	Type of Audit		
	Direct Mail	Phone	On-Site
Home and Lifestyle			
Type of home	✓	✓	✓
Own/rent	✓	✓	✓
Seasonal occupancy	✓		
Resided in home at least 8 months		✓	
Age of home	✓	✓	✓
Number of rooms	✓		
Square footage of home	✓	✓	✓
Number of people occupying home	✓	✓	✓
Hours people are home	✓		
Exterior wall insulation	✓	✓	
Attic/ceiling insulation	✓	✓	
Programmable thermostat	✓	✓	
Type of foundation/ insulated raised floor			✓
Considering remodeling	✓		
Heating			
Who pays for heating	✓		
Type of heating system(s)	✓	✓	✓

Data Collected	Type of Audit		
	Direct Mail	Phone	On-Site
Age of heating system	✓	✓	
Temperature settings of thermostat	✓		
Hours of operation – heating system			✓
Use of additional heating systems	✓		✓
Rooms heated by additional heating system	✓		
Hours of operation – additional heating systems			✓
Use of portable heaters	✓	✓	✓
Hours of use -- portable heaters		✓	✓
Cooling			
Type of air conditioner	✓	✓	✓
Who pays for central air conditioning	✓		
Age of central air conditioner	✓		✓
Hours of use – central air conditioner			✓
Temperature settings of thermostat	✓		
Number of window/wall air conditioners	✓		
Age of window/wall air conditioner used most frequently	✓		
Use of room air conditioner	✓		✓
Water Heating			
Who pays for water heating	✓		
Type of water heater	✓		✓
Number of water heaters		✓	
Age of water heater	✓	✓	
Size of water heater		✓	✓
Hours of operation – water heater			✓
Temperature setting of water heater	✓	✓	
Baths/showers per day	✓		
Use of low flow showerheads	✓		
Use of instantaneous water heater	✓		✓
Laundry			
Presence of washing machine	✓	✓	✓
Loads of laundry per week by temperature	✓	✓	

Data Collected	Type of Audit		
	Direct Mail	Phone	On-Site
Hours of use – washing machine			✓
Presence of clothes dryer	✓	✓	✓
Heating fuel of clothes dryer	✓	✓	✓
Dryer loads per week	✓	✓	
Hours of operation – clothes dryer			✓
Frequency of line drying	✓		
Refrigerators			
Number of refrigerators in use	✓	✓	✓
Style of refrigerator(s)	✓	✓	
Size of refrigerator(s)	✓	✓	✓
Type of defrost	✓	✓	✓
Presence of automatic ice maker		✓	
Age of refrigerator(s)	✓	✓	✓
Stand-Alone Freezers			
Number of stand-alone freezers in use	✓	✓	✓
Style of freezer(s)	✓	✓	
Size of freezer(s)	✓	✓	✓
Type of defrost	✓	✓	✓
Age of freezer(s)	✓	✓	
Food Preparation			
Type of range/oven	✓		✓
Number of meals prepared per week	✓		
Hours of operation – range/oven		✓	✓
Hours of operation – Toaster oven		✓	
Hours of operation – outdoor gas grill			✓
Frequency/hours of use – microwave oven	✓	✓	✓
Frequency/hours of use – dishwasher	✓	✓	✓
Dishwasher cycle used	✓		
Spas, Hot tubs and Pools			
Presence of spa or hot tub	✓	✓	✓
Type of fuel used for heating spa/hot tub	✓	✓	✓
Hours of operation – spa heater			✓
Use of an insulated cover on spa/hot tub	✓		

Data Collected	Type of Audit		
	Direct Mail	Phone	On-Site
Frequency of use of spa/hot tub	✓		
Size of spa/hot tub	✓	✓	
Presence of swimming pool	✓	✓	✓
Number of hours pool filter operates	✓	✓	✓
Type of fuel used for heating pool	✓	✓	✓
Hours of operation – pool heater			✓
Hours of operation – pool sweep			✓
Lighting			
Frequency of use – interior lights	✓		
Use of CFL's		✓	✓
Number of exterior lights	✓		
Type of exterior lighting	✓	✓	
Hours of use – exterior lighting		✓	
Other appliances (number)			
TV – color and b&w	✓	✓	
Hours of use – TV	✓	✓	
VCR	✓		✓
Hours of use – VCR			✓
Stereo	✓		✓
Hours of use			✓
Personal computer	✓	✓	
Hours of use – personal computer/printer		✓	
Humidifier	✓		
Dehumidifier	✓		
Well pump	✓	✓	✓
Hours of use – well pump		✓	✓
Irrigation pump	✓		
Heated waterbed	✓	✓	✓
Hours of use – waterbed		✓	✓
Aquarium	✓	✓	✓
Gas fireplace	✓		✓
Hours of use – gas fireplace			✓
Attic fan	✓		

