PHASE I BASELINE ASSESSMENT FOR THE STATEWIDE RESIDENTIAL LIGHTING AND APPLIANCE PROGRAM

FINAL REPORT
VOLUME I

Prepared for

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION AND BACKGROUND

This report is the Phase I report of the *1999 Statewide Residential Lighting and Appliance Study* (hereafter the "Study"). The purpose of the Study is to evaluate the effectiveness of the Program Year ("PY") 1999 and future statewide interventions in residential lighting and appliance markets. The key objective of Phase I of the Study is to develop a market characterization and baseline assessment of California's residential lighting and appliance markets that can be used as a benchmark for future evaluation of Program interventions.

In 1998 and early 1999, Pacific Gas & Electric (PG&E), Southern California Edison (SCE), Southern California Gas Company (SoCal Gas), and San Diego Gas & Electric (hereafter referred to as the "Sponsoring Utilities")developed a number of new statewide programs. One of these statewide market transformation programs was the Residential Lighting and Appliance Program (hereafter referred to as the "Program") which was designed to improve the availability, promotion, and sales of energy efficiency residential lighting and appliances by inducing sustained changes in the behavior of market participants.

Through a competitive bidding process, an independent third party (hereafter the "Implementation Contractor") was hired to assume the implementation of the *statewide portion* of the Sponsoring Utilities' 1999 Program. Some of the Sponsoring Utilities also carried service territory specific Program interventions in 1999 such as direct customer rebates, which were not in the Implementation Contractor's 1999 scope. The Implementation Contractor, hired in July, 1999 was responsible for proposing specific program strategies for the remainder of 1999. The Implementation Contractor will also be responsible for implementing the Program in 2000. *The Program, as implemented by the Implementation Contractor, is the focus of this XENERGY-led evaluation.*

1.2 THE 1999 STATEWIDE RESIDENTIAL LIGHTING & APPLIANCE PROGRAM

The Statewide Program, has two main and distinct components: lighting and appliances.

The lighting component of the Program covers three ENERGY STAR®-qualifying technologies: 1) screw-in lamps, 2) hardwired interior and exterior fixtures, and 3) torchieres with ≥ 3,500 nominal lamp lumens. Manufacturer buy-down incentives are provided to qualifying lighting manufacturers, thereby reducing prices to retailers and consumers (assuming retailers do not change their mark up levels). In addition, the Implementation Contractor provides training on the three lighting technologies to the sales staff. No customer rebates are permitted. Finally, existing point-of-purchase materials will be evaluated and redesigned in order to increase sales of the target technologies.

The appliance component of the Program covers four ENERGY STAR®-qualifying technologies: 1) refrigerators, 2) clothes washers, 3) dishwashers, and 4) room air conditioners. In this study, we also collected baseline information on gas water heaters, since it is *possible* that this technology may be added to the portfolio sometime in the future. For clothes washers, refrigerators, and dishwashers, the Program also promotes efficiency levels higher than ENERGY STAR®.

An incentive is provided to appliance *retailers* in the form of a sales incentive (spiff) reimbursement for each qualifying appliance sold. The expectation is that retailers will pass a portion or all of this store incentive on to the sales personnel as a sales incentive. As with lighting, no customer rebates are permitted. In addition, training regarding the four appliances is provided by the Implementation Contractor to the sales staff. Finally, existing point-of-purchase (POP) materials will be evaluated and redesigned in order to more clearly explain the costs and benefits of energy efficient equipment.

1.3 OVERALL AND PHASE I RESEARCH TASKS

The basic research tasks of the Study are fairly straightforward. As described in the original RFP for this Study, there are four phases to the evaluation of the market effects of the Program. In Phase I, the focus of this current report, the objectives are to measure key baseline market indicators and characterize the market for the eight technologies. In Phase II, the objective is to measure any near-term market effects of the 1999 Program, but only among retailers. In Phases III and IV, the evaluation team will re-measure the market indicators and compare them to the baseline results to determine whether there are any market effects that can be attributed to the Program. Phases III and IV are scheduled to be carried out in the years 2000 and 2001, respectively, and will cover cumulative effects across Program years (i.e., Phase IV will address the combined effects of the PY1999 and PY2000 Programs). A summary of the Study phases is shown in Table 1-1. The Phase I research tasks, the focus of this report, are presented in Table 1-2.

Table 1-1
Overview of the Study Phases

Phase	Schedule	Scope
Phase I	Complete (this report)	Baseline measurement of key indicators for retailers and consumers
Phase II	Spring 2000	Preliminary assessment of near-term PY99 program effects (manufacturers and retailers only)
Phase III	Mid-2000 to Mid-2001	Further assessment of PY99 and early PY00
Phase IV	Mid-2001 to Mid-2002	Final assessment of PY99 and PY00 effects

Table 1-2
Phase I Research Tasks

Phase I Tasks	Task Descriptions
4	Collect data
2, 5	Characterize residential lighting and appliance markets
6	Describe available lighting and appliance products
7	Assess baseline attitudes, beliefs, knowledge, and practices
8	Identify and assess primary market barriers
9	Develop market effects indicators
10	Develop market effects study methodology

1.4 METHODS AND DATA COLLECTION

The Study has been designed to follow a theory-driven evaluation approach. One of the first tasks of this Study was to develop initial program theories and hypotheses that could be used to form the basis of the market effects component of the evaluations to be conducted in later phases. Theory-based evaluation is a broad descriptor of an evaluation approach that has been used in a number of policy fields for some time. The idea behind theory-based evaluation (TBE) is that program interventions should be analyzed with respect to an expected, phased sequence of causes and effects. Rather than simply waiting many years to evaluate whether the final outcome of a particular program is achieved, TBE emphasizes early and ongoing assessments that focus on whether the expected sequence of events is or is not occurring (and, if not, why not).

Theory-based evaluation provides a critical framework for evaluation of programs that seek to cause lasting structural changes in social or economic systems. The first lesson of TBE is that a useful evaluation must be fully informed by the causal theory that underlies the program intervention. In particular, for the Program conducting a detailed exploration of program theories was necessary to inform development of data collection instruments, to establish appropriate baseline benchmarks, and to provide a framework for assessing both short- and long-term market effects. Included in our program theory are analyses of which market barriers are likely to be addressed by the Program as designed, development of detailed market feedback and market influence diagrams, assessment of what market effects could be hypothesized to occur as a result of the Program, and development of specific market indicators that could be measured initially and over time to determine whether the Program was generating the expected sequence of events. Our program theory is presented in Section 3 of this report.

Related to the use of a theory-based evaluation approach, the complexity and size of the residential California appliance and lighting markets argued for multiple measures of key variables. Such complexity virtually guarantees that any one measure of a phenomenon will be less reliable than multiple measures from different perspectives. This approach, often referred to

as triangulation, involves the collection of data related to a particular phenomenon from multiple sources, both primary and secondary, in as objective and consistent a manner as possible.

Data were gathered for this Phase I Study from four sources: 1) customers, 2) retail stores via mystery shoppers, 3) retail stores managers, and 4) in-depth interviews with utility program staff and the Implementation Contractor. A summary of the data collect to support this Phase I report is provided in Table 1-3.

Table 1-3
Phase I Research Tasks

Survey	Number of Completed Observations	
	In-State	Out-of-State
Consumers	1,003	350
Retailers - Mystery Shopper Surveys	184	None
Retailers - Store Manager Interviews	109	105
Program Staff	25	Not applicable

1.5 KEY PHASE I FINDINGS

Summaries of the key findings from the Phase I Study are presented below by topic.

Target Market Characterization

- The ***volume of purchases*** within the scope of the Program ***is enormous***.
  - ⇒ Annual purchase rates for target appliances ranges from 1.8% of the population for room air conditioners (168,000 units total) to 7.6% of the population for refrigerators (710,000 units total).
  - ⇒ For targeted lighting products, we estimate that a third of the population purchase roughly 60 million light bulbs per year, 6.6% of the population purchase about 1 million torchieres per year, and 7.4% of the population purchase approximately 2.3 million hard-wired fixtures.
- The ***target market of retailers is also very large***: Over 1,000 retailers are within the target market for most of the appliance and lighting technologies.
  - ⇒ Most white good appliances are purchased at department and appliance stores, whereas most lighting products (except standard bulbs) are purchased at hardware and discount retail stores.
  - ⇒ According to customers, 14% of hard-wired fixtures and 11% of torchieres are purchased from lighting specialty stores.

Customer Knowledge, Behavior, Awareness, and Attitudes

- Most appliance purchasers are aware that there are different levels of efficiency available, however, ***customers on telephone surveys continue to significantly miss-report the efficiency levels of appliances purchased***.

  ⇒ Lighting purchasers are currently much less aware that there are a range of efficiency levels available.
- Related to the point above, ***customers are ignorant with respect to whether or not they purchased high-efficiency appliances***, but are often unaware of this fact. Half of customers believe they purchased a high-efficiency appliance, one quarter believe they did not, and about one quarter say that they do not know.

  ⇒ However***, there is no correlation between whether customers report they purchased high-efficiency appliances and whether they actually did*** (as determined by model numbers obtained for a sub-sample of phone respondents).
- ***Buyers are still concerned much more about price and features than energy efficiency***. Operating costs are rarely considered one of the most important factors in appliance and lighting purchase decisions. On an unaided basis, energy-efficiency is mentioned by less than 20% of appliance purchasers as one of the most important factors in their choice. On an aided basis, however, energy efficiency is stated to be an important factor by the majority of appliance and lighting purchasers.

  ⇒ We believe the unaided figures are more reliable indicators of the importance of energy-efficiency in customers' decision making calculus. ***These results continue the trend***, shown in previous related studies, that ***customers believe energy-efficiency should be a consideration because of its environmental value to society but that they typically fail to consider it in their individual purchase decisions*** (the behavior versus attitude gap).
- ***Customers tend to underestimate incremental costs and overestimate savings*** for high-efficiency lighting and appliances, resulting in implied payback estimates that are significantly less than actual.

Awareness of ENERGY STAR® and DOE Energy Guide Label

- ***Awareness of the ENERGY STAR® Program is fairly high among appliance retail store managers***, who consider it to be an effective program, but only ***moderately high among lighting retail store managers***.
- ***Awareness of ENERGY STAR® among sales staff and customers is much lower***:

  ⇒ Unaided appliance customer awareness of the ENERGY STAR® Program at 12% is equal to the percent of cases in which mystery shoppers reported that retail sales staff were very knowledgeable about the ENERGY STAR® Program (i.e., 12%).

  ⇒ Unaided lighting customer awareness of the ENERGY STAR® Program is only 6% and is reasonably close to the percent of cases in which mystery shoppers reported

that retail sales staff were very knowledgeable about the ENERGY STAR® Program (i.e., 5%).

- As expected, the DOE Energy Guide Label was rarely cited by customers as a means by which they determined that an appliance was high efficiency. This is consistent with the fact that customers so inaccurately report whether the appliance they purchased was more efficient than standard units or not. ***In short, the DOE Energy Guide Label has failed to achieve even modest levels of customer knowledge*** (hence the creation of ENERGY STAR®).

In-Store Environment

- ***Based on results from trained mystery shoppers, the current sales force appears to be neither well trained nor highly motivated to sell energy efficient appliances***. With respect to lighting products, we conclude that the sales force is even less well trained and motivated than the appliance sales staff.

  ⇒ While this finding supports the program design that emphasizes training of the sales force, staff turnover poses a threat to the effectiveness of the training provided by the Program.
- ***Approximately half of the retailers claim to use in-store display materials; but***, mystery shoppers report that ***the material was not particularly easy to see or understand***.
- In addition, ***customers are likely to see energy efficiency display materials in only one-in-five cases or less***.
- ***Store managers report that approximately half of the appliances*** on their floors ***are high-efficiency*** models, while, ***in lighting stores, they report that only 17% to 19% of the lighting products are high-efficiency*** models.
- The store manager-based figures are higher than the closest proximate figure from ***the mystery shopping survey, which shows that about 25% of the appliances and 5% to 7% of the lighting products*** shown by salespeople to mystery shoppers ***were high efficiency***.

Market Barriers

- Based on data from customers, mystery shopper, and store managers the most significant market barriers for customers appear to be:

  ⇒ information search costs
  ⇒ product availability
  ⇒ asymmetric information
  ⇒ bounded rationality

  When customers who claimed that they did not purchase an efficient appliance or lighting product were asked on an unaided basis why not, very few mentioned concerns about the *performance* of the equipment or concerns about trying new high-tech units. They do mention that they could not find the type/size that they wanted, which suggest that

product availability remains a problem. However, store managers report that the number of efficient units on display has increased over the last 12 months, which may over time reduce the magnitude of this barrier. They also mention that they often do not have enough *information* or that they do not know enough about the product. Their self-confessed lack of information is underscored by their own manifest lack of knowledge regarding efficient units and the substantial lack of knowledge displayed by the sales staff.

The fact that customers know so little about efficient units also means that they will be at a *disadvantage* when encountering a sales person, a situation made even worse by the fact that the sales staff are not particularly well informed. Thus, *asymmetric information* remains a barrier.

Finally, *bounded rationality* remains a problem. Operating costs are rarely considered one of the most important factors in appliance purchase decisions. At the same time, a large percentage (over 60%) of those who *think they purchased high-efficiency units*, claim that the did so because the energy or cost savings justified the decision (about a third of *all purchasers*). Similarly, on an unaided basis, energy-efficiency is mentioned by less than 20% of lighting purchases as one of the most important factors in their choice.

Program-Participation Status

- ***The Program appears to be making progress toward reaching out to the appliance and lighting retailers***.
  - ⇒ Nearly 12% of appliance retailers report having been contacted by the Program staff and, of these, 80% have decided to participate.
  - ⇒ With respect to lighting retailers, nearly 4% report having been contacted by the Program staff.

Sales Trends

- For both appliances and lighting products, ***store managers report that the percentage of models displayed and sold that are high efficiency have increased over the past twelve months both in- and out-of-state***.
  - ⇒ The self-reported out-of-state increases appear to be somewhat higher.
  - ⇒ Within California, increases are reported most often for dishwashers, clothes washers, and screw-in CFLs.

1.6 IMPLICATIONS OF BASELINE FINDINGS

The implications of the findings presented above and in more detail in Section 5 of this report are presented below.

Key elements of the Program are well focused on barriers to increased and self-sustaining purchases of high-efficiency appliances and lighting products in the current retail environment. In the current environment, customers do not have the minimum amount of knowledge necessary to make informed choices about the energy efficiency of the appliances they purchase, as evidenced by their inability to accurately report whether they purchased high efficiency units. The good news from these results is that there is considerable room for improvement in customer knowledge levels about whether they are purchasing a high-efficiency unit from interventions targeted at sales staff and by increasing the penetration and awareness of ENERGY STAR® appliances. The Program's focus on ENERGY STAR® could help to improve this critical knowledge barrier.

In addition, customers are not likely to be informed regarding the relative efficiency of products or encouraged to purchase a high-efficiency unit by the sales staff they may encounter in the retail environment. Therefore, the Program's focus on the training of sales staff, the improvement of POP materials, the reduction of price for lighting products, and the appliance store incentives appear to be the key elements of a promising program design. In particular, the Program's focus on sales staff training addresses a critical market need as evidenced by our results showing that sales staff have limited knowledge and motivation to sell high-efficiency products.

At the same time, there are significant challenges to transforming the markets in question. For example, currently less than one in five customers state that energy efficiency is one of the most important factors they take into consideration when purchasing an appliance. In the short term, the fact that the Program offers incentives to stores to encourage increased sales of high-efficiency units may help to maintain or increase the market share of such units. On the other hand, the fact that customers are not demanding the units could lead retailers to abandon changes in their promotion and sales efforts in the absence of the store incentives. The bottom line is that retailers will always respond to customer demand; therefore, any sustained change in the market for high-efficiency products will likely require a corresponding change in customer demand. Once again, significantly increasing the presence, awareness, and understanding of ENERGY STAR® could help to provide customers with the information they need to better link their positive environmental attitudes with their individual appliance and lighting purchase decisions. This could then lead to an increase in the percent of customers who consider energy efficiency an important factor in their final purchase decisions.

Another challenge faced by the Program is that sales staff turnover frequently. While our Phase I findings support the Program's emphasis on training of the sales force, staff turnover poses a threat to its on-going effectiveness. This may ultimately be a cost-effectiveness issue as Program staff develop estimates of the relative costs and benefits of providing training to different types of establishments over time.

1.7 METHODOLOGICAL RECOMMENDATIONS

Based on our experience in Phase I, we have four recommendations regarding the methods to be used in future phases of this evaluation.

1.7.1 Data Collection Budget

While no formal decision has yet been made regarding customer data collection in Phase III, it is our opinion that the customer data collection should be postponed until Phase IV. The rationale for this recommendation is that, assuming customer data are collected in October/December of 2000, the PY2000 Program will have only 8 to 10 months to affect customer behavior, making the detection of any market effects unlikely. Whether customer data is collected in Phase III or Phase IV, a formal analysis of the costs of customer data collection should be conducted before finalizing the budget. The cost analysis should include an assessment of the lower expected incidence rates resulting from screening for customers who purchased targeted equipment within the last four to six months rather than within the last two years, as was the case in Phase I.

1.7.2 Non-Response Bias

Customer response rates in this and similar studies over the last several years have been low, creating the *possibility* of a non-response bias. That is, those customers who chose to respond may be systematically different than those who chose not to respond. To determine the existence and magnitude of any bias requires that additional data be collected from those customers who *initially* refused to participate in the survey. We recommend increasing the customer data collection budget for those Phases for which it is decided that customer data will be collected.

1.7.3 Shelf-Space/Floor Stock Tracking Study

In this study, we used mystery shoppers to address what we felt were the most important indicators. However, the mystery shopping approach does not lend itself to conducting a rigorous study of shelf-space and floor stock for lighting products. If tracking shelf space and floor stock is considered to be valuable as a near-to-mid-term indicator, we recommend allocating more resources for a separate shelf-space/floor-stock tracking study *or* more formally incorporating into this statewide evaluation study other tracking activities conducted by the Implementation Contractor or individual utilities.

1.7.4 Technologies Studied

If it is very likely that gas water heaters will not be included in the PY2000 and PY2001 Program, then we recommend dropping them from future data collection efforts. In addition, in the absence of increased resources for the statewide study, consideration should be given to dropping other technologies based on their relative importance. This would allow more sample points to be devoted to the remaining technologies and reduce the data collection costs.

2 INTRODUCTION

2.1 BACKGROUND

In 1997, the California Public Utilities Commission declared that the purpose of energy efficiency programs should be to transform the market so that individual customers and suppliers in the future, competitive market will make more rational choices. Pacific Gas & Electric (PG&E), Southern California Edison (SCE), Southern California Gas Company (SoCal Gas), and San Diego Gas & Electric (SDG&E) (hereafter referred to as the "Sponsoring Utilities"). The Sponsoring Utilities developed designs for the 1999 portfolio of energy efficiency program, with the major programs being statewide. One of these statewide market transformation programs was the Residential Lighting and Appliance Program (hereafter referred to as the "Program") which was designed to improve the availability, promotion, and sales of energy efficient residential lighting and appliances by inducing sustained changes in the behavior of market participants.

Through a competitive bidding process, an independent third party (Implementation Contractor) was hired to assume the implementation of these programs for the Sponsoring Utilities on a statewide basis. The Implementation Contractor, hired in July, 1999 was responsible for proposing specific program strategies for the remainder of 1999. Note that the Sponsoring Utilities have already set the Program goals and committed budgets for 1999. These utilities have also estimated the portion of these funds that will be available to the Implementation Contractor during the Implementation Contractor's 1999 period of performance. The Implementation Contractor will also be responsible for implementing the Program in 2000. *The Program, as implemented by the Implementation Contractor, is the focus of this XENERGY-led evaluation.*

2.2 THE PROGRAM

In this section, a brief description of the Program is provided with a more detailed description of the Program presented later in Chapter 3. The Program, implemented in the service territories of the Sponsoring Utilities, has two main and distinct components, lighting and appliances.

The lighting Program covers three ENERGY STAR®-qualifying technologies: 1) screw-in lamps, 2) hardwired interior and exterior fixtures, and 3) torchieres with ≥ 3,500 nominal lamp lumens. Note that, while the ENERGY STAR®-qualifying standard will be the standard for the SCE and PG&E service territories, in SDG&E's service territory a power factor of .90 will be required in 1999.

Manufacturer buy-down incentives are provided to qualifying lighting manufacturers so that the price faced by the retail consumer will be lower. In addition, training regarding the three lighting

technologies is provided to the sales staff. No customer rebates are permitted. Finally, existing point-of-purchase materials will be evaluated and redesigned in order to more clearly explain the costs and benefits of energy efficient equipment.

The appliance component of the 1999 Program covers four ENERGY STAR®-qualifying technologies: 1) refrigerators, 2) clothes washers, 3) dishwashers, and 4) room air conditioners. In this study, we also collected baseline information on gas water heaters, since it is *possible* that this technology may be added to the portfolio sometime in the future. For clothes washers, refrigerators, and dishwashers, the Program also promotes efficiency levels higher than ENERGY STAR®.

An incentive is provided to appliance *retailers* in the form of a sales incentive (spiff) reimbursement for each qualifying appliance sold. The expectation is that retailers will pass a portion or all of this store incentive on to the sales personnel as a sales incentive. As with lighting, no customer rebates are permitted. In addition, training regarding the four appliances is provided by the Implementation Contractor to the sales staff. Finally, existing point-of-purchase (POP) materials will be evaluated and redesigned in order to more clearly explain the costs and benefits of energy efficient equipment.

2.3 PHASE I RESEARCH TASKS

The basic research tasks are fairly straightforward. As described in the RFP, there are four phases to the evaluation of the market effects of the Program. In Phase I, the focus of this current report, we measured key baseline market indicators and characterized the market for the eight technologies. In Phase II, we will measure any near-term market effects but only among retailers. In Phases III and IV, the evaluation team will measure the same market indicators and compare them to the baseline results to determine whether there are any market effects that can be attributed to the Program.

The Phase I research tasks, the focus of this report, are presented in Table 2-1. The task numbers and description match those in the original RFP.

Table 2-1
Phase I Research Tasks

Phase I Tasks	Task Descriptions
4	collect data
2, 5	characterize the residential lighting and appliance markets
6	describe available lighting and appliance products
7	assess baseline attitudes, beliefs, knowledge, and practices
8	identify and assess primary market barriers
9	develop market effects indicators
10	develop market effects study methodology

2.4 PHASE II MARKET EFFECTS STUDY

The principal goals of the Phase II market effects studies are to:

- collect pertinent data needed to track the identified and agreed-upon market effects indictors,
- assess the market effects of the Programs, based on the methodology agreed-upon in Phase I, and
- provide process-related feedback on implementation of the Program.

In Phase II, mystery shops will be conducted among 100 lighting retailers and 100 appliance retailers. We will form a sample of retailers containing those stores that have chosen to participate in the Program and those stores that have not. To the extent possible , we will include in our sample those stores that were visited in Phase I. Of the stores that are eventually shopped, we will also conduct in-depth interviews with 10-15 lighting store managers and 10-15 appliance store managers. We will attempt to tease out any observable near-term effects due to the training provided by the Program to the sales staff.

2.5 THE REMAINDER OF REPORT

Table 2-2 presents each of the remaining chapters of this report and which Phase I research tasks are addressed in each.

Table 2-2
Chapter References for Phase I Research Tasks

Report Chapter	Phase I Research Tasks
3: Program Theory and Hypotheses	9
4: Methods	4, 10
5: Results	7, & 8
6: Market Characterization	2, 5
7: Product Descriptions	6

In Section 3, we will describe the Program in more detail and present the underlying program theory that links the Program activities with hypothesized near-, mid- and long-term market effects. Based on the development of these hypothesized market effects, measurable indicators were then developed. In Section 4, we will present the sample design, data collection, and analysis for this Phase I report. We will also present the recommended methods for measuring any market effects in Phases II through IV. In Section 5 of this report, we will present the baseline attitudes, knowledge, and practices with respect to energy efficiency and provide our assessment of the primary market barriers. In Section 6, we will present our characterization of the lighting and appliance markets. Finally, in Section 7, we will provide the descriptions of the available lighting and appliance products.

3 PROGRAM THEORY AND HYPOTHESES

This Section will describe the Program in more detail and then present the underlying program theory that links the Program activities with hypothesized near-, mid- and long-term market effects.

3.1 THE PROGRAM

The Program, implemented in the service territories of the Sponsoring Utilities, has two main and distinct components, lighting and appliances. The main focus of the Program is upstream from the customer. The lighting component attempts to reduce the prices to the lighting consumer and increase the knowledge and motivation of the retail lighting store sales staff. The appliance component attempts to increase the knowledge and motivation of the retail appliance store sales staff. Each of these two components is described in more detail below.

3.1.1 Lighting

The lighting Program covers three ENERGY STAR®-qualifying technologies: 1) screw-in lamps, 2) hardwired interior and exterior fixtures, and 3) torchieres with ≥ 3,500 nominal lamp lumens. Note that, while the ENERGY STAR®-qualifying standard will be the standard for the SCE and PG&E service territories, in SDG&E's service territory a power factor of .90 will be required in 1999.

Manufacturer buy-down incentives are provided to qualifying lighting manufacturers so that the price faced by the retail consumer will be lower. In addition, training regarding the three lighting technologies is provided to the sales staff in retail lighting stores. No customer rebates are permitted. Finally, existing point-of-purchase materials will be evaluated and redesigned in order to more clearly explain the costs and benefits of energy efficient equipment.

3.1.2 Appliances

The Program covers four ENERGY STAR®-qualifying technologies: 1) refrigerators, 2) clothes washers, 3) dishwashers, and 4) room air conditioners. In this study, we also collected baseline information on gas water heaters, since it is *possible* that this technology may be added to the portfolio sometime in the future. For clothes washers, refrigerators, and dishwashers, the Program also promotes efficiency levels higher than ENERGY STAR®. Table 3-1 presents the specific targeted efficiency tiers.

Table 3-1
Targeted Efficiency Tiers by Appliance

	Tier 1 (Min)	Tier 2	Tier 3
Refrigerators	ENERGY STAR®-qualifying (20% lower than current standard)	25.0% to 29.9% lower than current standard	≥30% lower than current standard
Clothes Washers	ENERGY STAR®-qualifying	> ENERGY STAR® *	
Dishwashers	ENERGY STAR®-qualifying (0.52 = Efficiency Factor < .58)	ENERGY STAR® Efficiency Factor ≥ .58	
Room Air	ENERGY STAR®-qualifying		

* Tier 2 clothes washers will meet the ENERGY STAR® qualifications, and will have remaining moisture content less than 50%.

An incentive is provided to appliance *retailers* in the form of a sales incentive (spiff) reimbursement for each qualifying appliance sold. The expectation is that retailers will pass a portion or all of this store incentive on to the sales personnel as a sales incentive. As with lighting, no customer rebates are permitted. In addition, training regarding the four appliances is provided by the Implementation Contractor to the sales staff. Finally, existing point-of-purchase (POP) materials will be evaluated and redesigned in order to more clearly explain the costs and benefits of energy efficient equipment.

Table 3-2 summarizes the activities for the lighting and appliances components of the Program.

Table 3-2
Program Activities by Appliance and Lighting Components

	Lighting	Appliance
In-Store Training of Sales Staff	X	X
Store Rebate/Spiffs		X
Manufacturer Buy Down	X	
Redesign of POP materials	X	X

3.1.3 Geographic Scope

While the Program encompasses the four service territories of the Sponsoring Utilities, because of budgetary and time constraints, *with the exception of SDG&E*, areas within a given service territory that are more remote will not receive as much attention as those areas that are closer to major metropolitan areas. For example, not all retail stores can be visited, making in-store training for the lighting component, on-site evaluation of POP materials impossible, and the personal appeals for participation impossible. These differences may result in market effects that vary depending on whether a store is in the "close" region or the "remote" region. Note, however, regardless of their location, all participating lighting retail stores will benefit from the

manufacturer buy down and any improvements in POP materials. Also, regardless of their location, all participating appliance retail stores will benefit from the store rebates and any improvements in POP materials.

3.2 MOTIVATION FOR A THEORY-DRIVE APPROACH TO EVALUATION

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

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

3.3 THE LINK TO DIFFUSION THEORY

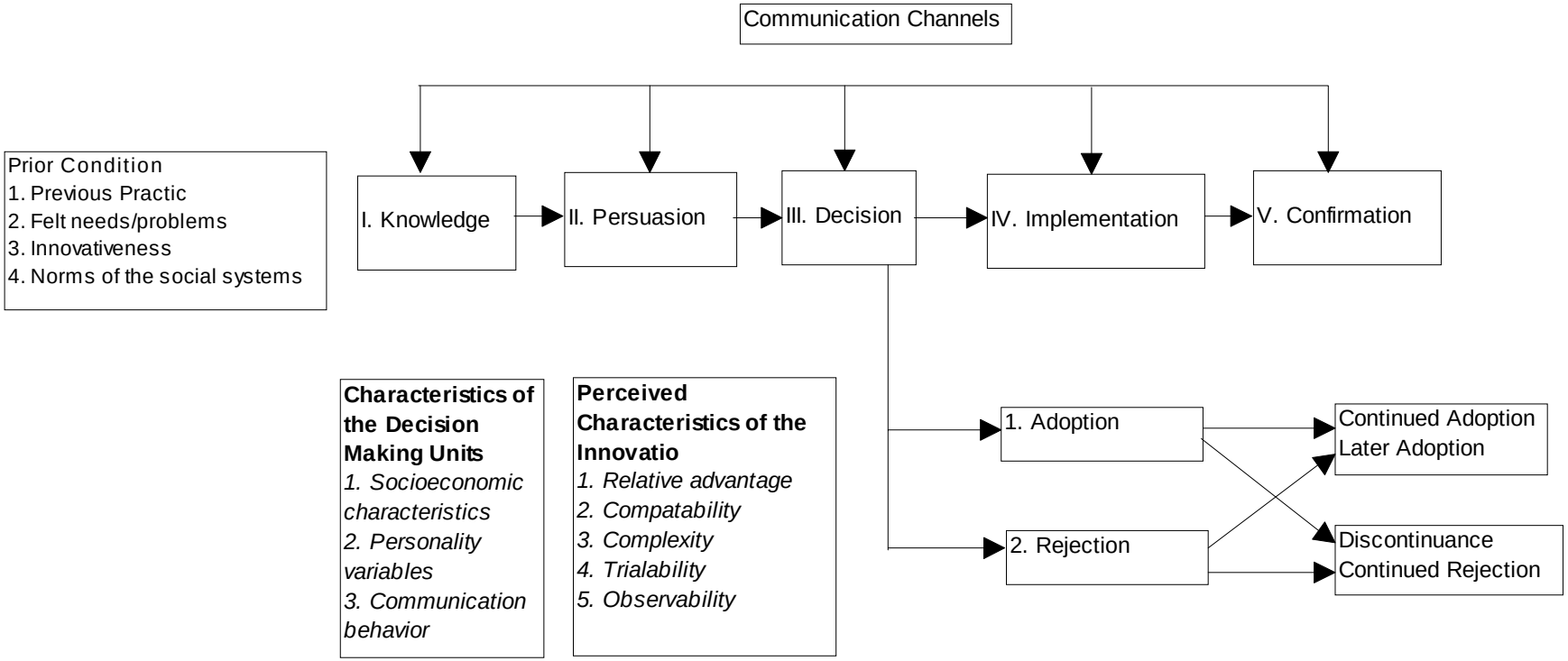
A broader view of factors relating to market transformation was derived from additionally examining the *diffusion of innovation* theory and its communications implications. Factors of diffusion from diffusion of innovation theory and elements of communication were examined alongside the anticipated market barriers and in the selection of indicators of market transformation (MT).

The most often cited summary of the diffusion of innovation theory is provided by Rogers' diagram as shown in Figure 3-1.

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

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

Figure 3-1
Model of Stages in the Innovation-Decision Process



More details regarding the five stages in this summary are provided in Table 3-3.

Table 3-3
Stages in the Innovation-Decision Process[3]

I. Knowledge Stage
Recall of information
Comprehension of messages
Knowledge or skill for effective adoption of the innovation
II. Persuasion Stage
Liking the innovation
Discussion of the new behavior with others
Acceptance of the message about the innovation
Formation of a positive image of the message and the innovation
Support for the innovative behavior from the system
III. Decision Stage
Intention to seek additional information about the innovation
Intention to try the innovation
IV. Implementation Stage
Acquisition of additional information about the innovation
Use of innovation on a regular basis
Continued use of the innovation
V. Confirmation Stage
Recognition of the benefits of using the innovation
Integration of the innovation into one's on-going routine
Promotion of the innovation to others

Clearly, the Program seeks to intervene in Stages I, II, and III of the innovation-decision process by attacking what it perceives as the significant market barriers. For example, the program seeks to provide information about efficient appliances (Stage I) as a way of addressing the information cost market barrier. Eventually, the hope is that after Program intervention, Stage V is reached in which the individual recognizes the benefits of energy efficiency, integrates the innovation into their on-going routine, and promotes the innovation to others. If others are appropriately influenced then a sustainable change has been achieved.

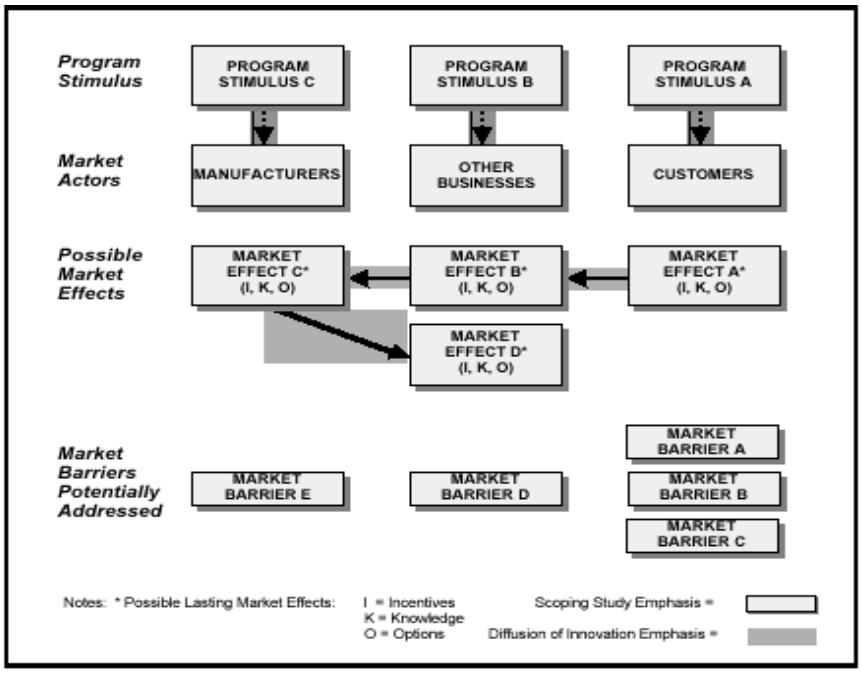
[3] Rogers, Everett M. Diffusion of Innovations. New York: Free Press, p. 190.

The diffusion of innovations literature also provides us with a list of six attributes of the product or service that influence the rate of diffusion (see Figure 3-1). These six factors are the following:[4]

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

The difference in emphases between the *Scoping Study* and the diffusion of innovations literature was highlighted in the recent *Market Effects Summary Study* as duplicated in Figure 3-2.[5]

Figure 3-2
Market Transformation Framework in Scoping Study



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

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

Table 3-4 provides a comparison of the market barriers discussed in *Scoping Study* with the five characteristics of an innovation.

Table 3-4
Market Barriers and Diffusion-Limiting Factors[6]

Scoping Study Market Barriers	Characteristics of Innovation
(No direct analog)	Lack of relative advantage
Information or search costs	Product characteristic: Complexity Lack of mass communication Lack of homophilous[7] interpersonal communication
Performance uncertainties	Lack of product trialability Lack of observability
Asymmetric information	Heterophilous[8] interpersonal communication channels
Hassle or transaction costs	(No direct analog)
Hidden costs	(No direct analog)
Access to financing	(No direct analog)
Bounded rationality	Compatibility between product characteristics, social norms
Organization practices or custom	Compatibility between product characteristics, social norms
Misplaced or split incentives	(No direct analog)
Product or service unavailability	(No direct analog)
Externalities	(No direct analog)
Nonexternality mispricing	(No direct analog)
Inseparability of product features	(No direct analog)
Irreversibility	Lack of product trialability

There is considerable overlap between the two ways of looking at the adoption and diffusion of efficient technologies. The *Scoping Study* focuses more on the perceived barriers because efficiency programs can be more effectively designed around such concepts.

A sustainable market also needs appropriate positive and communication flows. The rate of adoption also can be aided by the development of feedback in the marketing process. Research in the communications and marketing fields suggest including in our assessment of market barriers whether a new product/service is developing champions, such as the Program working in close collaboration with ENERGY STAR® Program and to what extent there are positive

[6] Mast, Bruce. "Why Can't We All Just Get Along? A Reconciliation of Economic and Innovation Diffusion Perspectives of Market Transformation." Proceeding from the International DSM Program Evaluation Conference held in Denver, Colorado, 1998.

[7] The extent to which to individuals are similar in attributes such as beliefs, education, common interests, and social status.

[8] The opposite of homophilous.

feedback and reinforcing communications (follow-up available) that support the commitment portion of the diffusion chain.

In conclusion, we do not view these two models as contradictory but complementary, each emphasizing different elements. We have attempted to integrate the strengths of both perspectives to arrive at a more comprehensive and robust theory of market transformation. Thus, these rate of diffusion factors and the stages in the innovation-decision process were considered in this study, to a some extent, as important elements in measuring progress towards market transformation. For example, we included questions on communication channels, including interpersonal communication, as well as mass communication. In Section 4, we look to the future by recommending a diffusion of innovation approach to forecasting likely market transformation outcomes.

3.4 MARKET BARRIERS

One key step in our approach to analyze the effects of the Program was to identify probable market barriers that might impede the adoption of the efficiency products promoted by the Program. We started with the generic barriers defined in the *Scoping Study*[9], which are described in Table 3-5 for reference. Our review of the literature then identified the most likely barriers that impeded the adoption of efficiency measures in the lighting and appliance markets. Based on the taxonomy of market barriers identified in the *Scoping Study*, we categorized these barriers and made preliminary assessments of their expected significance.

Table 3-5
Market Barrier Descriptions

Barrier	Description
Information or Search Costs	The costs of identifying energy-efficient products or services or of learning about energy-efficient practices, including the value of time spent finding out about or locating a product or service or hiring someone else to do so.
Performance Uncertainties	The difficulties consumers face in evaluating claims about future benefits. Closely related to high search costs, in that acquiring the information needed to evaluate claims regarding future performance is rarely costless.
Asymmetric Information and Opportunism	The tendency of sellers of energy-efficient products or services to have more or better information about their offerings than do consumers, which, combined with potential incentives to mislead, can lead to sub-optimal purchasing behavior.
Hassle or Transaction Costs	The indirect costs of acquiring energy efficiency, including the time, materials and labor involved in obtaining or contracting for an energy-efficient product or service. (Distinct from search costs in that it refers to what happens once a product has been located.)
Hidden Costs	Unexpected costs associated with reliance on or operation of energy-efficient products or services - for example, extra operating and maintenance costs.

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

Table 3-5 (continued)
Market Barrier Descriptions

Barrier	Description
Access to Financing	The difficulties associated with the lending industry's historic inability to account for the unique features of loans for energy savings products (i.e., that future reductions in utility bills increase the borrower's ability to repay a loan) in underwriting procedures.
Bounded Rationality	The behavior of an individual during the decision-making process that either seems or actually is inconsistent with the individual's goals.
Organization Practices or Customs	Organizational behavior or systems of practice that discourage or inhibit cost-effective energy-efficiency decisions - for example, procurement rules that make it difficult to act on energy-efficiency decisions based on economic merit.
Misplaced or Split Incentives	Cases in which the incentives of an agent charged with purchasing energy efficiency are not aligned with those of the persons who would benefit from the purchase.
Product or Service Unavailability	The failure of manufacturers, distributors or vendors to make a product or service available in a given area or market. May result from collusion, bounded rationality, or supply constraints.
Externalities	Costs that are associated with transactions, but which are not reflected in the price paid in the transaction.
Non-Externality Pricing	Factors other than externalities that move prices away from marginal cost. An example arises when utility commodity prices are set using ratemaking practices based on average costs (rather than marginal).
Inseparability of Product Features	The difficulties consumers sometimes face in acquiring desirable energy-efficiency features in products without also acquiring (and paying for) additional undesired features that increase the total cost of the product beyond what the consumer is willing to pay.
Irreversibility	The difficulty of reversing a purchase decision in light of new information that may become available, which may deter the initial purchase - for example, if energy prices decline, one cannot resell insulation that has been blown into a wall.

Source: Eto, et al., 1996.

Table 3-6 summarizes the barriers by market actor for efficient lighting products and appliances. The major barriers for customers were considered to be product availability, costs of acquiring information, information asymmetries between customers and providers, bounded rationality, and uncertainty about product performance and the market. For retailers, the most significant barriers were considered to be product availability, information costs, and performance uncertainty. For manufacturers, the most significant barriers were thought to be transaction/hassle costs and uncertainty regarding the response of the customer in the marketplace. Only those market barriers that were considered important were addressed in this study.

Table 3-6
Market Barriers by Market Actor

	Customer	Retailer	Manufacturer
Product/Service Availability			
Unavailable	●●●	●●●	
Awareness			
Information costs	●●●	●●●	
Asymmetric information	●●●		
Decision Process			
Transaction/Hassle costs	●	●●	●●●
Access to financing	●		
Bounded rationality	●●●		
Organizational practices		●●	●●
Perceived Reliability & Uncertainty			
Performance & market uncertainty	●●●	●●●	●●●

Key: ●●● = Important barrier/ Level impedes market transformation (MT)
●● = Moderate barrier/ Moderate impediment for MT
● = Low level barrier/ Some impediment for MT

3.5 PROGRAM MODEL

This subsection presents the program theory or model that we developed for the Program study and discusses the Program interventions, anticipated market barriers, potential market effects and indicators, and hypotheses linking the interventions, market barriers, market effects, and indicators.

Figure 3-3 presents a graphic illustration of the very much simplified residential Program model. In this Figure, there are 30 linkages that describe a variety of efforts in the environment that are designed to transform the market. At a minimum, these efforts include: 1) the Program, 2) utility rebate programs, and 3) the ENERGY STAR® Program.