Data Collected	Type of Audit		
	Direct Mail	Phone	On-Site
Portable fan	✓		
Hours of use – portable fan	✓		
Ceiling fan	✓	✓	✓
Hours of use – ceiling fan	✓	✓	✓
Whole house fan	✓	✓	
Hours of use – whole house fan	✓	✓	
Electric/gas kiln	✓	✓	
Hours of use – kiln		✓	
Electric/gas medical equipment	✓	✓	
Hours of use – medical equipment		✓	
Electric shop/power tools	✓	✓	
Hours of use – shop/power tools		✓	
Electric welding equipment	✓		
Swamp cooler		✓	
Hours of use – swamp cooler		✓	
Electric blanket		✓	
Hours of use – electric blanket		✓	
Hours of use – hair dryer			✓
Hours of use –evaporator cooler			✓
Other (open ended)	✓	✓	
Hours of use – other specified		✓	

APPENDIX F
PARTICIPANTS AND THEIR ACTIONS

F.A INTRODUCTION

This appendix provides additional information to characterize the participants in the 1998 REMS program. It will provide additional background to understand the structure of the market and the types of customers who participate in REMS. It will also provide some feedback to program planners on how customers heard of REMS and on customer satisfaction.

The source of most of the information in this appendix was surveys done as part of this or other evaluations. Some program tracking data was also used.

F.B PARTICIPANTS' EXPERIENCE WITH THE REMS PROGRAM

A sample of direct mail, phone, and on-site audit participants were surveyed for this market effects study and asked about their experience with the audit and the SEL. Table F-1 illustrates participants' awareness and recall of the home energy audit.

Table F-1
Participants' Awareness and Recall of the Home Energy Audit

	Type of Audit Participant			
	Direct Mail	**Phone**	**On-Site**	**All Audit Participants**
Recalled hearing of a home energy audit	90% (n = 119)	3% (n = 83)	87% (n = 76)	90% (n = 278)
How found out about home energy audit[1]				
Inside PG&E bill	23%	13%	19%	19%
Phone call to/from utility	11%	29%	21%	19%
Information in the mail	26%	8%	12%	17%
Back of PG&E bill	13%	13%	15%	14%
Friend, family, co-worker	8%	9%	15%	10%
Don't know/refused	8%	9%	11%	9%
PG&E "Spotlight" newsletter	8%	8%	6%	7%
Door-to-door solicitation	3%	4%	3%	3%
TV, radio advertisement	3%	3%	2%	2%

Table F-1 (continued)
Participants' Awareness and Recall of the Home Energy Audit

	Type of Audit Participant			
	Direct Mail	Phone	On-Site	All Audit Participants
Newspaper, magazine ad	2%	5%	0%	2%
PG&E's website	0%	1%	2%	1%
Home shows	0%	7%	0%	2%
Other	4% (n = 107)	3% (n = 77)	3% (n = 66)	3% (n = 250)
Said PG&E provides an audit[1]	90% (n = 107)	91% (n = 77)	92% (n = 66)	91% (n = 250)
Recalled having audit completed for their homes[1]	63% (n = 107)	88% (n = 77)	85% (n = 66)	76% (n = 250)
Recalled receiving written report[2]	84% (n = 67)	87% (n = 68)	88% (n = 56)	86% (n = 191)
Still have the report[3]	52% (n = 56)	70% (n = 59)	71% (n = 49)	64% (n = 164)

1 Only those respondents who recalled hearing about the audit were asked this question.
2 Only those respondents who recalled having the audit completed were asked this question.
3 Only those respondents who recalled receiving the report were asked this question.

Most audit participants (90%) recalled hearing of a home energy audit. How participants heard about the home energy audit differed by the type of audit they received. The largest group of direct mail participants (26%) found out about the audit from a mailing, while the largest group of phone and on-site participants (29% and 21%, respectively) found out from a phone call to or from the utility. All three types of participants cited information inside or on the back of their PG&E bill as the other main ways they found out about the audit. Although PG&E was not mentioned during this line of questioning, 91% of participants who were aware of the audit said that PG&E provided this service.

A large number of participants (24%) did not remember having the audit completed. Most of these customers were direct mail participants. Although most participants who remembered having the audit also remembered receiving the report (86%), only 64% of those participants still had the report at the time the survey was completed. Once again, the largest group of customers who did not keep their report were direct mail participants.