Figure 3-3
Program Theory/Model

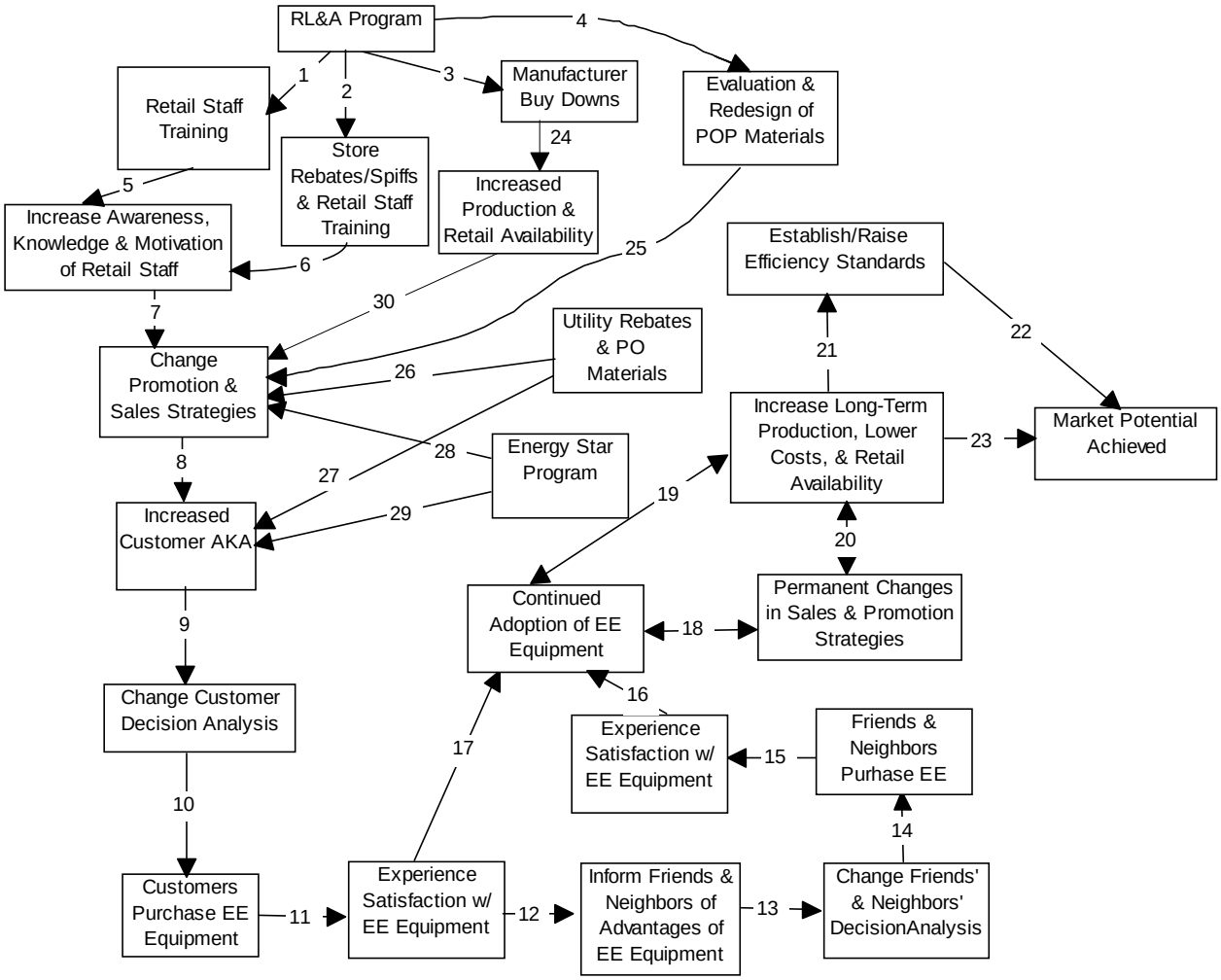


Table 3-7 presents those linkages that are unique to each of these three efforts.

Table 3-7
Unique Residential Program Linkages

Programs	Linkages
Residential Lighting & Appliance Program - Lighting	1, 3, 4, 5, 7, 24, 25, 30
Residential Lighting & Appliance Program - Appliance	1, 2, 4, 5, 6, 7, 25
Utility Rebate programs	26, 27
ENERGY STAR®	28, 29

The linkages unique to the Program's lighting and appliance components are the *primary* interventions of the Program. Other *secondary* linkages will also be examined in this study. These include 8, 9, 10, 11, 12, 17, 19, 20, 21, 26, 27, 28, and 29. These linkages are secondary because they are affected by a broad range of activities, *in addition to the Program*, designed to increase the penetration of efficient equipment. Thus, while these other linkages are important, it will be difficult to directly attribute any observed market effects related to these linkages to the Program.

The following subsection describes in more detail the linkages between program activities, market barriers and hypothesized market effects.

3.6 PROGRAM ACTIVITIES, MARKET BARRIERS ADDRESSED AND HYPOTHESIZED MARKET EFFECTS

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

Table 3-8 presents the linkages from the Program model in Figure 3-3, the related hypotheses, the indicators that will be used to measure these market effects, and the market barriers potentially addressed. We also separated these hypothesized market effects of the Program into three groups: 1) those that were expected to occur in the near term (NT) as participants installed measures under the Program, 2) those that were expected to occur over mid-term (MT), and 3) those that were expected to occur over the long-term (LT). Thus, we also included in Table 3-8 our assessments of whether we can reasonably expect to see market effects as measured by their associated indicators in the near-term (within the first year after the Program intervention), the mid-term (within the second and third years after the Program intervention), or the long-term (more than 3 years after the Program intervention).

Table 3-8
Program Linkages, Hypothesized Market Effects, Indicators and Market Barriers

Linkage	Market Effects Hypotheses	Indicators	Barriers Potentially Addressed
3	Manufacturer buy downs will reduce price of lighting and increase production given the anticipated increase in demand.	Size, efficacy, start-up speed, quality of products over time; associated set-up of product-specific mfg. processes; stimulated R&D (MT/LT) Trends in volume of shipments of targeted products (MT/LT) Prices of efficient lighting products (NT) Market share of efficient equipment (Residential Market Share Tracking System (RMSTS)) (MT/LT)	Unavailability of equipment Manufacturer transaction & hassle costs
6	Providing store incentives/spiffs and training will increase the awareness and knowledge of and motivation to sell energy efficient appliances.	Knowledge, awareness and behavior of sales staff with respect to efficient appliances/lighting products (NT/MT)	Retailer information costs Retailer performance uncertainties
5	Training sales staff in retail lighting/appliance stores will increase their awareness, knowledge, and motivation.	Knowledge, awareness and behavior of sales staff with respect to efficient appliances/lighting products (NT/MT)	Retailer information costs Retailer performance uncertainties Customer information costs
25	Evaluating and modifying the POP materials will result in changes in retail promotion and sales strategies.	Type and frequency of advertising regarding efficient appliances/lighting products (NT/MT)	Expected near-term/mid-term outcome of the Program
7	Increasing the awareness, knowledge, and motivation of sales staff regarding energy efficient lighting and appliances will result in changes in retail promotion and sales strategies.	Type and frequency of advertising regarding efficient appliances/lighting products (NT/MT)	Expected near-term/mid-term outcome of the Program
8	Changes in promotion and sales strategies will increase customer awareness and knowledge of efficient lighting and appliances.	Customer knowledge of efficient appliances/lighting products (MT/LT) Customer awareness of ENERGY STAR®/efficient appliances/lighting products (MT/LT)	Customer information costs Customer performance uncertainties Customer asymmetric information

Table 3-8 (continued)
Program Linkages, Hypothesized Market Effects, Indicators and Market Barriers

Linkage	Market Effects Hypotheses	Indicators	Barriers Potentially Addressed
9	Increasing customer awareness and knowledge will increase the extent to which customers consider incremental costs and savings in lighting choices.	Customer use/understanding of payback and lifecycle costs (MT/LT)	Bounded rationality
10	Increasing the extent to which customers consider incremental costs and savings in lighting and appliance choices will result in increased purchases of efficient equipment.	Customer stated intentions to purchase efficient appliances/lighting products (MT/LT) Customer purchase of efficient appliances/lighting products (MT/LT) Market share of efficient equipment (Residential Market Share Tracking System (RMSTS)) (MT/LT)	This is the expected near-term/mid-term outcome of the Program
11	As customers increase their purchase of efficient equipment, their satisfaction with the efficient equipment will increase.	Customer stated intentions to purchase efficient appliances/lighting products in the future (MT/LT) Sharing of information about energy efficient equipment with friends and neighbors (MT/LT)	Customer performance uncertainty
17	Customers who are satisfied with their efficient equipment will continue to purchase efficient equipment.	Customer stated intentions to purchase efficient appliances/lighting products in the future (MT/LT) Customer purchase of efficient appliances/lighting products (MT/LT) Market share of efficient equipment (Residential Market Share Tracking System (RMSTS)) (MT/LT)	This is the expected mid-/long-term outcome of the Program
12	Customers who are satisfied with their efficient equipment will share information about efficient equipment with their friends and neighbors.	Customer self-reports of sharing of information about their efficient equipment with friends and neighbors (MT/LT)	Customer information costs Customer performance uncertainties Customer asymmetric information
13	Increasing awareness and knowledge among friends and neighbors will increase the extent to which they consider incremental costs and savings in lighting and appliance choices.	Customer use/understanding of payback and lifecycle costs (MT/LT)	Bounded rationality

Table 3-8 (continued)
Program Linkages, Hypothesized Market Effects, Indicators and Market Barriers

Linkage	Market Effects Hypotheses	Indicators	Barriers Potentially Addressed
14	The consideration of incremental costs and savings by friends and neighbors will result in their purchasing efficient equipment.	Customer stated intentions to purchase efficient appliances/lighting products (MT/LT) Customer purchase of efficient appliances/lighting products (MT/LT) Market share of efficient equipment (Residential Market Share Tracking System (RMSTS)) (MT/LT)	This is the expected mid/long-term outcome of the Program
15	As friends and neighbors increase their purchase of efficient equipment, their satisfaction with the efficient equipment will increase.	Customer stated intentions to purchase efficient appliances/lighting products in the future (MT/LT) Sharing of information about energy efficient equipment with friends and neighbors (MT/LT)	Customer performance uncertainty
16	Friends and neighbors who are satisfied with efficient equipment will continue to purchase efficient equipment.	Customer stated intentions to purchase efficient appliances/lighting products in the future (MT/LT) Customer purchase of efficient appliances/lighting products (MT/LT) Market share of efficient equipment (Residential Market Share Tracking System (RMSTS)) (MT/LT)	This is the expected long-term outcome of the Program
18	Continued adoption of efficient equipment will result in permanent changes in sales and promotion strategies. Put another way, permanent changes in sales and promotion strategies will contribute to the continued adoption of efficient equipment.	Market share of efficient equipment (Residential Market Share Tracking System (RMSTS)) (MT/LT)	This is the expected mid-term/long-term outcome of the Program
19, 20	Continued adoption of efficient equipment and permanent changes in sale and promotion strategies will result in increased long-term demand for and production of efficient equipment.	Type and frequency of advertising regarding efficient appliances/lighting products (LT)	This is the expected long-term outcome of the Program

Table 3-8 (continued)
Program Linkages, Hypothesized Market Effects, Indicators and Market Barriers

Linkage	Market Effects Hypotheses	Indicators	Barriers Potentially Addressed
21	Increased long-term demand for and production of efficient equipment will support the eventual adoption and raising of efficiency standards.	CEC efficiency standards (LT)	This is the expected long-term outcome of the Program
22, 23	Increased long-term demand for and production of efficient equipment combined with the adoption and raising of efficiency standards will, over time, result in the realization of market potential.	Market share of efficient equipment (Residential Market Tracking System (RMSTS)) (LT)	This is the expected long-term outcome of the Program
24	Increased production and lower prices will increase the availability of efficient equipment to retailers.	Market share of efficient equipment (Residential Market Share Tracking System (RMSTS)) (MT/LT) Number of retailers stocking efficient equipment (MT/LT) Number of efficient lighting models on sales floors (MT/LT)	This is the expected short and mid-term/long-term outcome of the Program
26	Utility rebate programs and POP materials change the sales and promotional strategies of lighting and appliance retailers.	Type and frequency of advertising regarding efficient appliances/lighting products (MT/LT)	This is the expected mid-term/long-term outcome of the utility rebate programs
27	Utility rebate programs and POP materials will increase customer awareness and knowledge of efficient lighting and appliances.	Customer knowledge of efficient appliances/lighting products (MT/LT) Customer awareness of ENERGY STAR®/efficient appliances/lighting products (MT/LT)	Customer information costs Customer performance uncertainties Customer asymmetric information
28	ENERGY STAR® Program will change the sales and promotional strategies of lighting and appliance retailers.	Type and frequency of advertising regarding efficient appliances/lighting products (MT/LT)	This is the expected mid-term/long-term outcome of the ENERGY STAR® Program

Table 3-8 (continued)
Program Linkages, Hypothesized Market Effects, Indicators and Market Barriers

Linkage	Market Effects Hypotheses	Indicators	Barriers Potentially Addressed
29	ENERGY STAR® Program will increase customer awareness and knowledge of efficient lighting and appliances.	Customer knowledge of efficient appliances/lighting products (MT/LT) Customer awareness of ENERGY STAR®/efficient appliances/lighting products (MT/LT)	Customer information costs Customer performance uncertainties Customer asymmetric information
30	Increased availability of efficient equipment will change the sales and promotional strategies of lighting and appliance retailers.	Type and frequency of advertising regarding efficient appliances/lighting products (NT/MT)	This is the expected short-term/mid-term outcome of the Program

4 METHODS

This Section will present the research design, the sample design, data collection, and analysis.

4.1 RESEARCH DESIGN

While this report presents the results of the Phase I Study, which is designed to establish the various market effects baselines, we present the overview of the research design to be implemented over the four phases of this evaluation. This Section first describes the importance and essential elements of a theory-driven evaluation. We then go on to describe our approach to attributing any observed market effects to the Program, the methods of collecting data, the required sample sizes, and analytical techniques.

4.1.1 Theory-Driven Evaluation

Weiss[1] stresses that understanding the underlying theory of the program is essential to developing the most appropriate evaluation and that a good evaluation is based on defining, testing, and analyzing the assumptions of the program theory. There are many different areas in which programs can go astray, but by focusing on theory, evaluators can keep themselves on track. Thus, this evaluation will be theory-driven. What is studied will be a function of the program activities and their interrelationships, the market actors and barriers addressed, and the expected short-, mid-, and long-term market effects. Such a program theory will consist of customers, retailers, and manufacturers and their reactions to the various program stimuli, which may result in the reduction of identified market barriers, leading to a set of hypothesized market effects. Section 3 provides the detailed program theory/model that underlies this evaluation.

4.1.2 Overall Design

The evaluation design has both process and impacts elements. These two elements combine to provide the most comprehensive picture of not only *what* happened as the result of the program but *why* the impacts were what they were. Each element is described below.

Process

With respect to process evaluation, Program records were reviewed and in-depth interviews were conducted with utility program staff, the Implementation Contractor and its subcontractors. The primary purpose of these interviews was to learn as much as we can about how the program was actually implemented in the field and whether the program implemented deviates from the original design and why. Any problems with the implementation can thus be identified and

[1] Weiss, Carol H. *Evaluation: Methods for Studying Programs and Policies*. Upper Saddle River, New Jersey: Prentice Hall, 1998.

communicated to the program implementers so that mid-course corrections can be made. Equally important, such information will be invaluable in interpreting the results of the impact portion of the evaluation. For example, less than expected market effects, rather than a failure of a program concept, can be the result of a failure to faithfully implement the original program design. In such a case, the required action is not a redesign of the program but rather a more careful and systematic implementation of the program in the field.

Impact

The impact designs for this evaluation vary depending on the program element being addressed. For the customers and retailers, the research are illustrated in Figure 4-1. The Os represent observations, i.e. data collection, and the Xs represent the treatment, i.e., the program activities.

Figure 4-1
Research Designs

	1999			2000		2001	
Region	**Phase I Baseline**	**Program 1999**	**Phase II**	**Program 2000**	**Phase III**	**Program 2001**	**Phase IV**
In-State Customers	O_1	X_1		X_2	O_2	X_3	O_3
Out-Of-State Customers	O_4				O_5		O_6
In-State Retail Managers	O_1	X_1	O_2	X_2	O_3	X_3	O_4
Out-Of-State Retail Managers	O_5				O_6		O_7
In-State Mystery Shops of Retail Stores	O_1	X_1	O_2	X_2	O_3	X_3	O_4

This design has both time series and cross-sectional elements. Many utility studies of market transformation programs have used such a design in order to more confidently attribute any market effects observed over time to their programs. Note that the observations for customers and retail store managers over time are not of the same customers or retailers and thus these two designs are not classic longitudinal designs. This has implications for the possible analyses that are discussed in Section 4.4.

In Phase I, we interviewed customers who had made purchases within the last two years. In Phases III and IV, we must shorten this time period such that it at least does not include the most recent data collection effort conducted in a prior Phase. For example, when interviewing customers in October-December of 2000 as part of the Phase III evaluation, we should interview customers who have purchased equipment within the last four to six months. These customers

will have experienced eight months of the more fully mature Year 2000 Program. This is a fairer test of the program concept. The possibility that even eight months may not be sufficiently long to produce any measurable market effects is discussed in Section 5.4.1. Of course, restricting the period to four to six months has serious implementations for data collection costs due to the lower incidence of those who have purchased. These implication of the expected lower incidence rates is also discussed in Section 5.4.1

The in-state mystery shopper element, created to provide additional insights into the impact of the Program on participating retailers, uses a cross-section-time series design and collects data from participating and nonparticipating California retailers in Phase I and Phase II. The Phase I study established the baseline against which any future market effects among retailers will be compared.

4.1.3 Triangulation and Data Integration

The complexity and size of the residential California appliance and lighting markets argues for multiple measures of key variables. Such complexity virtually guarantees that any one measure of a phenomenon will be less reliable than multiple measures from different perspectives. This approach, often referred to as triangulation, involves the collection of data related to a particular phenomenon from multiple sources, both primary and secondary, in as objective and consistent a manner as possible. We systematically organized the collected information into hypotheses-related evidence, whether supporting, refuting, or ambiguous; and then synthesized the various pieces of evidence to come to informed answers to the key research questions developed as part of the program theory. For each hypothesis, or group of hypotheses, we organized the information developed from our primary research into a tabular format comprised of hypothesized market effects, evidence for/against the hypotheses, information about attribution to the program, and information about durability or sustainability of the effects. We believe that a realistic and useful analysis of attribution is one that acknowledges and describes degrees of attribution as well as the interactive aspects of the hypothesized market effects.

The use of quantitative and qualitative data from multiple sources requires that these data be integrated in an internally consistent manner so that a coherent picture of any program effects can be drawn. Such integration is the essence of triangulation.

4.2 SURVEY SAMPLE DESIGN

This study conducted telephone surveys of in-state customers, out-of-state customers, in-state managers of retail appliance and lighting stores, and out-of-state managers of retail appliance and lighting stores. In-store mystery shops were also conducted in in-state retail appliance and lighting stores. This section first discusses the regional segmentation of these samples. Next, for each of these surveys, this section discusses the development of the sample frame for each region, the stratification of the sample, and sample selection.

4.2.1 Regional Segmentation

The regional segmentation described in this section applies to the sample frames for both the Customer Phone Surveys and Retail Phone Surveys for both appliances and lighting baselines. The Mystery Shopper Survey sample frame uses the California portion of the regional segmentation but does not contain an out-of-state component.

The first level of regional segmentation used in this study was that of California and out-of-state. Out-of-state was defined as the contiguous 47 states. The California portion of the sample was further segmented by utility. Each utility provided a list of zip codes that it served. The zip codes were used to the construct the sample frame within each utility's service territory. California zip codes not served by the three electric utilities were automatically excluded from the frame.

The PG&E and SCE service territories were further segmented into two regions, *close* and *remote*. This was done for several reasons. First, we were informed by the Implementation Contractor that it would not be cost-effective for them to visit remote retail stores. We therefore believed that the impact of the Program might vary depending upon whether the appliance and retail lighting stores were visited by the Implementation Contractor and whether the staff of the lighting and appliance stores received any in-person training. Second, we believed that the diffusion of information and intra-region competition might vary as a function of whether a store was in a *remote* or *close* region. Because of its geographical size, the SDG&E territory was not segmented into remote and close regions.

The PG&E service territory segmentation was based on proximity to the San Francisco Bay Area. The areas considered "close" were defined using the following geographic boundaries:

- North along Highway 101 to include Santa Rosa,
- North and East along Highway 89 to include Woodland and Rocklin, (excluding the city of Sacramento),
- South and East along Highway 99 to include Modesto,
- South to include Salinas and Monterey.

All areas within the PG&E service territory yet outside the region defined as "close" were defined as "remote."

The SCE segmentation was based on proximity to Los Angeles. The area considered "close" was defined using the following geographic boundaries:

- North along Highway 101 to include Santa Barbara and Golita,
- North to include the communities along Highway 118 (Valencia and Pasadena),
- East to include San Bernardino, Redlands, and Riverside,

- South and West of Cleveland National Forest to include Orange County.

All areas within the SCE service territory yet outside the region defined as "close" were defined as "remote."

Of particular concern were the regions surrounded by PG&E and SCE yet served by a municipal utility or irrigation district. California residential customers not served by PG&E, SCE or SDG&E were not included in the sample. For the retail surveys, stores with Los Angeles or Sacramento addresses were excluded from the sample but stores within other smaller municipal utility and/or irrigation districts were not excluded because their customers may be served by the targeted utilities.

A second concern was providing adequate coverage of SCG customers. Ideally, all sampled stores would be shopped for two products. Only one gas appliance was to be shopped. Hence, it was desirable that stores shopped in the SCG service territory for gas water heaters could also be shopped for an electric appliance. Excluding Los Angeles also excluded some of the SCG service territory. However, even after excluding Los Angeles zip codes from the sample, 55% of SCG zip codes remained in the sample areas overlapping with the SCE service territory. Therefore, sampling inside the SCE service territory (and excluding Los Angeles) provided adequate coverage of SCG customers and retail stores selling gas water heaters.

Finally, at the periphery of electric utility service territories, a particular zip code may be served by two utilities. Zip codes bordering LADWP were dropped from the sample unless they had more than 5,000 SCE customers[2]. However, retail stores with Los Angeles addresses and customers served by LADWP were not included in the sample.

The Figure 4-2 illustrates what we call the Program catchment area, segmented into close and remote regions by utility. Figure 4-3 illustrates the estimated 1999 distribution of households by zip codes, provided by the U.S. Census Bureau. The populations of households within each utility and within each "close" and "remote" segment were used to develop expansion weights.

[2] In the LA areas a zip code would typically have over 50,000 residents.

Figure 4-2
Program Catchment Area by Utility by Region

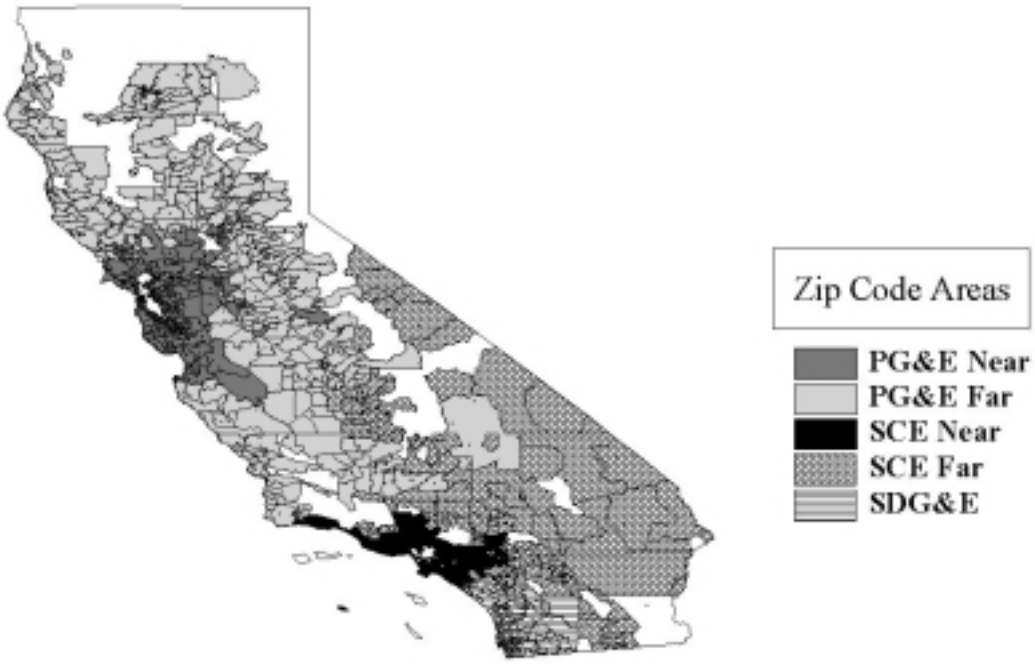
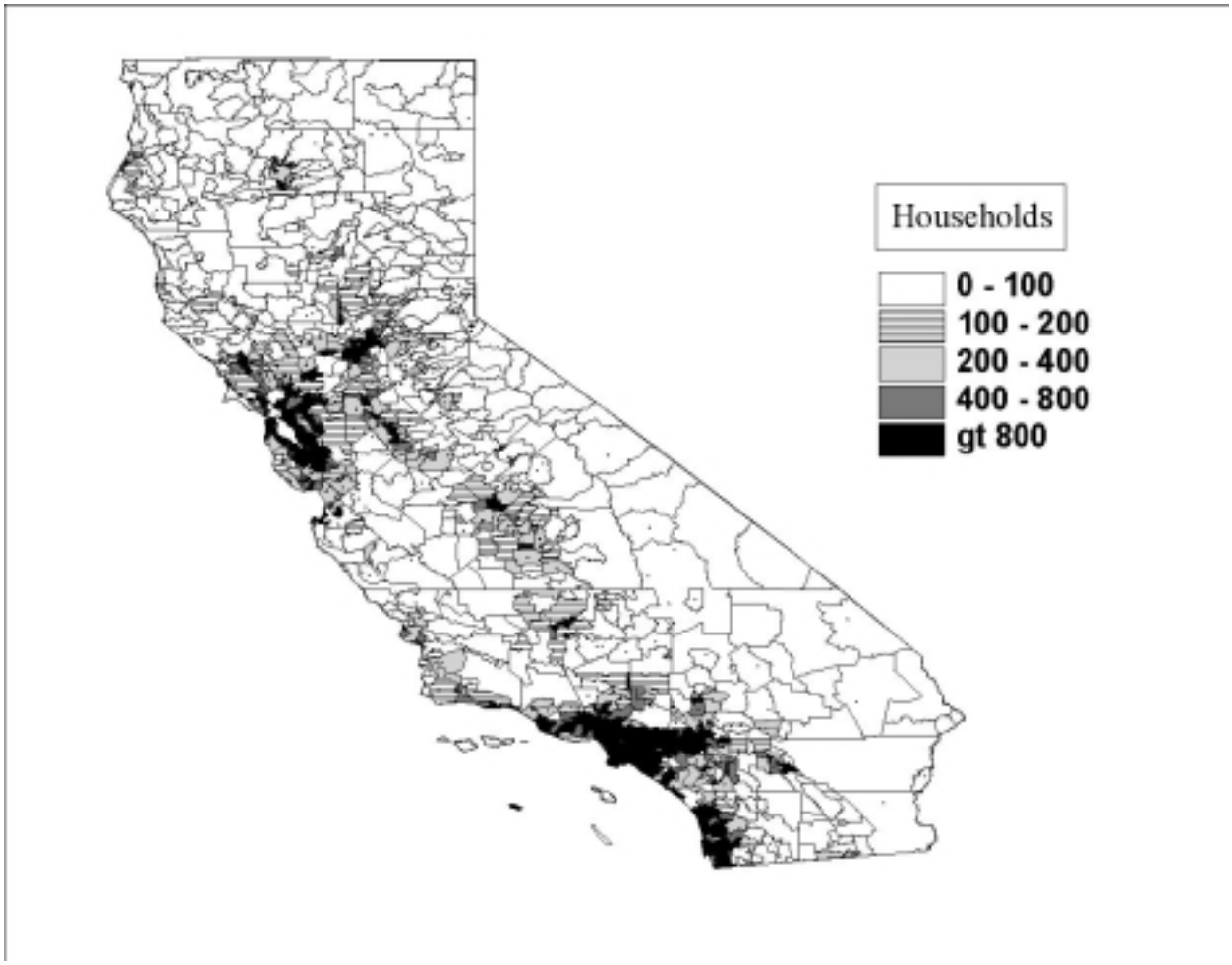


Figure 4-3
Households by Zip Code



4.2.2 Customers: In-State

Samples were drawn from a random selection of assigned residential phone numbers within each of the segments. The construction of the sample frame, stratification, and sample selection are presented below.

Frame Construction

There were 9.3 million California households eligible to be called in this study. The eligible pool of California households were all households with active telephone numbers within the PG&E, SCE, and SDG&E service territories. Table 4-1 provides a breakdown of households by household types and utility.

Table 4-1
Households by Utility and Housing Type

Utility	Single Family	Multi-Family	Other	Total
PG&E	3,057,692	1,330,412	121,766	4,509,870
SCE	2,373,436	1,206,172	311,270	3,890,878
SDG&E	528,047	381,891	33,003	942,941
Total	**5,959,175**	**2,918,475**	**466,039**	**9,343,689**

Note that only those approximately 2.1 million SoCal Gas customers who reside in SCE's service territory were eligible to be called. This household frame was developed and maintained by Scientific Telephone Samples (STS). See Appendix G for more details regarding the creation and maintenance of this list.

Stratification

The sample was stratified by utility service territories with the aim of completing an equal number of surveys within each. Within the PG&E and SCE service territories, we took a proportional sample within the *remote* versus *close* regions. There was no such stratification within the SDG&E service territory.

Sample Selection

We purchased a proportional random sample of active residential telephone numbers from those zip codes that defined the PG&E, SCE, and SDG&E service territories. Calls were made seven days a week between the hours of 5 p.m. and 9 p.m. with a maximum of five call backs made at different times during the calling period. See Appendix G for a description of the sampling method used by the STS from which these telephone numbers were purchased.

Table 4-2 presents the original quotas for the in-state customer surveys. As one can see, the original intent was to cover two technologies per interview in order to increase the sample size for each technology. The reason for increasing the sample sizes was to increase both the precision of any estimates and the power of any statistical tests.

Table 4-2
Quotas for In-State Customers

Measures	SCE Close	SCE Remote	SDG&E Close	PG&E Close	PG&E Remote	SCG	Total
Torchieres	64	19	83	64	19	n/a	250
Screw-in Bulbs	64	19	83	64	19	n/a	250
Hard-Wired Fixtures	64	19	83	64	19	n/a	250
Dishwashers	64	19	83	64	19	n/a	250
Clotheswashers	64	19	83	64	19	n/a	250
Refrigerators	64	19	83	64	19	n/a	250
Gas Water Heaters	n/a	n/a	83	64	19	83	250
Room A/C	64	19	83	64	19	n/a	250
Total	447	134	672	511	153	83	2000

4.2.3 Customers: Out-Of-State

The construction of the out-of-state customer sample frame, stratification, and sample selection are presented below.

Frame Construction

In 1996, the U.S. Census Bureau reported that there were 87 million households in the contiguous 47 states. Of these households, those with active telephone numbers were eligible to be called in this study. This frame was developed and maintained by Scientific Telephone Samples (STS). See Appendix G for more details regarding the creation and maintenance of this list.

Stratification

There was no stratification of the out-of-state customer sample. However, we will be able to *post-stratify* the achieved sample by low-to-no DSM states and moderate-to-high DSM states. Table 4-3 list those states that have been identified in past studies as being moderate-to-high DSM states and those that have been identified as no-to-low DSM states.

Table 4-3
No-To-Low Versus Moderate-To-High DSM States

Moderate-to-High		No-to-Low		
AZ	MN	AL	MO	PA
CO	NH	AR	MS	SC
CT	NJ	GA	MT	SD
DC	NY	IA	NC	TN
DE	OR	ID	ND	TX
FL	RI	IL	NE	UT
MA	VT	IN	NM	VA
MD	WA	KS	NV	WV
ME	WI	KY	OH	WY
MI		LA	OK	

Sample Selection

We purchased a simple random sample of active residential telephone numbers from those zip codes that defined the 47 contiguous states. See Appendix G for a description of the sampling method used by the STS from which these telephone numbers were purchased. Table 4-4 presents the original minimum quotas for the out-of-state customer surveys.

Table 4-4
Quotas for Out-Of-State Customers

Measure	Measure Frequency
Torchieres	44
Screw-in Bulbs	44
Hard-Wired Fixtures	44
Dishwashers	44
Clotheswashers	44
Refrigerators	44
Gas Water Heaters	43
Room A/C	43

4.2.4 In-State Retailers

The in-state retailer frame was designed to serve two surveys: 1) the mystery shopping survey and 2) the store manager survey. Once the 200 retail stores were shopped, the managers of a random sample of 100 of these same 200 retail stores were then interviewed by telephone. This was considered essential if we were to gain two important perspectives on the performance of retail stores, that of the customer and that of management.

The retailer sample was naturally divided into appliances and lighting technologies (50 lighting stores and 50 appliance stores). They were further segmented into market size. High and low volume retailers were defined using an estimate of their sales of targeted products. Chains were considered high volume retailers and independent stores were considered low volume retailers. Finally, they were further stratified by *close* versus *remote*.

Frame Construction

The *Dun & Bradstreet (D&B) Marketplace (July - September 1999)* database was used to obtain a list of appliance and lighting retailers in California and out of state.

The list of appliance retailers was drawn using the following SIC codes:

- 5722-0000 Household appliance stores,
- 5722-0201 Air conditioning room units, self-contained, and
- 5722-0202 Electric household appliances, major.

Upon comparing the results produced by a D&B search with the Electric and Gas Industries Association's (EGIA) database of appliance dealers who had previously participated in utility appliance rebate programs, it became apparent that the D&B database did not contain a complete list of California appliance retailers within those SIC codes. A D&B search on the names found in the EGIA database revealed that many of the retailers were actually listed in the D&B database but that there was no consistency with respect to SIC code identification. For example, Sears was listed under 12 different primary SIC codes. (Each store in the database can only list one primary SIC code. Usually there are no secondary SIC codes listed.) It was also apparent that adding additional SIC codes to the search criteria would not necessarily improve the list of appliance stores. A spot check revealed that most of the stores listed under the alternative SIC codes had nothing to do with the appliance list being studied. (e.g. Circuit City, which sells major appliances may be listed under Radio and TV. However, other stores listed under Radio and TV do not sell the major appliances being studied.)

Hence, the California appliance retailers to be sampled were drawn from the above SIC codes *and* from the list of appliance dealers known to have participated in utility programs in the past.

The list of lighting retailers was drawn using the following SIC codes:

- 5251-0000 Hardware stores,
- 5719-0200 Lighting, lamps, and accessories, and
- 5211-0000 Lumber and other building materials.

For lighting retailers, we encountered similar problems. Upon comparing the results produced by a D&B search with the ECOS[3] database of lighting dealers who had previously participated in utility appliance rebate programs, it was apparent that the D&B database did not contain a complete list of California lighting retailers within those SIC codes. As we did in the case of appliances, we drew our sample from the above SIC codes *and* from the list of lighting dealers know to have participated in utility programs in the past.

Stratification

The retail sample was segmented based on estimated appliance sales volume. Given that D&B data concerning total sales and total employees are considered unreliable at the individual store level, the number of related stores of the same name (chain) was considered a reasonable proxy for appliance sales volume. Any store in a chain of *three outlets or more* was considered high volume. All other stores were considered independents and low volume. Thus, the study segmented appliance and lighting retailers by volume category (high versus low).

Sample Selection

All information for all stores in the selected SIC codes in the selected zip codes were requested from D&B. Each store was assigned to the correct utility and within each utility (with the exception of SDG&E) either to the *close* or *remote* region.

In-Store Mystery Shopping

The original quotas for each cell of the sample design are presented in Tables 4-5 through 4-8.

Table 4-5
Quotas for Mystery Shopping: Large Appliance Store

	PG&E Close	PG&E Remote	SCE Close	SCE Remote	SDG&E	Total
Large Stores	**20**	**5**	**20**	**5**	**25**	**75**
Refrigerator	8	2	8	2	10	30
Clothes Washer	8	2	8	2	10	30
Dishwasher	8	2	8	2	10	30
Room A/C	8	2	8	2	10	30
Gas Water Heater	8	2	8	2	10	30
Total Appliances	**40**	**10**	**40**	**10**	**50**	**150**

[3] ECOS is a subcontractor to the Implementation Contractor and is responsible for implementing the lighting portion of the Program.

Table 4-6
Quotas for Mystery Shopping: Small Appliance Store

	PG&E Close	SCE Close	SDG&E	Total
Small Stores	**8**	**8**	**9**	**25**
Refrigerator	4	4	3	11
Clothes Washer	4	4	4	12
Dishwasher	4	4	4	12
Room A/C	3	4	4	11
Gas Water Heater	1	n/a	3	4
Total Appliances	**16**	**16**	**18**	**50**

Table 4-7
Quotas for Mystery Shopping: Large Lighting Store

	PG&E Close	PG&E Remote	SCE Close	SCE Remote	SDG&E	Total
Large Stores	**20**	**5**	**20**	**5**	**25**	**75**
Hard-Wired Fixtures	13	3	13	3	16	48
Light Bulbs	13	3	13	3	17	49
Torchieres	14	4	14	4	17	53
Total Lighting Products	**40**	**10**	**40**	**10**	**50**	**150**

Table 4-8
Quotas for Mystery Shopping: Small Lighting Store

	PG&E Close	SCE Close	SDG&E	Total
Small Stores	**8**	**8**	**9**	**25**
Hard-Wired Fixtures	6	5	7	18
Light Bulbs	8	5	8	21
Torchieres	2	6	3	11
Total Lighting Products	**16**	**16**	**18**	**50**

Once the sampled retail stores were allocated to one of these cells, they were sorted randomly and then called by XENERGY to confirm that the store sold at least *two* of the new appliances or new lighting measures. This was done since each mystery shopper was to collect information on

two appliances or two lighting measures, thus providing adequate coverage of the eight measures addressed in this study. The stores that passed this screening process were then eligible to be shopped. Randomly sorted lists of 100 qualified appliances and 100 qualified lighting stores were then passed to the managers of the mystery shopping survey.

Retail Store Manager

Random samples of managers of the 100 retail lighting stores and of the 100 retail appliance stores that had been mystery shopped were then interviewed by telephone. The plan was to complete interviews with 50 lighting store managers and 50 appliance store managers. Again, this was considered essential if we were to gain two important perspectives on the performance of retail stores, that of the customer and that of management. Tables 4-9 and 4-10 present the initial quotas for the retail manager surveys.

Table 4-9
Quotas for In-State Retail Appliance Store Manager Surveys

Type	PG&E Close	PG&E Remote	SCE Close	SCE Remote	SDG&E	Total
Chain	10	3	9	3	12	37
Independent	4	0	4	0	5	13
Total	**14**	**3**	**13**	**3**	**17**	**50**

Table 4-10
Quotas for In-State Retail Lighting Store Manager Surveys

Type	PG&E Close	PG&E Remote	SCE Close	SCE Remote	SDG&E	Total
Chain	10	3	10	3	12	38
Independent	3	0	4	0	5	12
Total	**13**	**3**	**14**	**3**	**17**	**50**

4.2.5 Out of State Retail Sample

Frame Construction

The out of state retail sample was selected using the same general criteria as the California sample. The retail samples for both appliance and lighting retailers were drawn from D&B using the same SIC codes as listed above. Random samples of the retailers listed in D&B were drawn

from the two segments (low-to-no DSM and moderate-to-high DSM) of the remaining contiguous 47 states.

Stratification

The out of state sample was segmented into two categories:

- states with high to moderate DSM and
- states with low to no DSM.

The breakdown of no-to-low and moderate-to-high DSM states was presented earlier in Table 4-3. This out-of-state regional segmentation was applied to the retail surveys only. No regional segmentation implemented in the residential out-of-state survey.

Sample Selection

All information for all stores in the selected SIC codes in the selected zip codes for the moderate-to-high DSM states and the no-to-low DSM states were requested from D&B. Table 4-11 presents the original quotas for the out-of-state retail survey.

Table 4-11
Quotas for Out-Of-State Retail Store Manager Survey

Store Type	Moderate-High DSM	Low-No DSM
Lighting	25	25
Appliance	25	25
Total	50	50

4.3 DATA COLLECTION

In-State Customers

The customer survey instrument was developed and then pre-tested.[4] Calls were made seven days a week between the hours of 5 p.m. and 9 p.m. with a maximum of five call backs made at different times during the calling period. The disposition of the sample is presented in Table 4-12.

[4] See Appendix A for the customer survey instrument.

Table 4-12
Sample Disposition for In-State Customer Surveys

Disposition	Close Frequency	Remote Frequency	Total
Disconnected	560	682	1,242
Out of Area	202	44	246
No Answer	2,177	699	2,876
Busy	548	247	795
Home Office	28	4	32
Answer Machine	2,940	832	3,772
Language Barrier	767	212	979
Did Not Buy	1,255	369	1,624
Fax Machine	688	114	802
Business (Not a residence)	1,720	304	2,024
Designated Respondent No Longer Available	90	35	125
Quota Full	29	49	78
Undialed Sample	18	0	18
Definite Appointment/Still Active	115	125	240
Refused	5,046	975	6,021
Completes	816	187	1,003
Total	**16,999**	**4,878**	**21,877**

From Table 4-12, one can see that once the interviewer engaged a qualified customer on the telephone, the interviewer was able to complete interviews with 14 percent.

From Table 4-13, it is clear that the achieved technology-level quotas presented earlier in Table 4-2 were not met. Recall that the main motive for this effort was to increase the precision of our estimates and the power of any statistical tests. However, the joint probabilities of purchasing two of the eight technologies within the last two years were much smaller than expected. A mid-course correction in the interviewing strategy was made that no longer required that a customer purchase two of the technologies in order to be interviewed.

Table 4-13
Achieved Sample By Technology and Utility

Technology	PG&E Close	PG&E Remote	SCE Close	SCE Remote	SDG&E	All CA
Torchieres	38	34	25	31	79	207
Screw-In Bulbs	48	47	59	66	105	325
Hard Wired Fixtures	33	29	33	44	63	202
Dish Washer	30	38	27	35	56	186
Clothes Washer	36	57	35	57	77	262
Refrigerator	44	39	37	43	91	254
Gas Water Heater	19	17	17	19	32	104
Room Air Conditioner	11	10	13	14	18	66
Total	259	271	246	309	521	1606

Despite the failure to achieve the original technology quotas, we did manage to achieve an average of 1.61 technologies per completed interview, considerably better than one technology per interview. As a result, the precision of any estimates and the power of any statistical tests are increased.

Out-Of-State Customers

The customer survey instrument was developed and then pre-tested.[5] Calls were made seven days a week between the hours of 5 p.m. and 9 p.m. with a maximum of five call backs made at different times during the calling period. Note that there was no requirement to only interview customers who purchased *two* of the eight technologies. However, when customers indicated they had purchased two or more of the eight technologies within the last two years, interviewers attempted to cover two technologies in the interview in order to increase the sample sizes. The disposition of the sample is presented in Table 4-14. From Table 4-14, one can see that once the interviewer engaged a qualified respondent on the telephone, the interviewer was able to complete interviews with 18 percent.

Table 4-15 presents the achieved sample at the technology level for the out-of-state customer survey.

[5] See Appendix A for the customer survey instrument.

Table 4-14
Sample Disposition for Out-Of-State Customer Surveys

Disposition	Frequency
Disconnected	484
Out of Area	16
No Answer	1,368
Busy	274
Renter (Landlord Purchased)	21
Answer Machine	1,211
Language Barrier	80
Did Not Buy	341
Fax Machine	137
Business (Not a residence)	336
Designated Respondent No Longer Available	36
Quota full	0
Undialed Sample	1,902
Definite Appointment/Still Active	324
Refused	1,258
Completes	352
Total	**8,140**

Table 4-15
Achieved Sample for Out-Of-State Customer Survey by Technology

Technology	Out of State
Torchieres	46
Screw-In Bulbs	129
Hard Wired Fixtures	77
Dish Washer	62
Clothes Washer	80
Refrigerator	79
Gas Water Heater	28
Room Air Conditioner	40
Total	541

In-State Appliance and Lighting Retailers

Mystery Shopping

A firm that is a member of the Mystery Shopping Providers Association (MSPA)[6] was selected through a competitive bid to conduct the 200 mystery shops. Separate sets of data collection protocols and an accompanying questionnaire were then developed for appliance and lighting stores[7]. Prior to actually collecting the data, three training sessions were conducted in Berkeley, Pasadena, and San Diego to make sure that the mystery shoppers understood the objectives of the study, the data collection protocols, and the survey instrument. It was also important that they could identify the equipment being shopped for and the types of point-of-purchase materials that they might encounter. We then pre-tested, and implemented the mystery shopping data collection protocols and survey instruments.