Similar questions were asked about the SEL (Table F- 2). Awareness and use of the SEL is extremely low among audit and SEL participants. This is particularly surprising for the phone audit participants and the SEL participants. Phone audit participants had to call the SEL in order to complete the audit, and SEL participants were identified in the SEL database as having called the SEL. One hypothesis is that name recognition of the SEL is very low. These participants

know they called the utility but do not identify the call as being made to the Smarter Energy Line.

Although it is not necessary to call the SEL to have an on-site or mail audit completed, the SEL is one way of marketing those types of audits. Most of the energy efficiency information distributed by PG&E lists the SEL number and the PG&E website refers people who are interested in the direct mail audit to the SEL. Therefore, it would be expected that a large proportion of mail and on-site audit participants would be aware of and remember calling the SEL. Only 20% of on-site audit participants, however, reported being aware of the SEL and of those, a little over half (57%) said they called the 1-800 number. No mail audit participants reported calling the SEL.

Those participants who are aware of the SEL reported becoming aware of the hotline mainly from information inside and on the back of their PG&E bill and newspaper and magazine advertisements. Very few audit participants found out about the SEL from the "Spotlight" newsletter, although 50% of SEL participants reported hearing about the 1-800 number from that source. Very few participants heard of the SEL from the PG&E website.

Table F- 2
Participants Awareness and Recall of the Smarter Energy Line

	Type of Audit Participant			SEL Participant[1]	All Participants
	Direct Mail	Phone	On-Site		
Heard of the SEL (no description)	8% (n = 120)	21% (n = 83)	15% (n = 76)	22% (n = 45)	15% (n = 324)
Aware of the SEL (after description given)[2]	11% (n = 110)	6% (n = 64)	5% (n = 64)	11% (n = 33)	8% (n = 269)
How became aware of SEL[3]					
Inside PG&E bill	32%	28%	43%	33%	33%
Back PG&E bill	32%	33%	29%	8%	27%
PG&E Spotlight	5%	6%	0%	50%	12%
Newspaper, magazine ad	18%	17%	0%	0%	11%
Information in the mail	14%	11%	0%	8%	9%
Phone call to/from utility	5%	6%	14%	8%	8%
Friend, family, co-worker	5%	6%	7%	0%	2%
Info tag on appliances	5%	6%	0%	0%	3%
PG&E's website	0%	0%	7%	0%	2%
Home shows	0%	0%	0%	8%	2%
Other	0% (n = 22)	6% (n = 18)	0% (n = 14)	0% (n = 12)	2% (n = 66)
Called the SEL[3]	0% (n = 22)	29% (n = 18)	57% (n = 14)	71% (n = 12)	34% (n = 66)

1 Customers identified from the SEL database as having called the SEL but not completing an audit.
2 Only respondents who said they had NOT heard of the SEL were asked this question.
3 Only respondents who said they had heard of the SEL or said they were aware of the SEL after hearing a description were asked this question.

Less than half of the audit participants (who remembered having the audit) accurately reported having the audit completed in 1998 (Table 11). A large majority of participants were either very or somewhat satisfied with their audit and SEL experience. Only 8% expressed any dissatisfaction with the audit.

Table F-3
Participants' Experience with the Audits

	Type of Audit Participant			All Participants
	Direct Mail	Phone	On-Site	
Heard of the SEL (no description)	91% (n = 67)	90% (n = 68)	96% (n = 56)	92% (n = 191)
Recalled that PG&E conducted audit[2]	91% (n = 67)	90% (n = 68)	96% (n = 56)	92% (n = 191)
Year audit was completed[2]				
Prior to 1990	3%	7%	4%	3%
1990 – 1995	33%	13%	7%	18%
1996 – 1997	18%	21%	20%	19%
1998	33%	43%	59%	44%
1999	8%	10%	0%	6%
Don't know	8%	10%	0%	6%
	(n = 67)	(n = 68)	(n = 56)	(n = 191)
Satisfaction with the audit[2]				
Very satisfied	42%	52%	68%	53%
Somewhat satisfied	43%	32%	25%	34%
Somewhat dissatisfied	6%	7%	5%	6%
Very dissatisfied	5%	2%	0%	2%
Don't know/refused	5%	8%	2%	5%
	(n = 67)	(n = 68)	(n = 56)	(n = 191)

1 These participants were sampled from PG&E's PY98 program tracking databases.
2 Only those participants who recalled having the audit conducted were asked this question.