The following kinds of information were collected during the visit:

Point-of-Purchase Materials – What type of materials were visible during the visit? What entity was portrayed as the sponsor for these materials? Were the materials effective (easy to see, understand, etc.)?

- **Product Exposure and Share of Sales Floor**– How many units were shown to the shopper (total v. energy efficient)? What percent of the total product *shown* had the ENERGY STAR® label? In lighting stores, shoppers were asked to estimate what percent of the total product on *display* had the ENERGY STAR® label? In *appliance* stores, shoppers were asked to record a variety of information about the appliances they were shown, including price, manufacturer, model number, availability of a rebate, the amount of the rebate, and its sponsor.
- **Salesperson Knowledge** – How knowledgeable were salespeople about energy efficiency, the ENERGY STAR® Program, and various rebate programs?

Point-of-Purchase Materials: As the mystery shoppers entered the stores, they were instructed to observe the point-of-purchase (POP) advertising and note which types of appliances or lighting were advertised, the organizational sponsor (e.g., manufacturer, utility, retailer, etc.) and the type of materials used in the advertising (e.g., banner, flyer, poster, sticker, etc.). The shoppers also observed where the information was displayed, whether it was easy to see and read, and whether the display was attractive.

[6] The MSPA was formed in 1998 with the purpose of strengthening the mystery shopping industry through out the world. The MSPA's goal is to improve and stimulate the acceptance, performance, reputation, and use of mystery shopping services, both regionally and internationally.

[7] See Appendix C for a copy of the protocols and questionnaires.

Product Exposure and Share of Sales Floor: Depending on whether they were shopping in an appliance store or a lighting store, mystery shoppers were instructed to look for two different appliances or lighting products in each store they visited. When approached by a salesperson, the mystery shopper was to explain that he/she was shopping for these two appliances or lighting products. Mystery shoppers were further instructed to look for *three* different models of each of the two appliance types or lighting products. Depending on which two *appliances* the mystery shopper was looking for, he/she was directed to indicate interest in:

- A white, standard-sized dishwasher.
- A white 40-gallon gas water heater.
- A white, standard-sized (not greater than 3 cubic feet) clothes washer.
- A room air conditioner between 8,000-9,000 BTUs.
- A white, 22-cubic foot refrigerator with either top or side freezer and no ice through the door (ice maker inside freezer optional).

Depending on which two *lighting* products the mystery shopper was looking for, he/she was directed to indicate interest in:

- A basic floor lamp (nothing too fancy) that would direct light upward toward the ceiling
- A basic (no fan) hard-wired ceiling fixture for the bathroom
- A 100 watt screw-in light for a table lamp (75 or 60 watts also acceptable)

As the salesperson began showing the three selections per appliance or per lighting product, the mystery shopper was instructed to pay particular attention to whether the salesperson mentioned specific aspects of the product, such as "energy use," "energy efficiency," "rebates," "lifecycle costs," etc. and what, exactly, the salesperson chooses to say about such attributes. The mystery shopper was also noting whether the ENERGY STAR® label was on the appliance or lighting equipment itself or its packaging.

If "energy use" or "energy efficiency" was not mentioned for any of the three appliance models or pieces of lighting equipment, the mystery shopper was to ask "Do all three use the same amount of electricity?" or "Are all three equally energy efficient?" If the ENERGY STAR® label was on the label or packaging and the salesperson did not discuss it, the mystery shopper was instructed to ask "What does the ENERGY STAR® label mean?" In addition, if shopping for an appliance with an Energy Guide label on it, mystery shoppers were instructed to ask the salesperson "Can you explain the Energy Guide label to me?"

Finally, if after raising the energy efficiency issue, the salesperson offers to show more products, mystery shoppers were instructed to shop for a maximum of two additional appliance or lighting models. The maximum number of models shown to most mystery shoppers, therefore, was five (three initially shown plus two additional).

Mystery shoppers were also instructed to collect data on *appliance* prices and rebates for each of the models they were shown by the salesperson (up to five). Mystery shoppers were also instructed to estimate the extent of floor stock or shelf space dedicated to ENERGY STAR®-qualifying *lighting* products.

Salesperson Knowledge: Finally, mystery shoppers were instructed to evaluate the extent to which salespeople were knowledgeable about energy efficiency, the ENERGY STAR® Program, and various rebate programs.

The disposition of the sample is presented in Table 4-16**.**

Table 4-16
Disposition of Sample for Mystery Shops

	Appliance Stores	Lighting Stores	Total
Visited	103	102	205
Shopped	89	95	184
Not Shopped			
Sold Only Used Appliances	5	1	6
Did not sell Equipment of Interest	2	5	5
Service Only	3		3
Closed	4	1	4

There were a number of cases in which the mystery shopper went to the store only to encounter a situation that prevented the store from being shopped. In four cases, the store had closed since the time that we contacted them to determine eligibility. In six cases, the store only sold used equipment. In five cases, the store did not sell any of the eligible equipment. Finally, in three cases, the store provided only repair services. We believe most of the reporting errors were made by store personnel. In some cases, we found a replacement store to be shopped. However, in the mystery shopping industry, shoppers who are not able to shop a given store for the reasons outlined above are paid for the work nonetheless. Unfortunately, for budgetary reasons, we could not continue to do replace stores indefinitely. Thus, despite our best efforts to screen for qualified retail stores, there are only 89 appliance stores and 95 lighting stores that were able to participate in the analysis.

Store Managers

A store manager instrument was then developed and pre-tested[8] for use in interviewing a random sample of the managers of the 89 appliance stores and the 95 lighting stores that were shopped. The disposition of the sample is presented in Table 4-17.

Table 4-17
Sample Disposition for In-State Store Manager Surveys

Disposition	Appliance Frequency	Lighting Frequency	Total
Disconnected	62	1	63
No Answer	1	0	1
Busy	7	3	10
Does Not Sell	3	7	10
Wrong Address	1	0	1
Quota Full	4	19	23
Designated Respondent No Longer Available	0	1	1
Definite Appointment/Still Active	36	41	77
Refused	21	32	53
Completes	56	53	109
Total	**191**	**157**	**348**

From Table 4-17, one can see that once the interviewer engaged a qualified store employee on the telephone, the interviewer was able to complete interviews with 67 percent.

Out-Of-State Appliance and Lighting Retailers

A store manager instrument was then developed and pre-tested[9] for use in interviewing the managers of out-of-state retail lighting and appliance stores. Store managers were called seven days a week between the hours of 9 a.m. and 5 p.m. in the relevant time zone with a maximum of 5 call backs. The disposition of the sample is presented in Table 4-18.

[8] See Appendix E for the retail store manager survey.

[9] See Appendix E for the retail store manager survey.

Table 4-18
Sample Disposition for Out-Of-State Store Manager Surveys

Disposition	Appliance Frequency	Lighting Frequency	Total
Disconnected	35	11	46
No Answer	153	6	159
Busy	31	1	32
Answer Machine	79	14	93
Does Not Sell	29	13	42
Fax	4	0	4
Quota Full	0	361	361
Language Barrier	0	1	1
Designated Respondent No Longer Available	6	1	7
Definite Appointment/Still Active	98	69	167
Undialled Sample	28	0	28
Refused	76	37	113
Completes	64	50	114
Total	**608**	**566**	**1,174**

From Table 4-16, one can see that once the interviewer engaged a qualified store employee on the telephone, the interviewer was able to complete interviews with 50 percent.

4.3.2 Data Collection Summary

Table 4-19 presents a summary of all data from all surveys that are available to participate in the various analyses. This table also shows the data collection plan for Phases, II, III, and IV. Note that, in later Phases of this evaluation, retailers will be segmented by participation in the Program.

Table 4-19
Data Collection Summary

	Phase I	Phase II	Phase III	Phase IV
In-State Customers	1003		1000	1000
Out-of-State Customers	350		350	350
Out-of-State Retail Lighting Store Managers	52		50	50
Out-of-State Retail Appliance Store Managers	53		50	50
In-State, In-Store, Lighting Retail Store Surveys	102	100	100	100
In-State, In-Store, Appliance Retail Store Surveys	103	100	100	100
In-State Retail, Lighting Store Managers	53	5-10[1]	50	50
In-State Retail, Appliance Store Managers	56	5-10[1]	50	50
Implementation Staff	25			
Manufacturers and Government Staff (in-depth)		20	20	20
Total	**1797**	**240**	**1770**	**1770**

[1] These 5-10 interviews will be in-depth in nature and designed to determine whether the perceptions of store managers match the perceptions of mystery shoppers.

Weights

In-State Customers

The California residential customer sample was weighted based on the number of households in each region. The total household count for each utility was provided by each utility[10]. The distribution between close and remote households was based on U.S. Census Bureau data projected for 1999 by zip code. To estimate population totals upon which percentages and means are calculated, we used Equation #1.

$$\hat{Y}_{st} = N\bar{y}_{st} \qquad \text{(Eq. 1)}$$

where

$\bar{y}_{st} = \sum_{h=1}^{L} W_h \bar{y}_h$ is the mean based on a stratified sample

[10] Theoretically a separate weighting scheme should be used for electric and gas technologies to account for the differences in SCE and SCG customers. However, the SCE household weights were applied to both electric and gas technologies for the following reasons. All SCG customers surveyed are also SCE customers. We have no way of knowing how representative the SCG customers that were surveyed are of the total SCG population The total household population of SCE and SCG are about the same, about 4 million; even if a unique SCG weight was applied to the gas technology parts of the analysis the, results would be about the same.

$$\bar{y}_h = \frac{\sum_{i=1}^{n_h} y_{h,i}}{n_h}$$ is the sample mean

$$W_h = \frac{N_h}{N}$$ is the stratum weight

Out-Of-State Customers

No weights were required for this analysis since the sample was a simple random sample, i.e., the sample was self-weighting.

Out-Of-State Retailers

The retail survey was weighted both by region and volume. As with the customer survey data, the retail survey data were weighted regionally by the number of households. The further segmentation was based on sale volume. However, because of concerns regarding the unreliability of sales volume data in D&B, we chose to segment based on a variable that was thought to be highly correlated with sales volume, the number of full-time-equivalent employees.

The full population of California targeted retailers listed in D&B was used to establish the sales volume splits. Appliance and lighting retailers were considered separately. The total number of employees working at the identified chains was compared to the total number of employees working at the independent outlets[11]. The comparison of employees between chain and individual (high and low volume) outlets was considered at the state level and regional level for both the lighting and appliance segments[12]. Although our intent was to use regional comparisons, some of the regional comparisons had small samples and produced counter intuitive results. Consequently, we used the state level comparisons for all state regions.

Finally, in the process of developing a baseline assessment for SDG&E, we observed that the number of retail sources listed in the D&B database that did not sell targeted technologies was significantly higher for individual, low volume, outlets relative to chain, high volume, outlets. The ratio of retailers that sold targeted technology verses retailers listed in D&B (that should sell the technology based on SIC code) was applied to the state level employee count by technology type and sales volume.

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[11] Unfortunately, there is no source that would allow us to track the sales volume of target technologies. The two proxies for these numbers were available in the D&B data, annual sales and number of employees. We believe that the annual sale numbers for individual stores are less reliable than the number of employee data. In addition, the annual sales data also has more missing values in the D&B database. Hence, the number of employees was used as a proxy for sales volume of targeted technologies

[12] The D&B database provides employee counts at each location in ranges. For this analysis the center point of each range was used at the actual number of employees. These numbers were summed.

Table 4-20 presents the input data for calculating the weights used for lighting retailers. Using the methods described above, 75% of the lighting technology, sold to residential customers through retail markets in California, is sold through (high volume) chains. The remaining 25% of lighting technology is sold through (low volume) independent retail outlets.

Table 4-20
Input Data for In-State Lighting Retailer Weights

Utility	Distance	Outlet Type	Regional Households	Outlet Factor	Expansion Weight Numerator
PG&E	Close	Chain	3,089,961	.75	2,317,471
PG&E	Close	Independent	3,089,961	.25	772,490
PG&E	Remote	Chain	1,419,909	.75	1,064,932
PG&E	Remote	Independent	1,419,909	.25	354,977
SCE	Close	Chain	3,211,875	.75	2,408,906
SCE	Close	Independent	3,211,875	.25	802,969
SCE	Remote	Chain	679,003	.75	509,252
SCE	Remote	Independent	679,003	.25	169,751
SDG&E	Close	Chain	942,941	.75	707,206
SDG&E	Close	Independent	942,941	.25	235,735

Table 4-21 presents the input data for calculating the weights used for appliance retailers. Using the methods described above, 92% of the target appliances, sold to residential customers through retail markets in California, are sold through (high volume) chains. The remaining 8% of appliances are sold through (low volume) independent retail outlets.

Table 4-21
Input Data for In-State Appliance Retailer Weights

Utility	Distance	Outlet Type	Regional Households	Outlet Factor	Expansion Weight Numerator
PG&E	Close	Chain	3,089,961	.92	2,842,764
PG&E	Close	Independent	3,089,961	.08	247,197
PG&E	Remote	Chain	1,419,909	.92	1,306,317
PG&E	Remote	Independent	1,419,909	.08	113,593
SCE	Close	Chain	3,211,875	.92	2,954,925
SCE	Close	Independent	3,211,875	.08	256,950
SCE	Remote	Chain	679,003	.92	624,683
SCE	Remote	Independent	679,003	.08	54,320
SDG&E	Close	Chain	942,941	.92	867,506
SDG&E	Close	Independent	942,941	.08	75,435

Within each cell of Tables 4-20 and 4-21, the *expansion weight numerator* was then divided by the counts within each cell of completed interviews to create the expansion weights.

Out-Of-State Retailers

Weighting of the out-of-state retail survey sample was based on the same criteria discussed above. The first criteria was the number of households in each segment. The sales volume segmentations based on technology type were overlaid on top of the household segmentation using the same method as described above. The total household numbers for each segment are based on U.S. Census data. Table 4-22 presents the input data used to calculate the out-of-state retailer weights. Within each cell of Table 4-22, the *expansion weight numerator* was then divided by the counts within each cell of completed interviews to create the expansion weights.

Table 4-22
Input Data for Out of State Retailer Weights

Technology	Segment	Outlet Type	Total Households (x1000)	Outlet Factor	Expansion Weight Numerator (x1000)
Lighting	Mid to High DSM	Chain	36,591	.75	27,443
	Mid to High DSM	Independent	36,591	.25	9,148
	Low to No DSM	Chain	50,459	.75	37,844
	Low to No DSM	Independent	50,459	.25	12,615
Appliances	Mid to High DSM	Chain	36,591	.92	33,664
	Mid to High DSM	Independent	36,591	.08	2,927
	Low to No DSM	Chain	50,459	.92	46,422
	Low to No DSM	Independent	50,459	.08	4,037

4.3.3 Descriptions of Available Products

Our approach to this task involved a comprehensive review of the products targeted through the program – i.e., those that meet criteria established through the ENERGY STAR® initiative. This review was accomplished mainly through an analysis of the information contained on the ENERGY STAR® product web pages and the California Energy Commission (CEC) Appliance Efficiency Databases, as well as a number of other secondary research sources[13]. For example, we compared products listed in the ENERGY STAR® on-line product list to the products listed in the CEC appliance efficiency databases (as applicable) to:

- determine the absolute number of unique appliances available in the current market,

[13] For a complete list of sources used to complete this review, see Appendix F.

- develop a list of manufacturers (and their various brands) that produce models that would qualify for the ENERGY STAR® label, and
- estimate the percent of all available appliances that would qualify for the ENERGY STAR® label[14].

In addition, we assessed the extent to which the full range of qualified products are being promoted to California consumers through a series of mystery shopper visits, retailer interviews, and a consumer survey.

4.3.4 Equipment Efficiency

In interviews with in-state and out-of-state customers, we attempted to collect basic nameplate information from the equipment they purchased that they claimed was energy efficient. This information was used to match to the Energy Efficiency Database (EED) maintained by the California Energy Commission (CEC) to verify the customers' claims.

However, there were some difficulties in matching these data. We interviewed the person at the CEC who is responsible for maintaining the Energy Efficiency Database (EED). This person indicated that for various reasons the data from manufacturers are spotty. While some manufacturers provide data for both inside and outside California, some others do not always provide it for outside California. In addition, it is not mandatory for manufacturers selling clothes washers and dishwashers in California. Another problem is that some manufacturers need more than the current field length to hold their model numbers, which means that some model numbers are truncated.

Despite these problems, using the available data, we were able to determine the extent to which customers correctly reported the purchase of standard efficiency appliances or high efficiency appliances.

4.4 ANALYSIS

4.4.1 Phase I Approach

Both quantitative and qualitative methods were used in this baseline analysis. The quantitative techniques relied on "objective" closed-ended questions that allow for statistical analyses. However, *qualitative* techniques can be equally useful.[15] *Qualitative* methods stress in-depth, open-ended interviews, direct observation, and written documents, including open-ended questions and program records. There is wide agreement on the value of using *both* qualitative and quantitative data in the evaluation of many kinds of programs.

[14] This is not an estimate of market share, since these data were not weighted by actual shipment data or sales volume. Rather, this tells us about the absolute number of qualifying brands that could potentially be available to California consumers.

[15] Patton, Michael Quinn. *Qualitative Evaluation Methods*. Beverly Hills, CA: Sage Publications, 1980.

Because the integration of quantitative and qualitative data can be challenging, regular meetings were held to discuss the integration of the quantitative and qualitative data. Such integration often involved exercising judgment in deciding how much weight to give the quantitative and qualitative data and how to integrate the two in a manner that is internally consistent. This included identifying coherent and important examples, themes, and patterns in the data. The analysts looked for quotations or observations that went together and were relevant to the customer's decision to purchase the energy efficient equipment. This process has been called "convergence," i.e., the extent to which the data hold together or dovetail in a meaningful way.[16]

Sometimes, *all* the data clearly pointed in the same direction while, in others, the *preponderance* of data pointed in the same direction. Other cases were more ambiguous. In many cases, in order to maximize reliability, more than one person was involved in analyzing the data. Each person examined the data separately and the group then compared and discussed the results. Important insights usually emerged from the ways in which two different analysts looked at the same set of data. Ultimately, differences were resolved and a case was made for a particular point of view or conclusion.

The state-wide baseline was constructed using market indicators based on the primary data collected from customers and retailers. The analysis used descriptive statistics including simple frequencies, means, and crosstabs. We also relied on the secondary sources listed in Appendix H.

4.4.2 Phase II Approach

In Phase II, we plan to conduct the first near-term market effects study, principally using data collected from retailers via mystery shopping. The emphasis will be on the sales staff in these retail stores because we consider changes among these actors to be leading indicators of any overall change in the appliance and lighting retail markets attributable to the Program. This approach is prudent, we believe, since, by the time the time the Phase II data are collected, the Program will have been implemented for only a very short time period, not likely more than six months. As a result, the impact of the Program on *end users*, *retail store stocking and advertising practices*, and *manufacturers* is likely to be small at best. The subsequent market effects studies (Phases III and IV) will add data collected directly from consumers, retail store managers, and manufacturers reflecting the fact that the Program will be more developed and mature, thus increasing the likelihood that there will be measurable market effects.

Given that we will have both Phase I (baseline) and Phase II data for retail stores via mystery shopping, we will be able to measure any changes over time. However, we will have no comparison data for the in-state, in-store mystery shops. Qualitative data will also be analyzed and integrated with the quantitative data in order to construct an internally consistent story regarding any market effects. In Phase II, we will also identify an *in-state* comparison group for

[16] Guba, Egon G. And Yvonna S. Lincoln. "The Countenances of Fourth Generation Evaluation: Description, Judgement, and Negotiation." In *Evaluation Studies Review Annual* (vol. 11), eds. D. Cordray and M. Lipsey, pp. 70-88. Newbury Part, CA: Sage Publications.

retailers who were not targeted by the Implementation Contractor or who chose not to participate in the Program. This provides us with a unique opportunity to assess the effectiveness of sales staff training and the extent to which retailers change their promotion and business strategies as a result of being exposed to the Program. Changes in the behavior of the participating retailers is a leading indicator that the expected sequence of events, as predicted by the program theory, is actually occurring.

4.4.3 Phase III and Phase IV Approach

This section describes our recommended approaches to analyzing the data expected to be available at the conclusion of Phase III and Phase IV. The approaches cover techniques suitable for pre-post data, cross-sectional data, and time-series-cross-sectional data. When comparison groups are involved, we will also attempt to control for self-selection bias. We will also describe the use of the Residential Market Share Tracking System and ways to model the future impacts of the Program through the use of diffusion models.

Pre-Post

The analysis of the mystery shopping data will involve a simple pre-post analysis. This design is adequate to detect any near-term impacts on retail sales staff resulting from Program's focus on both formal and informal training.

Cross-sectional

When one forms a comparison area (either in-state or out-of-state), there are two basic choices. One can try to match the comparison area to the treatment area (California) on two or three key variables as a way of controlling for differences between the two areas. This approach requires that one knows *a priori* what the two or three key variables are that are related to the outcome variables, and therefore must be controlled. The analysis is relatively straightforward and involves mostly t-tests for proportions and means. The other choice is to select comparison subjects from a wide range of geographic areas, collect all the information that might conceivably be related to the program outcomes, and control statistically for differences on these variables. The sampling designs discussed above for retailers and customers makes it clear that we have opted for the latter. We have reviewed studies that have used the former and have been disappointed in their ability to control for key variables through matching.

The cross-sectional analysis will focus on comparisons of 1) participating and non-participating retailers inside California, 2) comparison of close versus remote locations inside California, 3) comparisons of in-state customers and out-of-state customers, and 4) comparisons of in-state retailers and out-of-state retailers.

In our cross-sectional analysis, we will use both self-reports and multivariate techniques that attempt to control for any differences between groups.

Self Reports:

In some cases, the only available data were the responses of market actors with no points of comparison. For example, manufacturers will be asked the extent to which they have invested in re-tooling for the production of energy efficient equipment and whether customer demand will match the new levels of output. Because their responses cannot be compared to those of any comparison group, there are no firm conclusions regarding the role of the Program in causing these changes. However, these data can be placed in the context of all other data from customers and retailers to see if they are consistent and can contribute to an internally consistent and coherent story.

Multivariate Techniques:

Regression: Selection bias is a potential problem since the in-state and out-of-state groups will differ on a number of key, *observed* variables. Some of the key customer variables are annual income, educational attainment, and tenure (own versus rent). Such differences may be related to such market effects as changes in attitude, knowledge, and awareness with respect to efficient lighting and appliance equipment. To control statistically for these observed differences, a regression model can be estimated with the various market indicators as the dependent variables and exposure to the program as the main independent variable, along with a number of covariates such as are annual income, educational attainment, and tenure. However, there are *unobserved* differences that may still affect any observed market effects. To control for any unobserved differences, an inverse Mills ratio will be entered into the regression model. First, a logit model will be estimated that predicts whether one lives in-state versus out-of-state. This model takes the following form:

$$P_{P_i} = \frac{e^{\beta Z_i}}{1 + e^{\beta Z_i}} \qquad (1)$$

where

P_{p_i} = the probability of living in-state for the i^{th} customer
Z_i = the vector of explanatory variables corresponding to the i^{th} customer
β = the vector of estimated coefficients that maximizes P_{Pi}.

The variables included in vector Z are demographic characteristics and regional characteristics such an price of electricity and cost of living. Next, an inverse Mills ratio will be calculated using the estimated probability. For in-state customers, it will be calculated as:

$$\text{Mills} = -\left[\frac{(1-P)\times\ln(1-P)}{P} + \ln P\right] \qquad (2)$$

For nonparticipants, it will be calculated as:

$$\text{Mills} = \frac{(P)\times\ln(P)}{1-P} + \ln(1-P) \qquad (3)$$

where

P= the probability of living in-state

Then the regression model was estimated, integrating the inverse Mills ratio. Thus, the general form of the regression model will be:

$$Y_i = \alpha + \beta_1 \text{Mills}_i + \beta_2 \text{Part}_i + \sum \beta_k X_{k,i} + \varepsilon_i \qquad (4)$$

where

Y_i = the dependent variable of interest, i.e., performance uncertainty

$Mills_I$ = the Mills ratio associated with the i^{th} customer

$Part_I$ = the binary variable indicating whether one was in the Program catchment area or not

X_k = the vector of explanatory variables corresponding to the i^{th} customer that affect the dependent variable of interest

β_1 = a coefficient that reflects the change in the dependent variable associated with a one unit change in the Mills ratio

β_2 = a coefficient that reflects the change in the dependent variable associated with being a participant or not

β_k = a vector of coefficients that reflect the changes in the dependent variable associated with one unit changes in the explanatory variables

Structural Equation Modeling : Structural equation modeling (SEM) Bollen, 1989; Byrne, 1994) will also be explored as a possible analytical tool. SEM allows the analyst to estimate the impacts of multiple endogenous, exogenous and mediating variables simultaneously. Barriers can be conceived as mediating variables between exposure to information provided by the Program and consumer attitudes and behavior.

The advantage of the SEM approach over the regression approach described above is that the relative importance of the various barriers can be assessed, taking into account all of the other barriers simultaneously. Direct and indirect paths can be estimated. Confirmatory factor analyses can be performed to determine that we have identified the best indicators of the most important latent constructs, allowing barriers to be correlated as they surely are in reality. Measurement error can be assessed and removed from estimation of the structural model (i.e., the paths between latent constructs).

The sample sizes for the Phase I and Phases III and IV for customers are sufficiently large to allow for the SEM approach. While we will attempt to apply SEM to the store manager surveys, the sample sizes (100 in-state and 100 out-of-state) may be too small.

Hierarchical Linear Modeling: In analysis of covariance (ANCOVA) models, the assumption is that the slopes for all variables within groups are equal. This, however, often turns out not to be the case. An alternative to ANCOVA is hierarchical linear or multi-level modeling (HLM)[17] Consider the in-state and out-of state customer data. The first level model would regress the market indicators on a set of demographic characteristics available for each customer. The first level regression coefficients are then treated as random variables which are regressed on group variables defined using in-state and out-of-state membership. Such a model allows for the slopes to vary by groups.

Cross-Sectional-Time-Series

It is important to note again that observations in Phases I, III, and IV will not involve the same customers, and is thus not a longitudinal study. This is the case since the we are interested in interviewing customers who have recently purchased one of the eight technologies. Using standard cross-sectional time series techniques cannot control for the differences between the in-state and the out-of-state groups since we will not have repeated measurements of the same customers over time. One could simply treat the data as cross-sectional with dependent variables being market effect indicators and the independent variables being dummy variables representing in-state versus out-of-state, different times (Phases I, III, and IV) at which data were collected, and the interaction of these two variables. One could also include demographic variables as other covariates.

Such an approach is feasible but may be inferior to other alternatives such as hierarchical linear or multi-level modeling.[18] As described above, the first level model would regress the market indicators on a set of demographic characteristics available for each customer. The first level regression coefficients are then treated as random variables which are regressed on group variables defined using combinations of in-state and out-of-state membership *and* the time period during which the data were collected (Phases I, III, or IV).

Use of the Market Share Tracking System

Ultimately, we are interested in determining the effect of the Program on actual purchases made by all customers. What are the current market shares of the efficient version of these technologies and how do they change over time? By collecting nameplate information over the telephone from customers, we obtained data on efficiency on appliances. This was done in order to validate the predictive power of key leading and intermediate indicators. In addition, nameplate information was collected by mystery shoppers who actually visited the retail appliance stores.

However, there is no need to expend precious project resources to track market shares for a larger sample of *all* technologies. We plan to obtain these data from the Residential Market Share Tracking System, which is tracking all of the technologies promoted by the Program. This

[17] Kreft, Ita, and Jan De Leeuw. Introducing Multilevel Modeling. Thousand Oaks, CA: Sage Publications, 1998.

[18] Kreft, Ita, and Jan De Leeuw. Introducing Multilevel Modeling. Thousand Oaks, CA: Sage Publications, 1998.

tracking system may include a comparison area(s) that could be used to support claims of market effects. This information is expected to be available in late February/March and will be integrated into the final report at the completion of Phase II.

Diffusion Models

This section summarizes the diffusion-of-innovation techniques that could be used to project market potential and to hypothesize future market effects. In the early 1990s, various California utilities made significant investments in software and data collection to estimate the technical, economic, and market potential of a large array of DSM technologies and their associated savings. The forecast errors could not be statistically estimated given the nature of the software. Rather, various scenarios were run under various assumptions regarding such variables as required paybacks and electricity prices. The primary value, in our opinion, of these efforts is that they served as heuristic devices that at least bounded the future possibilities. Perhaps more importantly, they provided program planners and policy makers with a complex yet intelligible economic model of a system of incentives designed to increase the adoption of DSM technologies. By the mid-1990s, these efforts ceased as market transformation programs began to supplant these traditional rebate programs. Market transformation programs rely less on incentives paid to individual customers and more on affecting the behavior of market actors working up stream from the customer.

Having said this, we believe that forecasts of market potential can still be useful in the same ways as the earlier forecasts. However, we believe the same benefits can be achieved with far less resources. Below we describe such an approach that uses analogical diffusion models.

Forward-Looking Assessment of Market Potential

First, it is recognized that there are essentially three types of potential: 1) technical potential, 2) economic potential, and 3) market potential. Technical potential is defined as all customers who are eligible to purchase a given piece of equipment. The economic potential is defined as that portion of the technical potential that is cost effective. For example, a rule of thumb is that equipment that has a simple payback of two years or less is cost effective from the customer's perspective. Market potential is defined as that portion of the economic potential that is realistically achievable. That is, not everybody is perfectly rational and people do not always possess perfect information due to imperfections (market barriers) in the market. The point of market transformation programs is to reduce the gap between economic and market potential. For example, for refrigerators one could assume that economic potential is 85% of technical potential and market potential is 85% of economic potential.[19] These assumptions would lead to an economic potential equal to 72% overall.

In order to estimate market potential, it is necessary to estimate the total number of California households at some future time and the number of, for example, refrigerators, expected to exist in California at that future time. From these two pieces of information, one can derive the total

[19] Technical and market potential percentages are partially based on assumptions used in the Compass program as implemented by the Southern California Edison Company in 1990 and the evaluation team's interviews with Key Market Actors.

number of refrigerators expected to exist in California in, for example, 2010. This number represents the technical potential. Of this, 85% was assumed to be the economic potential (i.e., cost effective). The question is: What percentage of the refrigerator market potential will be realized by 2010?

Hypothesized Future Market Effects

Once the market potential is estimated, a number of diffusion scenarios could be estimated that describe the penetration of the eight technologies. In the Bass diffusion models (Rogers, 1995), potential buyers are divided into two major classes: innovators and imitators. Innovators (Ino) are viewed as the first buyers to enter a market during a given period of time. Their purchases are assumed to be motivated by commercial or external sources of communication over the planning period. Imitators (Imi) are assumed to purchase on the basis of interpersonal influence processes within a market. The diffusion model is formulated as:

$$Adp_t = Ino\ (Pot - Cum_t) + Imi\ (Cum_t/Pot)(Pot - Cum_t) \qquad (5)$$

where

Adp_t = The number of adopters at time *t*
Ino = Coefficient of innovation
Imi = Coefficient of imitation
Pot = Market potential
Cum_t = Cumulative number of adopters by time *t*

Typically, the Ino and Imi parameters are estimated with a multiple regression analysis from a product's historical sales data and then used to predict the penetration of market potential.[20] However, this approach does not work in a situation where there is little or no historical data. Consequently, an analogical diffusion model could be explored.

Analogical diffusion models follow the structure of Equation 5. The literature could be reviewed to identify estimates of the two parameters (Ino and Imi) that were estimated from the historical data of existing product analogies, market studies, and published data. Sultan et al. (1990) conducted a meta-analysis of 213 studies incorporating various technologies that estimated the Ino and Imi parameters. They found that the Ino parameter averaged 0.03 and the Imi parameter averaged 0.38. These findings suggest that the diffusion process is more affected by such factors as word of mouth than by an innate consumer tendency to be innovative. In another study, Mahajan et al. (1990) examined a wide range of consumer durables and found that for residential refrigerators the ratio of Imi to Ino was 85.7 and for air conditioners it was 40.6 (both of which have labeling systems), underscoring the main point of Sultan (1990). Again, the value of any diffusion curve is as a heuristic device for understanding the complex web of assumptions that underlie any market. Such heuristic devices can be very useful for strategic program planning.

[20] The Pot parameter was estimated earlier in Hypothesized Future Market Effects

Before concluding, it is essential to underscore the obvious; for any particular technology, there is a fair amount of uncertainty regarding these parameters and their diffusion. For example, the size of the advertising budget for the energy efficient refrigerators, future funding from the State for DSM programs, the price of electricity, or the health of the economy cannot be predicted. One source of uncertainty has always been the current saturation of efficient residential technologies. However, this should change as the results of the next state-wide residential saturation become available.

5 RESULTS

In this Section, we present the results from our primary research organized by market indicators within separate appliance and lighting sections. For each indicator we begin with a list of survey questions used to inform our analysis. Results from multiple survey sources are included within most indicators. We then present the relevant results from each individual survey source and then end with a subsection that ties our findings together into an integrated conclusion for each indicator. Finally, we provide several methodological recommendations for Phases III and IV of this Study.

5.1 BASELINE APPLIANCE INDICATOR RESULTS

5.1.1 Customer Purchase of Efficient Appliances and Customer Knowledge of Efficient Appliances

Information on purchase and knowledge of efficient appliances is drawn from several questions included in the customer survey effort. The questions that bear on this indicator are:

- Whether the customer thinks he or she purchased an efficient appliance
- Whether customers actually purchased efficient appliances
- How he or she knew it was more efficient than comparable units
- Customers' estimates of the incremental costs of efficient appliances
- Customers' estimates of the annual cost savings of efficient appliances

Customer Results

One question is whether customers know enough about standard versus high efficiency appliances to accurately report whether they purchased a high efficiency unit.[1] For this analysis, we used the following definitions high efficiency appliances:

- High efficiency for refrigerators was set at the program minimum of 20% above standards.
- For the other appliances, high efficiency units were identified by the model numbers listed in ACEEE's guide, *The Most Energy Efficient Appliances 1999*.

Note: Appliances without model numbers or model numbers for which the efficiency could not be determined were excluded from the analysis.

[1] Documentation to verify the efficiency of purchased lighting products was not collected.

Of the 856 in-state respondents, 52% (445) claimed to have purchased a high efficiency unit. Of the 856 customers, 214 were able to provide the necessary documentation that enabled us to verify whether they purchased standard or efficient units. Table 5-1 shows that very few *claimed* purchases of high efficiency appliances were actually *verified* using the above criteria.

Table 5-1
Verified In-State Purchases of High Efficiency Appliances

Appliance	Frequency
Clothes Washer	3
Dish Washer	0
Refrigerator	12
Water Heater	1
Room AC	1
Total	17

Table 5-2 shows that customers purchased high efficiency appliances in approximately the same proportions, independent of whether they said that they purchased high efficiency appliance. Clearly, customers do not know the efficiency of the appliances they purchased. These results are reasonably consistent with the results presented in an earlier study.[2]

Table 5-2
Percent of In-State Customers Correctly Claiming to Have Purchased a High Efficiency Appliance

Said they Bought EE Appliance	Actually Bought High Efficiency Appliance	*Total Responses*
Yes	9%	109
No	7%	64
DK	5%	41

Customers who thought they purchased high-efficiency were also asked how they knew the unit they purchased was high-efficiency. The most common means by which self-reported purchasers claimed to determine that the unit purchased was high efficiency were point-of-purchase materials (32%), ENERGY STAR® label (19%), and sales person (17%). (We have reason to believe that the 19% figure for ENERGY STAR® is an over-report. This is because a number of respondents for whom model numbers were used to assess the actual efficiency level were found to report that their unit had the ENERGY STAR® label but the unit was not actually ENERGY STAR® -qualifying.) The DOE Energy Guide label was cited by only 8%. Unfortunately, the

[2] McElroy, Kathleen and Kent Van Liere. "CBEE baseline Study on Public Awareness and Attitudes Toward Energy Efficiency." Submitted to the California Board for Energy Efficiency and the Pacific Gas and Electric Company, 1999.

information in Table 5-3 is of limited use given that most customers who think they purchased high-efficiency units did not, in fact, do so.

Table 5-3
Means by Which Self-Reported High-Efficiency Purchasers Determined Unit Was High Efficiency, In-State (multiples accepted)

Response	Refrig-erator	Dish-washer	Clothes Washer	Room AC	Gas Water Heater	All
Point of purchase materials	28%	36%	25%	48%	38%	32%
Friends or family	4%	0	8%	3%	7%	3%
Mass media advertising	4%	8%	10%	12%	1%	7%
Sales person	15%	18%	22%	16%	19%	17%
Consumer reports	5%	13%	7%	13%	11%	9%
Department of Energy Guide Label	9%	10%	10%	8%	1%	8%
ENERGY STAR® label	20%	21%	16%	8%	32%	19%
Other	20%	15%	31%	18%	16%	20%
Don't know	15%	6%	5%	1%	2%	6%
# Respondents	140	98	114	36	57	445

For those customers who stated that they did not purchase a high-efficiency unit, we asked then if there were a range of efficiency levels available on the market. Responses are shown in Table 5-4. Over two-thirds of those who reported they did not purchase high-efficiency units stated that they were aware that a range of efficiencies exist. In Table 5-5, we present the means by which those who report they didn't purchase high-efficiency, but were aware of high-efficiency, found out about high-efficiency. The results are similar to the responses of those who stated they did purchase high-efficiency units except that a much larger percentage cited mass media advertising and friends and family. Conversely, fewer cited ENERGY STAR® or DOE labels. Given both self-reported purchases and non-purchasers appear to miss-report their true purchases, little credence should be given to the differences in the two sets of results.

Table 5-4
Awareness That Range of Efficiencies Available Among Those That Report They Did Not Purchase An Energy-Efficient Unit

Aware of Differences in Efficiency Among Units?	In-State	Out-of-State
Yes	67%	69%
No	27%	27%
Refused	3%	2%
Don't Know	3%	1%
Number of Observations.	433	135

Table 5-5
Means By Which Those Who Report They Didn't Purchase High-Efficiency, But Were Aware of High-Efficiency, Found Out About High-Efficiency

Response	All California	Out of State
In-store point of purchase materials	22%	28%
Friends or family	12%	10%
Mass media advertising	25%	27%
Sales person	13%	8%
Consumer reports	10%	7%
Department of Energy label	3%	4%
ENERGY STAR® label	11%	10%
Previous experience	8%	8%
Bill stuffer	11%	1%
Other	2%	0%
Refused	1%	0%
Don't know	9%	8%
# Respondents	*275*	*89*

Customer knowledge regarding appliances was also investigated on two key points: 1) expected incremental costs associated with the energy efficient version of the equipment, and 2) expected annual savings associated with the energy efficient version of the equipment. These results are presented by appliance in Tables 5-6 and 5-8. For some appliances, the cost figures can be compared to incremental cost estimates from the 1996 Measure Cost Study (MCS), the last year for which detailed, model-based measure costs are available. Cost estimates from the 1996 MCS are shown in Table 5-7. To benchmark customers' estimates of annual energy savings, we developed our own savings estimates as shown in Table 5-9.

By comparing the two tables, we can see that customers tend to overestimate, by a factor of two or three, the incremental costs of refrigerators and room air conditioners and underestimate, by a factor of 3, the costs of resource-efficient clothes washers (note that no 1996 MCS estimates are available for dishwashers). On the savings side, comparison between the customer and XENERGY estimates indicates (if our estimates are reasonably accurate) that customers overestimate refrigerators six-fold, clothes washers three to six-fold, room air conditioners ten-fold, and gas water heaters four-fold.

Table 5-6
Customers' Estimate of Incremental Cost for High-Efficiency Units, All California

Parameter	Refrigerator	Clothes Washer	Dish Washer	Room Air Conditioner	Water Heater
Mean	153	129	114	106	83
Standard Dev.	142	122	141	100	77
Max	800	700	700	400	600
Min	0	0	0	0	0
# Respondents	149	178	128	41	50

Table 5-7
Estimates of Incremental Cost for High-Efficiency Units, 1996 Measure Cost Study

Parameter	Refrigerator	Clothes Washer	Dish Washer*	Room Air Conditioner	Water Heater
Incremental Cost	$60	$300 - $600	$150 - $200	$35	$92
Efficiency Definition	>20% above Standard	Horizontal Axis Unit	ENERGY STAR® qualifying (avg. >25% above Std.)	1 EER above Standard (10 versus 9)	10 to 20% above Standard
Size	20 cubic feet	Standard Capacity	Standard Capacity	1 ton unit	40 gallon unit

*XENERGY estimate based on analysis of cost data on manufacturers' websites.

Table 5-8
Customers' Estimate of Annual Energy Cost Savings for High-Efficiency Units, All California

Parameter	Refrigerator	Clothes Washer	Dish Washer	Air Conditioner	Water Heater
Mean	103	104	59	118	127
Standard Dev.	99	136	77	148	163
Max	600	800	800	900	800
Min	0	0	0	5	0
# Respondents	170	166	122	43	61

Table 5-9
XENERGY Estimates of Annual Energy Cost Savings for High-Efficiency Units

Parameter	Refrigerator	Clothes Washer**	Dish Washer***	Room Air Conditioner	Water Heater
Base Unit Consumption	827 kWh*	--	700	1,000 kWh	365 therms
High Efficiency Consumption	662 kWh*	--	543	889 kWh	310 therms
Annual Cost Savings (@10 cents/kWh and 60 cents/therm)	$17	$15 to $30 (non-all electric dryer and DHW)	$15	$11	$33
Efficiency Definition	>20% above Standard	Horizontal Axis Unit	ENERGY STAR® qualifying (avg. >25% above Std.)	1 EER above Standard (10 versus 9)	10 to 20% above Standard
Size	20 cubic feet	Standard Capacity	Standard Capacity	1 ton unit	40 gallon unit

*Residential Appliance Efficiency Incentives Program High Efficiency 19994 First Year Statewide Load Impact Study, prepared by XENERGY Inc. for Southern California Edison and San Diego Gas & Electric Company, February 1996.

**Savings based on Consortium for Energy Efficiency (CEE) High-Efficiency Clothes Washer Initiative program information.

***XENERGY estimate based on ENERGY STAR® website. Assumes highest savings case, i.e., electric water heat.

In Table 5-10, we summarize these differences by comparing XENERGY- versus customer-estimated paybacks for each appliance. Whereas customer-estimated paybacks are around one year, our estimates range from 3 years to well over ten years (for resource-efficient clothes washers). The results indicate that while customers are reasonably close when it come to costs, they overestimate significantly when it comes to annual savings.

Table 5-10
Comparison of Estimated Paybacks

Source	Refrigerator	Clothes Washer**	Dish Washer	Room Air Conditioner	Water Heater
XENERGY Estimate	3.5	>10	n/a	3	3
Implied Customer Estimate	1.5	1.2	1.9	0.9	0.7

Conclusion

Customers are extremely unknowledgeable about the relative efficiency of the unit that they purchased and ***customer self-reports are extremely unreliable as indicators of appliance efficiency purchase levels*** (both of which were found to be true in previous studies as well). ***Customers are also very unknowledgeable about the costs and savings of high-efficiency units in ways that actually result in overly optimistic payback estimates***.