Table F-4
Participants' Experience with the SEL

	Type of Audit Participant			SEL Participant[1]	All Participants
	Direct Mail	Phone	On-Site		
Result of SEL call[1]					
Sent materials on energy efficient products	NA	50%	75%	70%	67%
Referred to a program or service	NA	17%	0%	30%	17%
Offered to complete phone energy audit	NA	67% (n = 6)	38% (n = 8)	31% (n = 10)	42% (n = 24)
Satisfaction with SEL[1]					
Very satisfied	NA	17%	75%	40%	46%
Somewhat satisfied	NA	50%	25%	50%	42%
Somewhat dissatisfied	NA	0%	0%	10%	4%
Very dissatisfied	NA	33% (n = 6)	0% (n = 8)	0% (n = 10)	8% (n = 24)

1 Customers identifies from the SEL databases as having called the SEL, but not completing the audit.

Since most participants said they did not call the SEL, the data collected on the result of the SEL call and satisfaction with the SEL is based on only a handful of participants. Therefore, results should be interpreted cautiously. Most participants who remembered calling the SEL were sent information on energy efficient products and/or offered the telephone energy audit. Seventeen percent of these participants were referred to a program or service.

Satisfaction among participants is fairly high, with 88% reporting they were somewhat or very satisfied. A third of the phone audit participants said they were very dissatisfied, but this result is based on only 2 of the several thousand customers who telephoned the SEL in 1998.

F.C PARTICIPANT ACTIONS

F.C.A Profile of Participants

The program tracking databases for the direct mail, telephone, and on-site audits were examined in order to profile demographic and housing characteristics of participants. The direct mail database was very comprehensive and provided a wealth of data in this area. The telephone

database provided very limited information, and the on-site database did not provide the necessary data for this exercise. A summary of the available data for direct mail and telephone participants is provided below.

Direct Mail Participants

People who received a direct mail energy audit tended to own one-story single-family homes, occupied year-round with two to five people living in the home. These homes were likely to be between 1,100 and 2,500 square feet, 16 – 50 years old, with 5 – 9 rooms in each.

The majority of participants pay to heat their home, and use natural gas central forced-air furnaces. The majority of those who have air conditioning in their home also had central air conditioning. However, roughly half of participants did not have any type of air conditioning system at all in their home. Both air conditioning and heating systems tended to be either between 1 to 5 years of age or 16 to 30 years of age, indicating a large number of recently purchased systems as well as aging systems. Roughly 21% of participants had an additional heating system in place (such as a portable or space heater), and about 12% had window or wall air conditioners in the home.

Participants tended to pay to heat their water with a natural gas standard tank heater that was between 1 and 10 years old. They were likely to have the tank's temperature setting at medium (130º - 150ºF) and have flow restrictors or low-flow showerheads on all their showers. The majority also owned a clothes washer and a natural gas-powered dryer.

Most participants owned at least one refrigerator, and a little less than half owned a stand-alone freezer unit. Refrigerators were basically split between the side-by-side and top/bottom models, were 1 to 10 years old, and tended to be in the medium to large category (17 – 23 cu. ft.). While most refrigerators owned by participants contained automatic defrost systems, many of the stand-alone freezers had a manual system. Freezers were typically the chest style, and were also in the medium to large category. However, freezers tended to be a bit older than refrigerators – between 6 and 15 years old. The majority of participants owned an electric range/oven and often used a microwave oven. They also tended to run their dishwashers 2 – 4 times a week on either an air-dry or energy-saving cycle.

Nearly all participants owned at least one color TV and one VCR. Televisions were turned on between 4 and 10 hours per day. Roughly two-thirds of participants owned a stereo system, a personal computer and between one and three ceiling fans.

Phone Survey Participants

The majority of the phone survey participants owned a 20 – 40 year-old single-family home that was between 1,000 and 2,000 square feet and occupied by 2 to 5 people. Though about half did not have any type of wall insulation in their home, more than half had attic and floor insulation installed.

F.D ENERGENIUS

Only 10 percent of customers who have children in grades 1 –8 are aware of PG&E 's ENERGENIUS program. Of those customers, a little over half (52%) said their children have participated in this program.

Table F-5
ENERGENIUS Awareness and Influence

	General Population
Have children in grades 1 –8	22% (n = 597)
Aware of ENERGENIUS Program	10% (n = 128)
Children participated in ENERGENIUS	64% (n = 12)
Usefulness Rating of Program	
7	40%
8	0%
9	20%
10 Extremely Useful	40% (n = 12)
Have made changes in home as a result of ENERGENIUS	58% (n = 12)
Types of changes made	
Self regulation of energy use	75%
Other	25% (n = 4)

Everyone who has children participating in ENERGENIUS felt that the program is useful, rating it a 7 or higher on a 10-point usefulness scale. Fifty-eight percent of those customers say they have made changes in their home as a result of the program. The main change made is self-regulation of energy use.

F.E MULTI-FAMILY PARTICIPANTS

A sample of multi-family building owners/managers who received an on-site energy audit for the common areas of their building were asked questions regarding their awareness and recall of the audit, their awareness and use of the Smarter Energy Line and their experience and satisfaction with the audit.

Multi-family owners/managers had very high awareness and recall of the energy audit (Table F-6). Eighty-five percent of these respondents were aware of the energy audit, and 91 percent said that PG&E provided this service. The vast majority of respondents who were aware of the audit, heard about it from a call or letter from PG&E (65%) or received information in the mail (22%).

Table F-6
Multifamily Participants' Awareness and Recall of the Energy Audit

	Percent of Multifamily Respondents
Recalled hearing of an energy audit	85% (n = 27)
How found out about energy audit[1]	
Call or letter from PG&E	65%
Information in the mail	22%
Friend, family, co-worker	9%
PG&E Spotlight newsletter	4%
Other	9% (n = 23)
Said PG&E provides audit[1]	91% (n = 23)
Recalled having an audit completed for building(s)[1]	86% (n = 23)
Recalled receiving written report[2]	95% (n = 19)
Still have the report[3]	94% (n = 18)

1 Only those respondents who recalled hearing about the audit were asked this question.
2 Only those respondents who recalled having the audit completed were asked this question.
3 Only those respondents who recalled receiving the report were asked this question.

Eighty-six percent of respondents who recalled hearing about the audit, also recalled having the audit completed for their building(s). Of these almost all (95%) remembered receiving the report. Of those who said they had received a report, 94% said they still had it.

Multifamily respondents who recalled having the audit conducted were asked who conducted the audit, what year it was completed, and how satisfied they were with it (Table F-7).

Table F-7
Multifamily Participants' Experience with Audit

	Percent of Multifamily Respondents
Recalled that PG&E conducted audit[1]	90% (n = 19)
Year audit was completed [1]	
Prior to 1990	0%
1990 – 1995	11%
1996 – 1997	16%
1998	68%
1999	5% (n = 19)
Satisfaction with the audit[1]	
Very satisfied	69%
Somewhat satisfied	21%
Somewhat dissatisfied	5%
Very dissatisfied	5% (n = 19)

1 Only those respondents that recalled having the audit conducted were asked this question.

Ninety percent of the respondents recalled that PG&E had conducted their audit, and 68 percent remembered that the audit was conducted in 1998. Satisfaction with the audit was high among this group. Sixty-nine percent said they were very satisfied, and 21% were somewhat satisfied. Only 10% of respondents expressed any dissatisfaction.

Only 15% of multi-family respondents had any awareness or knowledge of the SEL (Table F-8). These respondents heard of the SEL from three sources (1) friends, family, co-workers, (2) information inside their PG&E bill, and (3) newspaper or magazine advertisements. None of the respondents reported calling the SEL.

Table F-8
Multifamily Participants' Awareness and Use of the Smarter Energy Line

	Percent of Multifamily Respondents
Heard of the SEL (no description)	7% (n = 27)
Aware of the SEL (after description given) [1]	8% (n = 25)
How respondents became aware of SEL [2]	
Friend, family, co-worker	50%
Inside PG&E bill	25%
Newspaper, magazine advertisement	25% (n = 4)
Called the SEL [2]	0% (n = 4)

1 Only respondents who said they had NOT heard of the SEL were asked this question.
2 Only respondents who said they had heard of the SEL or said they were aware of the SEL after hearing a description were asked this question.