The good news from these results is that there is considerable room for improvement in customer knowledge levels about whether they are purchasing a high-efficiency unit from interventions targeted at sales staff and by increasing the penetration and awareness of ENERGY STAR®-qualifying appliances. Increasing customer knowledge of payback periods, however, may be counter productive.

5.1.2 Customer Use or Understanding of Payback and Lifecycle Costs

Information for this indicator can be drawn from several questions included in the customer survey effort. The questions that bear on this indicator are:

- Unaided mention of most important considerations in appliance purchase decision
- Aided scoring of importance of appliance attributes
- Reasons mentioned for purchasing an energy-efficient appliance
- Main reasons for not purchasing an energy-efficient appliance

As shown in Table 5-11, in their unaided responses, features/appearance (48%), and price (22%) were the most important considerations mentioned both in and out-of-state in purchasing an appliance. Nineteen percent in-state and 17% out-of-state mentioned energy efficiency. Quality was mentioned by a similar percentage of respondents, while brand was mentioned by only 6% in-state and 10% out-of-state. We believe that the unaided level at which energy-efficiency is mentioned is perhaps the most important of all the baseline indicators for customer purchase behavior and intent. This is because experience shows that as customers are asked more and more specific questions on energy-efficiency they begin to provide overestimates of the importance of this attribute because of its perceived social desirability. ***For this reason, it is imperative that an identically phrased question on most important appliance purchase considerations be asked as the first question in any future longitudinal surveys that follow up on this baseline study***.

Table 5-11
Unaided Mentions of the Most Important Purchase Considerations for Appliances

Response	All California	Out of State
Brand	6%	10%
Features and appearance	48%	47%
Purchase price	22%	25%
Energy efficiency	19%	17%
Annual operating cost for electricity	2%	1%
Quality	19%	13%
Other	9%	4%
Refused	1%	0%
Don't know	5%	6%
# Respondents	*872*	*289*

Not surprisingly, on an appliance specific basis, energy-efficiency was cited by higher percentages of water heater, room AC, and refrigerator respondents, than dishwasher and clothes washer purchasers, as shown in Table 5-12. The same pattern was found in the out-of-state responses.

Table 5-12
Unaided Mentions of Energy-Efficiency by Appliance (In-State)

Appliance	Unaided Mention of Energy-Efficiency	Sample Size
Gas Water Heater	27%	104
Room AC	21%	66
Refrigerator	20%	254
Clothes Washer	15%	262
Dishwasher	14%	186

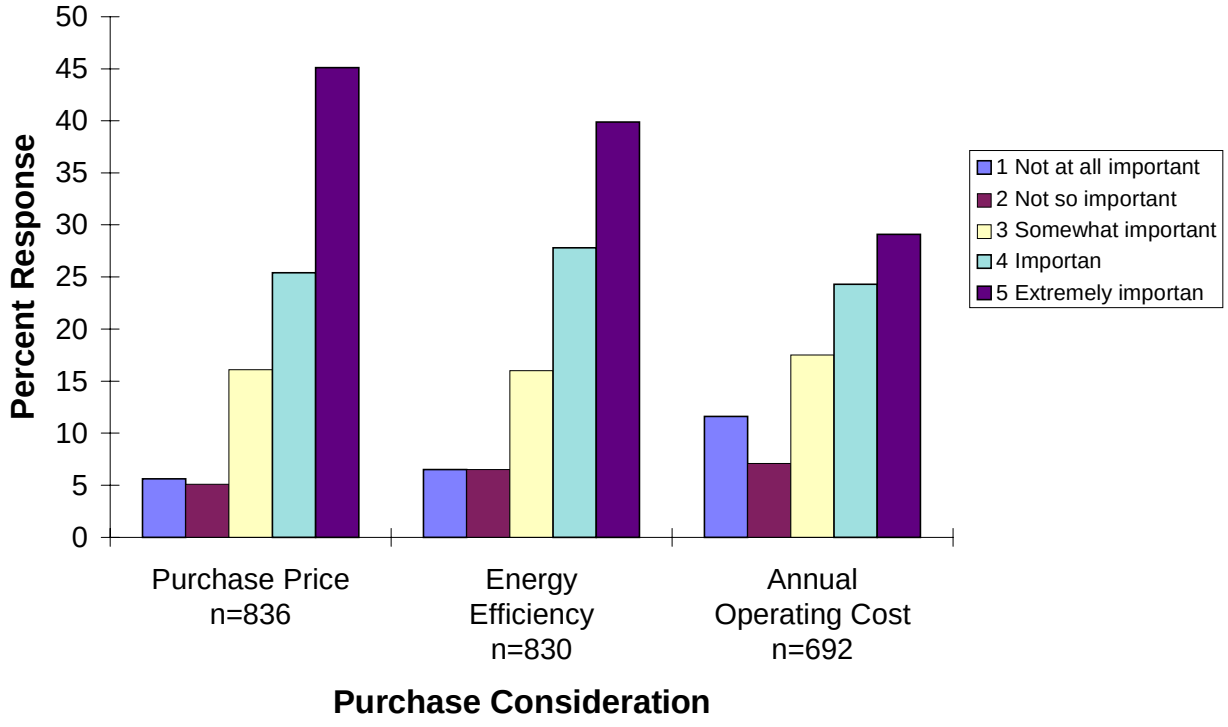
Customers were also asked to rate, on an aided response basis, the importance of various attributes that they take into account when purchasing an appliance. These results for five aided attributes are shown in Table 5-13. As can be seen from these data, when asked to rate the importance of the different attributes on an aided basis, it becomes more difficult to differentiate relative importance than was true with the unaided approach. For the aided scoring, features and appearance and purchase price are still the highest scores, generally, but the scores for energy-efficiency and operating costs are much higher than would be expected from the unaided responses.

Table 5-13
Mean Importance of Appliance Attributes (Based on 1 to 10 scale, where 1 is "not at all important" and 10 is "extremely important")

Attribute	Region	Room AC	Clothes Washer	Dish Washer	Refrigerator	Water Heater
Brand	In-State	4.6	6.7	6.1	6.1	4.6
	Out-of-State	*5.5*	*6.7*	*6.8*	*6.2*	*4.6*
Features and	In-State	6.2	6.9	7.3	7.6	4.6
appearance	*Out-of-State*	*5.8*	*6.4*	*7.2*	*8.1*	*3.2*
Purchase price	In-State	8.5	7.4	6.9	8.0	7.3
	Out-of-State	*7.9*	*7.6*	*7.9*	*7.9*	*7.5*
Energy efficiency	In-State	8.4	6.7	6.6	7.4	8.2
	Out-of-State	*8.6*	*6.4*	*7.0*	*7.2*	*7.7*
Annual operating	In-State	7.4	6.5	5.8	6.6	7.3
for electricity	*Out-of-State*	*7.0*	*6.3*	*5.9*	*6.6*	*7.5*
Sample Size	In-State	66	245	184	241	97
	Out-of-State	*39*	*77*	*62*	*78*	*26*

This distribution of responses on aided rating of appliance attributes is shown for three of the attributes across appliances (in-state) in Figure 5-1. As shown in the figure, 45% said price was extremely important, while 40% indicated that energy efficiency was extremely important. This dramatic increase from the unaided to the aided responses may be due to the fact that having positive attitudes toward energy efficiency is socially desirable. This figure shows that very few respondents are willing to state that energy efficiency is unimportant when prompted, despite the fact that only 19% mentioned efficiency as an important attribute on an unaided basis (conversely, 40% said energy efficiency was extremely important on an aided basis, while 81% failed to mention it all on an unaided basis). The differences between the aided an unaided responses for operating costs are even more dramatic.

Figure 5-1
Importance of Price, Energy Efficiency, and Annual Operating Costs (In-State)



Another indication of the extent to which customers considered and used payback or lifecycle costs in their appliance choices comes from customers' stated reasons for purchasing efficient appliance. Those customers who stated they purchased an efficient appliance[3] (see Table 5-1 above) were asked, on an open-ended basis, why they purchased an energy-efficient unit. Responses are shown in Table 5-14. For the 52% of in-state respondents who believe they did purchase a high-efficiency unit, 64% said the reason they did so was either that the energy or cost savings were worth the extra first cost. Since roughly half of the in-state respondents believe they purchased a high-efficiency appliance, about a third of all respondents indicated that they purchased a high-efficiency unit for economic reasons. The next most important reason cited was that "it was the right thing to do," referring to the societal environmental benefits. Interestingly, 15% of in-state and 9% of out-of-state efficient purchasers stated that they wanted the unit for some other reason and it happened to be more efficient. In addition, 9% and 7% of in-state and out-of-state respondents said that they purchased a high-efficiency unit because the incremental purchase price was small.

[3] Note that, as discussed in Section 5.1.1, we believe the percentage of customers that said they bought a high-efficiency unit is over-reported.

Table 5-14
Reasons for Purchasing an Efficient Appliance (open-ended, multiples accepted)

Response	All California	Out of State
The extra cost for efficient unit was minimal	9%	7%
Higher efficiency came along with unit I wanted anyway for other reasons	15%	9%
Energy savings were worth the extra cost	39%	38%
Cost savings were worth the extra cost	25%	32%
It was the right thing to do	18%	11%
Other benefits make purchase worthwhile	2%	1%
Product works better/is higher quality	4%	10%
I like to have new, high-tech appliances	<1%	1%
Salesperson convinced me it was the best	<1%	1%
To get a rebate	0%	1%
Friends/family suggested I purchase high efficiency unit	3%	3%
Other	2%	3%
Refused	1%	0%
Don't know	4%	7%
# Respondents	*439*	*152*

Those customers who stated they did not purchase an efficient appliance[4] were asked, on an open-ended basis, *why* they did not purchase an energy-efficient unit. Responses are shown in Table 5-15. Of the 23% of in-state respondents who said they did not purchase a high-efficiency unit, 32% said the reason was that the high-efficiency units cost too much (e.g., high first cost). Importantly, only 2% said that the high-efficiency unit wouldn't save enough energy to make it worthwhile (implying they considered both operating cost savings and first cost increment in their decision).

[4] Note that as discussed under Section 5.1.1, we believe the percentage of customers that said they *did not buy* a high-efficiency unit is *under*-reported.

Table 5-15
Reasons for Not Purchasing an Efficient Appliance (open-ended, multiples accepted)

Response	All California	Out of State
Costs too much to purchase	32%	34%
Won't save enough energy to make purchase worthwhile	2%	4%
Can't find the type/style/size I want	18%	8%
Can't find the brand I want	3%	2%
Don't like to try new high-tech appliances	<1%	0%
Moving/selling my home	<1%	2%
Don't know enough about product	3%	4%
Would have to compare costs/brands	2%	0%
Other priorities more important	16%	13%
Standard product is better	2%	0%
Uncertain that savings will occur	0%	2%
Didn't have enough information	2%	2%
Did not think about energy efficiency	9%	8%
Other	1%	6%
Refused	3%	0%
Don't know	12%	23%
# Respondents	*158*	*53*

Conclusions

The information presented above indicates that operating costs are rarely considered one of the most important factors in appliance purchase decisions. At the same time, a large percentage (over 60%) of those who *think they purchased high-efficiency units*, claim that the did so because the energy or cost savings justified the decision (about a third of *all purchasers*). Similarly, on an unaided basis, energy-efficiency is mentioned by less than 20% of appliance purchases as one of the most important factors in their choice. On an aided basis, however, energy efficiency is stated to be an important factor by the majority of purchasers. We believe the unaided figures are more reliable indicators of the importance of energy-efficiency in customers' decision making calculus. The aided responses continue the trend, shown in previous related studies, that customers believe energy-efficiency should be a consideration because of its environmental value to society. The likely over-reporting that accompanies measurement of the importance of energy efficiency on an aided basis limits the usefulness of these questions as baseline indicators. However, this same phenomenon may point to a programmatic opportunity to reinforce consumers' desire to benefit the environment as a justification for energy-efficiency purchases

independent of economic merit (which may be rational given the small absolute value of the annual dollar savings associated with some high-efficiency appliances).[5]

5.1.3 Knowledge, Awareness and Behavior of Sales Staff with Respect to Efficient Appliances - Customers' In-Store Experience

The in-store experience refers to how the customer experiences the in-store advertising, the floor stock, and the sale staff. Data were available from the customer surveys, mystery shops, and retail store managers. From the customer survey, we drew on questions that addressed:

- Whether the customer talked with the sales person
- Whether the customer asked the sales person about energy efficiency
- Whether the sales person mentioned energy efficiency to the customer
- The extent to which the sales person emphasized energy efficiency
- What the sales person said about energy efficiency
- How confident the customer was regarding the energy efficiency information provided by the sales person

From the retail store manager survey, we drew on questions that addressed:

- The training of sales staff in general
- The training of sales staff with respect to energy efficiency
- Reasons for not training sales staff in energy efficiency
- Who provides training on energy efficiency
- How often training on energy efficiency takes place
- How effective the training is with respect to the knowledge and motivation of the sale staff sales
- If training was received from the Program, what was the quality of the training
- Whether the store has specific overall goals for energy efficient appliances
- Whether the sales staff have specific goals for energy efficient appliances

[5] This is because the incremental costs for appliances besides resource-efficient clothes washers are relatively modest and, perhaps most importantly, are difficult for consumers to observe in practice. For example, the 1996 Measure Cost Study (prepared by XENERGY for CADMAC) showed that a complex multivariable, hedonic price model is needed to accurately tease out the incremental costs of high-efficiency refrigerators (factors that must be controlled for include size of the unit, through-the-door ice, humidity control, tempered glass, whether the unit is side-by-side, and whether the color is white or non-white).

- The extent to which the sales staff routinely recommends energy efficient appliances to customers
- Any reasons for not routinely recommending energy efficient appliances to customers

From the mystery shopper survey, we drew on questions that addressed:

- The number of appliances shown to a mystery shopper and whether they were described by the sales person as being energy efficient and whether they were ENERGY STAR® qualifying
- How knowledgeable the sales person was regarding energy efficiency, the ENERGY STAR® Program, utility rebate programs, manufacturer rebate programs, and store rebate programs
- The extent to which the sales person mentioned energy efficiency in their sales pitch
- If the sales person discussed energy efficiency, what did he or she say

Customers

Of all the consumer purchase events captured in the customer survey, in 72% of cases, customers reported that they talked with a sales person. Of these, in 47% of cases they report that they asked the sales person about energy efficiency. Of those who did not ask, 48% of the customers encountered a sales person who mentioned energy efficiency. Put another way, of the 72% who talked with a sales person, 25% encountered a sales person who voluntarily mentioned energy efficiency. Overall, of the 72% who talked to a sales person, in nearly three-fourths of the cases a discussion took place about energy efficiency initiated either by the customers or sales person. Finally, of all customers who shopped for an appliance, 52% had a discussion about energy efficiency. These results are very consistent with a prior survey that also addressed on refrigerators in which 46.3% of the customers reported that salespeople discussed energy efficiency with them.[6]

As shown in Table 5-16, of the 72% who talked with a sales person about energy efficiency, about 40% of the sales staff said it would lower their utility bills. Only 8% of in-state and 1% of out-of-state customers reported that the sales person discussed environmental benefits. In Table 5-17, we present customers' assessments of the extent to which energy efficiency was emphasized. Slightly more than 32% indicated that the sales staff emphasized energy efficiency a great deal. An additional 57% indicated that the sales staff mentioned energy efficiency some. On the other hand, as shown in Table 5-18, of those customer who discussed energy efficiency with the sales person, nearly 76% stated that they were *very confident* or *mostly confident* that the information provided by the sales person was accurate. Thus, sale people maintain strong credibility on the topic of energy efficiency with customers.

[6] Hagler Bailly Consulting, Inc. "Residential Market Effects Study: Refrigerators and Compact Fluorescent Lights." Prepared for San Diego Gas & Electric (Study ID #: 3902) and Pacific Gas & Electric n(Study ID #: 3302), 1998.

Table 5-16
What Sales Person Said About Energy Efficient Appliances

Response	All California	Out of State
Said that it would save money	38%	28%
Discussed comparative information	22%	36%
Discussed environmental benefits	8%	1%
Available rebate	2%	0%
Other	5%	2%
Refused	1%	1%
Don't know	21%	29%
# Respondents	*448*	*137*

Table 5-17
Extent To Which Sales Person Emphasized Energy Efficiency

Response	All California	Out of State
Very little	*5.9%*	*2.9%*
Some	*56.8%*	*62.8%*
A great deal	*32.5%*	*32.8%*
Refused	*1.6%*	*0%*
Don't know	*3.2%*	*1.5%*
# Respondents	*462*	*137*

Table 5-18
Confidence in the Accuracy of the Information Provided By Sales Staff

Response	All California	Out of State
1 Not at all confident	*3.6%*	*11.0%*
2 Not so confident	*2.2%*	*5.9%*
3 Some what confident	*17.5%*	*17.3%*
4 Mostly confident	*36.5%*	*30.8%*
5 Very confident	*39.4%*	*35.0%*
Don't know	*0.7%*	*0%*
# Respondents	*463*	*137*

Retailers

Information on appliance retailers was obtained from two sources: the mystery shops in California, and interviews with California and non-California appliance retailers. The results relevant to the in-store experience indicators are presented below.

Mystery Shopping Survey

The mystery shop results are broken down by "sales staff interaction" and "sales staff knowledge."

Sales Staff Interactions: Recall from the Section 4 that mystery shoppers were instructed to look for two different appliances at each store they visited. When approached by a salesperson, the mystery shopper was to explain that he/she was shopping for these two appliances (e.g., a dishwasher and a refrigerator). Mystery shoppers were further instructed to look for three varieties of each of the two appliances. Inevitably, sales people would ask mystery shoppers about the types of features they desired in each of the products. Depending on which two *appliances* the mystery shopper was looking for, he/she was directed to indicate interest in:

- A white, standard-sized dishwasher.
- A white 40-gallon gas water heater.
- A white, standard-sized (not greater than 3 cubic feet) clothes washer.
- A room air conditioner between 8,000-9,000 BTUs.
- A white, 22-cubic foot refrigerator with either top or side freezer and no ice through the door (ice maker inside freezer optional).

As the salesperson began showing the three selections per product, the mystery shopper was instructed to pay particular attention to whether the salesperson mentioned specific aspects of the product, such as "energy use," "energy efficiency," "rebates," "lifecycle costs," etc. and what, exactly, the salesperson chooses to say about such attributes. The mystery shopper was also noting whether the ENERGY STAR® label was on the lighting product itself.

If "energy use" or "energy efficiency" was not mentioned for any of the three product varieties, the mystery shopper was to ask "Do all three use the same amount of electricity?" or "Are all three equally energy efficient?" In addition, if the ENERGY STAR® label was on the appliance and the salesperson did not discuss it, the mystery shopper was instructed to ask "What does the ENERGY STAR® label mean?" If, after raising the energy efficiency issue, the salesperson offers to show more products, mystery shoppers were instructed to shop for a maximum of two additional units.

As one can see in Table 5-19, each mystery shopper was initially shown approximately 2.5 units on average with about 0.60 units on average being voluntarily described by the sales person as energy efficient (i.e., 24% of the units shown). Approximately 0.40 units (or 16%) on average were ENERGY STAR®-qualifying, an outcome that may in part be due to the possibility that there is a lag in getting ENERGY STAR® labels and other promotional materials into the stores.

Table 5-19
Product Exposure

Indicator	Room Air Conditioner	Clothes Washer	Dish-washer	Water Heater	Refrig-erator
Units initially shown (average)	2.11	2.72	2.74	2.61	2.61
Energy efficient units (average)	0.39	0.72	0.44	0.51	0.77
ENERGY STAR® units (average)	0.08	0.60	0.35	0.35	0.49
Energy efficient units (average when prompted)	0.71	1.42	1.04	1.05	0.95
Percent shown additional units	0%	38%	24%	16%	29%
Energy efficient units (average of additional units shown)	na	1.50	1.42	1.67	0.95
ENERGY STAR® units (average of additional units shown)	na	1.18	0.19	0.00	0.51
Energy Efficiency Mentioned in Sales Pitch [1]	18%	18%	7%	9%	15%

[1] Results shown as percent reporting salesperson mentioned energy efficiency in his/her sales pitch "a great deal" (coded "4" on a four point scale, where "1" indicates "not at all" and "4" indicates "a great deal").

Approximately 21% of the shoppers were shown additional units (usually, two additional units). Of these, the number of units that were described as energy efficient rose to 1.1 with the average number of these additional units that were ENERGY STAR® qualifying remaining essentially the same (i.e., 0.40 as per above). These patterns are what one might expect given the series of prompts provided by the shoppers. Consistent with these results is that only slightly more than 13% of the sales persons mentioned energy efficiency a great deal in their sales pitch. Of those who mentioned energy efficiency, lower utility bills and annual operating costs were most frequently mentioned.

Sales Person Knowledge: Mystery shoppers were instructed to evaluate the extent to which salespeople were knowledgeable about energy efficiency, the ENERGY STAR® Program, and various rebate programs. Table 5-20 presents the results of this assessment.

Table 5-20
Sales Person Knowledge [1]

Knowledge Indicators	Room AC	Clothes-washer	Dish-washer	Water Heater	Refrig-erator	All
Knowledge of Energy Efficiency [1]	9%	31%	15%	10%	19%	17%
Knowledge of ENERGY STAR® Program [1]	6%	26%	9%	0%	18%	12%
Knowledge of Utility Rebate Program [1]	6%	41%	18%	8%	31%	21%
Knowledge of Manufacturer Rebate Program [2]	35%	56%	39%	32%	63%	45%
Knowledge of Retailer Rebate Program [2]	77%	14%	18%	31%	22%	32%
Salesperson Mentioned in Discussion of Energy Efficiency: [3]						
Annual operating costs	32%	50%	31%	33%	54%	40%
Payback period	8%	16%	5%	5%	14%	10%
Lifecycle costs	6%	23%	7%	8%	18%	12%
Lifecycle savings	6%	27%	12%	13%	20%	16%
Utility rebates	8%	50%	25%	16%	39%	28%
Lower utility bills	41%	56%	44%	32%	52%	45%
Equipment reliability	39%	51%	28%	56%	27%	40%

[1] Results shown as percent reporting salesperson as "very knowledgeable" (coded "4" on a four point scale, where "1" indicates "not at all knowledgeable" and "4" indicates "very knowledgeable").