APPENDIX F. PARTICIPANTS AND THEIR ACTIONS

Tables

APPENDIX G
DETAILED RESULTS OF AUDIT RECOMMENDATIONS

Table G-1
Direct Mail Audit Recommendation

	1996	1997	1998			
Number of Records	36,407	99,478	61,283			
Description of Measure Recommendation	Number of Recommendations			Percent of All Participants Receiving Recommendation		
Program Year	1996	1997	1998	1996	1997	1998
Use compact fluorescent light bulbs	28,981	80,248	57,692	80%	81%	94%
Try alternatives to all night security lighting	21,644	70,657	46,922	59%	71%	77%
Caulk and install weatherstripping	12,763	48,275	32,982	35%	49%	54%
Lower your heater's thermostat setting at night	18,128	45,123	28,970	50%	45%	47%
Replace your electric dryer with a gas dryer	19,037	45,634	28,534	52%	46%	47%
Use a microwave oven for cooking	7,619	35,420	25,828	21%	36%	42%
Remove or recycle your second refrigerator	16,456	40,340	22,041	45%	41%	36%
Lower your heaters thermostat setting	10,244	31,648	20,551	28%	32%	34%
Wash laundry in cold water	13,196	31,391	19,761	36%	32%	32%
Clean your air conditioner filter monthly	3,131	22,932	17,838	9%	23%	29%
Replace your washing machine	14,653	30,839	17,697	40%	31%	29%
Install a whole house fan	10,233	35,927	15,357	28%	36%	25%
PG&E offers reduced rates for low-income customers	2,762	16,574	13,390	8%	17%	22%
Use shower heads and faucet aerators	4,528	16,824	12,421	12%	17%	20%
Raise your air conditioners temperature	6,569	21,811	11,807	18%	22%	19%
Lower your hot water heater setting	5,279	16,042	11,636	14%	16%	19%
Replace the pool pump motor	11,000	26,192	11,450	30%	26%	19%
PG&E offers routine gas safety and system	2,551	13,689	10,003	7%	14%	16%
Replace your stand alone freezer	7,276	17,726	9,143	20%	18%	15%
Replace your primary refrigerator	6,147	14,704	8,148	17%	15%	13%
Install an evaporative cooler	8,229	30,516	7,937	23%	31%	13%
Use PG&E's payment options to help pay your bills	1,148	8,970	7,809	3%	9%	13%
Use an outdoor clothesline instead of your clothes dryer	2,345	10,273	7,456	6%	10%	12%
Cover room air conditioners in the winter	3,132	9,434	7,123	9%	9%	12%
Wash laundry in warm or cold water	3,959	10,019	6,524	11%	10%	11%
Tips for spa electricity savings	0	0	4,353	0%	0%	7%
Install a timer for your pool filter pump	3,278	7,149	2,951	9%	7%	5%
Cover your spa or hot tub when not in use	2,090	4,647	2,171	6%	5%	4%
Remove or recycle your third refrigerator	1,665	4,486	2,015	5%	5%	3%
Eliminate your secondary freezer	1,252	3,921	1,986	3%	4%	3%

Call about financing for energy-efficiency remodeling	414	2,537	1,979	1%	3%	3%
Check the filters on your heat pump monthly	1,424	4,146	1,881	4%	4%	3%
Cover your waterbed with a comforter	674	2,197	1,599	2%	2%	3%
Change your heating system filters	325	1,531	1,374	1%	2%	2%
Replace your electric water heater	629	1,941	1,248	2%	2%	2%
Upgrade your wall insulation	576	1,263	1,084	2%	1%	2%
Upgrade your attic insulation	406	1,055	921	1%	1%	2%
Insulate the walls of your home	189	798	601	1%	1%	1%
Replace room air conditioners	210	655	552	1%	1%	1%
Insulate your attic	94	441	326	0%	0%	1%
Replace your central air conditioning	4	78	14	0%	0%	0%
Replace your main room air conditioner	5	17	4	0%	0%	0%
E8 rate option	36,405	12,421	0	100%	12%	0%
Lighting recommendation	0	9,049	0	0%	9%	0%
Medical rate option	25	12	0	0%	0%	0%

Type of Measure Recommendation	Number of Recommendations			Percent of All Participants Receiving Recommendation		
O&M, behavioral	35,174	97,869	60,471	97%	98%	99%
Lighting (CFLs, security ltg)	28,981	89,297	57,692	80%	90%	94%
Appliance replacement	30,082	77,112	46,968	83%	78%	77%
Weatherization	21,875	73,855	44,124	60%	74%	72%
Other (e.g., rate programs, remodeling, pool/spa)	36,407	49,802	27,484	100%	50%	45%
Appliance removal	16,893	41,706	22,816	46%	42%	37%
HVAC replacement	8,432	31,165	8,472	23%	31%	14%

Appliance Addressed by Measure Recommendation	Number of Recommendations			Percent of All Participants Receiving Recommendation		
Clothes Dryer	20,497	51,798	32,629	56%	52%	53%
Refrigerator	20,640	51,185	28,258	57%	51%	46%
Cooking (microwave)	7,619	35,420	25,828	21%	36%	42%
Clothes Washer	14,653	30,839	17,697	40%	31%	29%
Showerheads, aerators	4,528	16,824	12,421	12%	17%	20%
Freezer	8,143	20,542	10,697	22%	21%	17%

End-Use Addressed by Measure Recommendation	Number of Recommendations			Percent of All Participants Receiving Recommendation		
Appliances	34,655	93,935	57,693	95%	94%	94%
Heating and cooling	34,953	97,694	60,273	96%	98%	98%
Lighting	28,981	89,297	57,692	80%	90%	94%
Other (e.g., rate programs, remodeling, pool/spa)	36,407	50,792	27,961	100%	51%	46%
Water heating	22,301	58,897	38,526	61%	59%	63%

Table G-2
Onsite Audit Recommendation

	1996	1997	1998			
Number of Records	17,195	9,048	5,888			
Description of Measure Recommendation	Number of Recommendations			Percent of Participants Receiving of Recommendation		
Program Year	1996	1997	1998	1996	1997	1998
Clean Refrigerator Coils	4,994	3,228	2,454	29%	36%	42%
Furnace Filters	765	392	1,590	4%	4%	27%
Fluorescent Light Bulbs	3,375	1,276	1,437	20%	14%	24%
Appliance Tips	6,099	3,606	1,322	35%	40%	22%
Weatherstripping	447	347	807	3%	4%	14%
Ceiling Fans	1,651	475	615	10%	5%	10%
Ceiling Insulation	980	265	542	6%	3%	9%
Lower thermostat on heater	502	370	497	3%	4%	8%
Water Heater Pipe Wrap	679	562	492	4%	6%	8%
Remove Extra Refr/Frz	1,667	520	482	10%	6%	8%
Lighting Tips	391	461	465	2%	5%	8%
Reduce water heater temperature	3,213	550	454	19%	6%	8%
Water Heater Blanket	414	135	417	2%	1%	7%
Outlet Gaskets	51	68	417	0%	1%	7%
Gas Dryer Replacement	3,423	975	405	20%	11%	7%
Fireplace Tips	277	199	386	2%	2%	7%
Caulking	156	269	375	1%	3%	6%
Water heater tips	863	491	332	5%	5%	6%
Energy Efficient Appliance	3,516	876	290	20%	10%	5%
Pool Eqpt Efficiency	916	394	271	5%	4%	5%
Water Heater Timer	932	690	209	5%	8%	4%
LIRA	1,114	838	208	6%	9%	4%
Floor Insulation	116	122	193	1%	1%	3%
Duct Repair	414	357	160	2%	4%	3%
Furnace Maintained	316	191	159	2%	2%	3%
Windows	555	295	158	3%	3%	3%
Exterier Shade Device	754	520	152	4%	6%	3%
Glass Fireplace Doors	107	137	150	1%	2%	3%
Time of Use	1,244	309	150	7%	3%	3%
Wall Insulation	204	99	140	1%	1%	2%
Reduce Drafts	225	121	139	1%	1%	2%
Showerhead	216	44	132	1%	0%	2%
Insulate Windows	191	138	121	1%	2%	2%
Use Clothes Line to Dry Clothes	634	161	119	4%	2%	2%

Furnace Check	132	375	107	1%	4%	2%
Water Conservation	111	39	101	1%	0%	2%
Insulate Windows	400	27	93	2%	0%	2%
Double Pane Windows	114	76	73	1%	1%	1%
Check Insulation	402	84	73	2%	1%	1%
Attic Ventilation	312	570	65	2%	6%	1%
Put Plastic on Windows	54	290	53	0%	3%	1%
Balanced Payment Plan	113	153	41	1%	2%	1%
Pilot Light Tips	170	63	34	1%	1%	1%
Duct Wrap	70	39	33	0%	0%	1%
Energy Partners Program	364	437	33	2%	5%	1%
Water Bed Tips	257	103	28	1%	1%	0%
Medical Baseline	294	141	27	2%	2%	0%
Replace Water Heater	74	114	20	0%	1%	0%
Shade AC Condensor	173	88	20	1%	1%	0%
Insulate Duct	10	14	18	0%	0%	0%
Raise AC Temperature Setpoint	1,132	399	18	7%	4%	0%
Electric Blanket	39	40	14	0%	0%	0%
No recommendations (Good Job!)	31	21	14	0%	0%	0%
Storm Windows	41	19	12	0%	0%	0%
TCAP Refrigerator	160	235	11	1%	3%	0%
Purchase Efficient AC Unit	143	139	9	1%	2%	0%
Furnance Filter Alarms	7	0	5	0%	0%	0%
Air Diverter	24	3	2	0%	0%	0%
Contact EGIA	62	26	1	0%	0%	0%
Recycle	1	0	1	0%	0%	0%
Faucet Aerators	1	3	0	0%	0%	0%
Electric Meter Test	189	55	0	1%	1%	0%
Yolanda	2	1	0	0%	0%	0%

End-Use Addressed by Measure Recommendation	Number of Recommendations		Percent of All Participants Receiving Recommendation			
Appliances	13,990	6,944	4,092	81%	77%	69%
Heating and Cooling	8,209	4,730	2,737	48%	52%	46%
Lighting	3,714	1,578	1,811	22%	17%	31%
Water heating	5,658	2,227	1,442	33%	25%	24%
None	3,084	1,702	457	18%	19%	8%
Other (pool)	916	394	271	5%	4%	5%

Type of Recommendation	Number of Recommendations			Percent of All Participants Receiving Recommendation		
O&M, Behavioral	13,557	7,456	4,230	79%	82%	72%
Lighting	3,714	1,578	1,811	22%	17%	31%
HVAC Replacement, Efficiency	3,011	1,911	1,430	18%	21%	24%
Weatherization	4,896	2,599	1,372	28%	29%	23%
Appliance Replacement	6,282	1,887	691	37%	21%	12%
Appliance Removal	1,667	520	482	10%	6%	8%
Other (Misc.)	1,269	510	304	7%	6%	5%
Other (Low Income Referral)	1,399	1,138	234	8%	13%	4%
Other (Rate Programs)	1,617	585	216	9%	6%	4%
None (Good Job!)	31	21	14	0%	0%	0%
Other (EGIA Referral)	62	26	1	0%	0%	0%

Table G-3
Phone Audit Recommendation

	1997	1998		
Number of Records	1027	958		
Description of Measure Recommendation	Number of Recommendations		Percent of All Participants Receiving Recommendations	
Program Year	1997	1998	1997	1998
Install Indoor CFLs	839	646	82%	67%
Replace Your Refrigerator	403	298	39%	31%
Install Energy Saving Shower Heads / Faucet Aerators	175	237	17%	25%
Lower Your Heating System Temperature Setting	83	200	8%	21%
Replace your Electric Dryer with a Gas Dryer	282	198	27%	21%
Maintain Your Heating System	96	191	9%	20%
Look For The Energy Star Label ! ! !	0	180	0%	19%
Tune Up Your Heating System	190	156	19%	16%
None (Congratulations ! ! !)	4	148	0%	15%
Eliminate Your Extra Refrigerator	182	146	18%	15%
Use Your Energy Saving Dishwasher Cycle	122	146	12%	15%
Install Ceiling Insulation	97	69	9%	7%
Install Outdoor Lighting Motion Sensor(s)	99	68	10%	7%
Raise Your Cooling System Temperature Setting	48	68	5%	7%
Use The Clothes Dryer Sensor	65	60	6%	6%
Reduce Your Pool/Spa Energy Use	0	59	0%	6%
Replace Your Gas Water Heater	67	53	7%	6%
Install High Efficient Outdoor Lighting	81	48	8%	5%
Replace Your Central Cooling System	102	40	10%	4%
Replace Your Existing Freezer	59	39	6%	4%
Insulate Your Water Heater	8	35	1%	4%
Use Cold Water For Clothes Washing	29	28	3%	3%
Install New Windows	57	23	6%	2%
Eliminate Your Extra Freezer	17	14	2%	1%
Lower Your Water Heater Temperature Setting	1	12	0%	1%
Replace Your Electric Water Heater	1	7	0%	1%
Maintain Your Room Air Conditioner(s)	35	0	3%	0%
Insulate Your Water Bed	35	0	3%	0%
Tune Up Your Cooling System	0	0	0%	0%
Replace Your Room Air Conditioner	0	0	0%	0%
Replace Your Existing Clothes Washer	0	0	0%	0%

Type of Measure Recommendation	Number of Recommendations		Percent of All Participants Receiving Recommendations	
Program Year	1997	1998	1997	1998
Lighting	937	708	91%	74%
Heating	560	708	55%	74%
Water Htr	252	483	25%	50%
Energy Star	57	344	6%	36%
Laundry	376	286	37%	30%
None	4	203	0%	21%
Other, misc.	35	148	3%	15%
Misc. Kitchen	122	146	12%	15%
Air Conditioning	190	84	19%	9%
Refrig, Freez	644	59	63%	6%