[2] Percent calculated only if manufacturer/retailer rebate programs were mentioned by salesperson.

[3] Results shown as percent of all mystery shops.

Finally, about two thirds of the salespeople were asked the direct question "Do you think it is worth it to buy energy efficient appliances?" About 5% of the salespeople reported that they "did not know" or did not have an opinion as to whether it would be worth it to buy energy efficient appliances. Just over half (54%) offered a positive response, as in "Yes it would be worth it to purchase an energy efficient appliance because. . . " Some examples of positive responses include:

- "It does save a lot on your utility bills to purchase energy efficient models."
- "[Energy efficient models] are usually constructed better, last longer and provide better room comfort."
- "I realize that a $1,000 is a lot to spend on a washer but over the life of the machine, you will have more than recouped your money. This [Neptune clothes washer] is the greatest machine around."
- "It will more than pay for the difference in cost in a short time and then last longer besides."

- "Of course [it is worth it]. Especially with all the rebates being offered. This one costs more but you get $225 in rebates."

However, about 42% offered responses that were either negative or inaccurate, such as:

- "All models have about the same energy efficiency."
- "Dishwashers and refrigerators just don't cost that much to run - energy doesn't really matter so much."
- "No, they all pretty much cost the same to operate. Not much difference."
- "Only if you want a better warranty. They're all the same except for the warranty."
- "They are all about the same in the long run because you can end up spending more for the energy efficient model."
- "They are all equally efficient concerning electricity use but the higher priced models save on water consumption."

Store Manager Survey

Having presented the customer and the mystery shopper perspective on the in-store experience, in this subsection we now provide the perspective of the store manager with a focus on the degree of consistency between their responses and those received from customers and mystery shoppers.

First, 84% of the store managers indicate that their staff receives specialized product training. More to the point, 71% indicate that their sales staff receives training specifically on the benefits of energy efficient appliances with most of the training provided by manufacturers and internal staff. Table 5-21 presents the various sources of training. Interestingly, manufacturers are the most cited source of training, followed by internal training staff, and department manager or supervisor.

Table 5-21
Sources of Training

Sources	All California	Out Of State
Department manager of supervisor	16%	34%
Internal training staff	40%	41%
Utility representative	4%	<1%
ENERGY STAR® representative	1%	<1%
California Residential Light and Appliance Program	0%	N/A
Manufacturer	80%	48%
Other SPECIFY	7%	22%
# Respondents	30	47

* Numbers do not sum to 100 percent due to multiple responses

Training provided by internal staff is done mostly on a monthly basis (57%) and on an as-needed basis (22%). Training provided by manufacturers is spread out in roughly equal portions on monthly, quarterly, six-month, and annual bases. In general, there appears to be a fair amount of training.

Also, the quality of this training is judged by store managers to be quite high. Tables 5-22 through 5-24 indicate that, as a result of the training, store managers believe that sales staff are more knowledgeable, more motivated, and that sales of efficient appliances have increased as a result.

Table 5-22
How Much More Knowledgeable As A Result of Training

Response	All California	Out of State
1 No More Knowledgeable	0%	<1%
2	0%	4%
3	0%	5%
4	6%	<1%
5	8%	1%
6	8%	9%
7	22%	13%
8	25%	32%
9	18%	8%
10 Much More Knowledgeable	13%	22%
Don't Know	0%	4%
# Respondents	*30*	*47*

Table 5-23
How Much More Motivated As A Result of Training

Response	All California	Out of State
1 No More Motivated	1%	1%
2	1%	5%
3	0%	<1%
4	0%	8%
5	0%	9%
6	18%	5%
7	32%	17%
8	17%	20%
9	8%	5%
10 Much More Motivated	19%	25%
Don't Know	4%	5%
# Respondents	*30*	*47*

Table 5-24
Extent To Which Training Has Increased Sales of Efficient Appliances

Response	All California	Out of State
1 No Increase	3%	1%
3	7%	5%
4	4%	4%
5	13%	23%
6	3%	9%
7	23%	16%
8	28%	17%
9	2%	0%
10 Significant Increase	16%	16%
Don't Know	0%	9%
# Respondents	*30*	*47*

With respect to sales goals, however, only 22% indicate that they have specific overall sales goals for energy efficient appliances. In addition, only 17% indicate that their sales staff have specific overall sales goals for energy efficient appliances. In light of these responses, it is interesting to note, as shown in Table 5-25, that 48% indicated that their sales staff almost always recommend energy efficient appliances to customers (scores of 8 and above on a 10-point scale).

Table 5-25
Extent To Which Sales Staff Recommend Energy Efficient Appliances

Response	All California	Out of State
1 Never Recommend	9%	6%
2	0%	4%
3	0%	<1%
4	4%	8%
5	7%	16%
6	7%	4%
7	12%	21%
8	15%	14%
9	6%	7%
10 Always Recommend	27%	19%
Ref	10%	0%
Don't Know	2%	<1%
# Respondents	*43*	*64*

Conclusions

Mystery shoppers provide a low estimate of the extent to which appliance sales staff are knowledgeable about and motivated to sell energy efficient appliances. Their perspective is valuable since they were trained to observe systematically the POP materials and engage sales

staff in a discussions of energy efficiency and ENERGY STAR®. The judgment of customers may be colored by the passage of time and the desire to provide answers that are socially acceptable. The perceptions of store managers may of course be accurate in terms of frequency and source of training but perhaps self serving in their evaluation of the effectiveness of the training. Moreover, it may be that the effectiveness of the training is also diminished in the current robust economy by staff turnover. As a result, even though there may be a fair amount of high quality training about energy efficiency, the chances of encountering a well informed and motivated sales person may be small due to high rates of staff turnover. In the main, we find the reports of the mystery shoppers to be less biased and more current than either of the two other perspectives. This is not to say that these other two perspectives are without any value but that the in-store experience is better captured by the mystery shoppers.

Thus, taking all the data into account along with our estimation of its accuracy and reliability, we conclude that the sales force is neither well trained nor highly motivated to sell energy efficient appliances. While this finding supports the program design that emphasizes training of the sales force, staff turnover poses a similar threat the Program training. Other ways of educating the customer should be explored such as TV, radio, or the Internet. Another opportunity may be too increase sales staff emphasis on the environmental benefits of purchasing high-efficiency appliances, rather than focusing strictly on discussion of dollar costs versus dollar savings.

5.1.4 Customer Awareness of ENERGY STAR®/Efficient Appliances

The awareness of energy efficient appliances in general and ENERGY STAR® in particular are critical links in the program model described in Chapter 3. Data for this indicator were available from the customer surveys and the mystery shops. From the customer survey, we drew on questions that addressed:

- awareness of energy efficient appliances
- sources of information regarding energy efficient appliances
- the presence of the ENERGY STAR® label on the efficient appliances they examined and on the one the efficient appliance they eventually purchased
- the influence of the ENERGY STAR® label on their decision to purchase the efficient appliance

From the mystery shopper survey we drew on questions that addressed how knowledgeable the sales person was regarding energy efficiency, the ENERGY STAR® Program, utility rebate programs, manufacturer rebate programs, and store rebate programs.

From the store manager survey, we drew on two questions. One addressed the awareness of the ENERGY STAR® Program while the other asked store managers, who were aware of the program, to assess the effectiveness of the ENERGY STAR® Program.

Customers

When customers who stated that they purchased an energy efficient appliance were asked an *unaided* question about how they found out about energy efficient appliances, the most often mentioned source was point-of-purchase (POP) materials (35 %). The next most often mentioned was the *ENERGY STAR® label* (19%), followed by the sales person (18%). It is worth noting that the Program is focused on all three of these as vehicles for communicating to the customer the message of energy efficiency. Past studies and data from this study strongly indicate that customers miss-report to a *large degree* their purchases of energy efficient appliances. Customers surveys reveal that often those who mentioned the ENERGY STAR® label actually purchased a standard appliance; however, it remains significant that the awareness of the ENERGY STAR® label is relatively high. Those who did not mention ENERGY STAR® label in response to this unaided question were asked directly if the ENERGY STAR® label was on the efficient appliance they claimed they purchased. Sixty-seven percent said, "yes." In addition, the percent of all the appliances they looked at that had the ENERGY STAR® label was reported to be 70%. Both the 67% and the 70% seem to be clear cases of over-reporting and argue for taking the unaided responses as the best estimate of ENERGY STAR® awareness.

Those customers who indicated that the ENERGY STAR® label was how they knew their appliance was energy efficient, were asked how influential the ENERGY STAR® label in their decision to purchase an efficient appliance. Sixty-three percent indicated that the label was influential or extremely influential.

Of those customers who stated they did not purchase an energy efficient appliance, nearly 68% indicated that they were aware that there were differences in energy efficiency among the various appliances. Of those 68%, 11% (in-state) indicated that ENERGY STAR® was the means by which they knew there were high-efficiency units available. Overall, 12% of all respondents mentioned ENERGY STAR® on an unaided basis. Conversely, on 4% of all respondents mentioned the DOE Energy Guide Label on an unaided basis.

Retailer Surveys

Mystery Shopping Survey

It was reported earlier in Table 5-19 that the sales staffs' knowledge of energy efficiency, the ENERGY STAR® Program, utility rebate programs, manufacturer rebate programs, and store rebate programs was relatively low. In addition, we reported in Section 5.1.3 that 16% of the appliance units shown to mystery shoppers were ENERGY STAR® units.

Store Manager Survey

Fifty-nine percent of the in-state store managers indicated that they are aware of the ENERGY STAR® Program compared to 60% for the out-of-state group. When those who are aware were asked to rate the effectiveness, 55% rate it at an 8 or above on a 10-point scale, compared to 35% for the out-of-state group.

Conclusions

Awareness of the ENERGY STAR® Program is fairly high among retail store managers who consider it to be an effective program. However, according to the mystery shopper data, awareness among the sales staff is much lower, both for energy efficiency in general and for the ENERGY STAR® Program in particular. Customer awareness that there are a range of efficiency levels available is fairly high at 68% among those who did not purchase an energy efficient appliance. Unaided customer awareness of the ENERGY STAR® Program at 12% is equal to the percent of cases in which mystery shoppers reported that retail sales staff were very knowledgeable about the ENERGY STAR® Program (i.e., 12%). Thus, while managers seem well informed regarding the ENERGY STAR® Program, their sales staff and the customers they serve are far less aware.

5.1.5 Satisfaction

Satisfaction with energy efficient equipment was measured using two indicators: 1) willingness to purchase another energy efficient appliance in the future and 2) telling friends and neighbors about your efficient appliance. The second indicator is related to an observability factor, i.e., the more observable a technology, the more likely that the technology will diffuse throughout the society[7].

Two questions on the customer survey were drawn on to serve as the indicator:

- Whether those who claim to have purchased an energy efficient appliance will purchase another some time in the future
- Whether the those who claim to have purchased an energy efficient appliance have told friends and neighbors about the efficient appliance

Customer

Table 5-26 presents the likelihood that a customer who purchased an energy efficient appliance will purchase one in the future. Ninety-three percent indicate that they are very likely or likely to purchase one in the future.

[7] Rogers, Everett. *Diffusion of Innovations*. New York: THE FREE PRESS, 1995.

Table 5-26
Purchase an Efficient Appliance in the Future

Likelihood	Percent
Very Likely	61%
Somewhat Likely	32%
Somewhat Unlikely	3%
Very Unlikely	3%
Don't Know	1

Finally, of those who claim to have purchased an energy efficient appliance, nearly 54% have told their friends and neighbors about it.

Conclusion

Given that customers' predictions about their future purchase behavior are notoriously poor, the 93% should be heavily discounted. However, even a heavily discounted number coupled with the extent to which customers appear to be sharing information with their friends and neighbors argues for at least a modicum of satisfaction. This result, however, should be expected given the fact that most of the efficient appliances are not materially different (excepting energy consumption) from their standard efficiency counterparts. Nonetheless, it is important to monitor whether any cases of dissatisfaction do occur.

5.1.6 Types and Frequency of Advertising Regarding Energy Efficient Appliances

Information for this indicator was drawn from several questions included in the customer, retailer, and the mystery shopper surveys.

Customer Observations

The questions that bear on this indicator found in the customer survey are:

- Whether appliance advertising or information materials were noticed at the store
- A description of the advertising or information materials noticed at the store
- Whether the message of the materials was understood
- The content of the main message of the materials

Almost half of all respondents said that they noticed some form of display in the store (47% in-state, 42% out-of-state). Almost all of the respondents who noticed display material could identify what they saw (96% in-state, 92% out-of-state). Similarly, almost all respondents who

saw display materials said that they understood their message (96% in-state, 91% out-of-state). Table 5-27 shows that in their unaided response regarding the content of the display material messages, under half of the respondents said that the material had something to do with energy efficiency or operating cost, while about two-thirds of the respondents claimed that the message was in regards to other product attributers.

Table 5-27
Display Material Message Noticed (of those who noticed any message)

Noticed Message	All California	Out of State
Related to energy efficiency or operating cost	46%	41%
Non energy or operating cost product attributes	69%	64%

Thus, approximately 22% (0.47 x 0.46) of California appliance customers report noticing display information related to energy efficiency or operating cost.

Retail Surveys

Mystery Shopper Survey

The questions that bear on this indicator found in the mystery shopper survey are:

- Whether energy-efficiency-related point-of-purchase materials are on display in the store
- The kinds of energy-efficiency-related point-of-purchase materials displayed
- What organizational sponsor provided the energy-efficiency-related point-of-purchase materials displayed
- Whether the point-of-purchase materials were easy to see
- Whether the point-of-purchase materials were easy to understand
- Whether the point-of-purchase materials were nicely displayed

Half the mystery shoppers found energy efficiency related point of purchase materials on display in the store. Over 80% of the stores used stickers for their point of purchase displays with flyers ands posters appearing in about 20% of the stores. About half the stores had material sponsored by manufacturers, about half had materials sponsored by the utility, and about a quarter had materials sponsored by ENERGY STAR®.

Table 5-28 shows the effectiveness of the display materials as experienced by the mystery shoppers.

Table 5-28
Effectiveness of Displayed POP Materials

Effectiveness	Percent
Easy to see	36%
Easy to understand	38%
Nicely displayed	29%

Store Manager Survey

The questions that bear on this indicator found in the retailer survey are:

- Whether the store uses and media advertising to promote energy efficient appliances
- The type of media advertising used to promote energy efficient appliances
- Whether media advertising used to promote energy efficient appliances is effective
- Whether the store uses any in-store advertising to promote energy efficient appliances
- The types of in-store advertising to promote energy efficient appliances
- How often in-store advertising to promote energy efficient appliances are used
- Whether the store uses any in-store advertising to promote energy efficient appliances
- Whether in-store advertising to promote energy efficient appliances is effective
- Awareness of incentives used by California utilities to retail stores for selling certain energy efficient appliances
- How effective the California utilities in-store incentives have been in increasing the demand for energy efficient appliances

Almost half the stores reported that they use some form of media advertising to promote energy efficient appliances (44% in-state, 48% out-of-state). As shown in Table 5 29, most of the focus is on newspaper advertising.

Table 5-29
Reported Advertising Media Used to Promote Energy Efficient Appliances (for the 44% in California and 48% outside California that use media advertising for EE Appliances)

Response	All California	Out of State
Newspaper	78%	85%
Radio	40%	39%
Internet	0%	16%
Press Releases	0%	8%
Signs/Billboards	0%	8%
Other (Please Specify:)	29%	8%
# Respondents	*18*	*23*

Table 5-30 shows that most retailers are in the middle regarding the whether media advertising has been effective in increasing sales of energy efficient appliances. About a quarter of California retailers believe that media advertising is very effective.

Table 5-30
Extent to Which Store Managers Believe Media Advertising Has Been Effective in Increasing Sales of Energy Efficient Appliances

Response	All California	Out of State
Not at all effective	2%	1%
2	0%	1%
3	1%	16%
4	18%	<1%
5	16%	37%
6	20%	0%
7	7%	23%
8	9%	<1%
9	0%	7%
Very effective	28%	9%
Don't Know	0%	7%
# Respondents	*18*	*23*

Over half the stores report that they use some form of in-store advertising to promote energy efficient appliances (56% in-state, 60% out-of-state). As shown in Table 5-31, a mixture of approaches are used. Manufactures' product literature is the most common type of in-store material use in California. Retailers claim to use the in-store materials at least monthly. Much of it is used daily.

Table 5-31
Types of Store Advertising/Promotion for Energy Efficient Appliances

Response	All California	Out of State
Point of purchase rebate coupons	33%	13%
Mail in rebates	23%	7%
Residential Lighting and Appliance Program point-of-purchase	19%	na
Manufacturer's product literature	40%	18%
ENERGY STAR® label and literature	37%	26%
Other SPECIFY	29%	37%
# Respondents	*24*	*38*

As shown in Table 5-32, most retailers believe that in-store promotional materials are effective at increasing sales of energy efficient appliances.

Table 5-32
Extent to Which Store Managers Believe In-Store Promotional Material Has Been Effective in Increasing Sales of Energy Efficient Appliances

Response	All California	Out of State
Not at all effective	0%	6%
2	0%	7%
3	7%	6%
4	5%	7%
5	14%	19%
6	7%	18%
7	13%	11%
8	20%	13%
9	11%	<1%
Very effective	23%	13%
Don't Know	0%	<1%
# Respondents	*24*	*38*

Almost all of those retailers who are aware of the incentives believe the incentives to be an effective means of increasing the demand for energy efficient appliances.

Conclusion

A little more than half the retailers claim to use in-store display materials. Mystery shoppers said that they saw the material about half the time but that the material was not particularly easy to see or understand. Combining the percentage reporting materials that were easy to see (36%) with the percent of stores with material (50%) it appears that customers see energy efficiency display material about 18% of the time. This corresponds well with the customer survey data where 47% of the California customers say that they saw any point of purchase material, with 46% of that

material being related to energy efficiency, yielding 21% of the customers seeing energy efficiency display materials. Considering that retailers believe that energy efficiency display materials increase the sale of energy efficient appliances, program efforts to increase the extent and visibility of the display materials appear to be appropriate.

5.1.7 Number of Efficient Appliance Models on Sales Floor

Information for this indicator can be drawn from several questions included in the retailer survey and the mystery shopper survey.

Retail Observations

The questions that bear on this indicator found in the retail survey are:

- The source for appliances
- How many models are on display
- What percentage of models are energy efficient
- Whether there has been a shortage of energy efficient appliances in the last 12 months
- The number of models on display that are energy efficient compared last year
- How the sales of energy efficient appliances have changed compared last year
- The average lead time required to receive an energy efficient appliance

Store Manager Survey

Most retailers get their appliances directly from manufacturers. Table 5-33 shows that under 10% come from independent distributors.

Table 5-33
Sources from Which Retailers Obtain Appliance Shipments

Appliance	Direct from Manufacturer	From Manufacturer Rep	Independent Distributor	Your Own Company Distribution Center
Refrigerator	47%	8%	6%	39%
Dishwasher	49%	9%	4%	38%
Clothes Washer	46%	10%	4%	40%
Gas Water Heater	41%	12%	4%	43%
Room AC	39%	16%	6%	39%

On average, retailers display more refrigerators (25) than other appliances. Table 5-34 shows the average number of appliances displayed on a store's floor.

Table 5-34
Average Number of Appliances Displayed

Appliance	Models Displayed	# Respondents
Refrigerator	27	103
Dishwasher	13	108
Clothes Washer	19	98
Gas Water Heater	5	81
Room AC	8	48

Stocking practices vary among retailers. Some claim to display all energy efficient appliances and some claim to display none. Table 5-35 shows the average percent of appliances displayed that are claimed to be energy efficient. As one can see in the table, there is little variation across appliance types and, based on the large standard distributions, stocking practices are not uniform.

Table 5-35
Store Managers' Reported Percent of Appliances Displayed that are Energy Efficient

Appliance	Mean Percent Energy Efficient	Standard Distribution about the Mean	# Respondents
Refrigerator	54%	39%	98
Dishwasher	50%	39%	97
Clothes Washer	46%	42%	90
Gas Water Heater	50%	45%	68
Room AC	57%	43%	41

About 21% of retailers report that they have experienced shortages in energy efficient refrigerators in the last 12 months. For all other appliances, retailers report under 10% shortages.

Table 5-36 shows the change in the number of energy efficient model numbers on display. The vast majority of retailers reported that they have the same number of energy efficient appliances on display this year compared to last. However, more retailers added energy efficient appliances this year than removed energy efficient appliances from display.

Table 5-36
Number of Different Energy Efficient Models on Display Compared To Last Year

Response	All California	Out of State
Much less then last year	3%	0%
Some what less than last year	6%	1%
Same as last year	38%	53%
Some what more than last year	16%	19%
Much more than last year	4%	19%
Didn't sell last year	3%	2%
Refused	3%	2%
Don't know	27%	2%
# Responses	200	228

Tables 5-37 and 5-38 show the change in the percent of sales of energy efficient models on display. In and out of California, sales are reported to be slightly higher than they were last year. The increase appears to be larger outside California. In particular, sales of efficient dishwashers and clothes washers are reported to be up in both markets.

Table 5-37
Annual Energy Efficient Appliance Sales Compared to Last Year, California

Response	Refrigerator	Dishwasher	Clothes washer	Gas Water Heater	Room AC
Much less than last year	6%	5%	2%	0%	11%
Somewhat less than last year	9%	4%	4%	0%	12%
Same as last year	33%	41%	21%	16%	20%
Somewhat more than last year	14%	26%	25%	16%	10%
Much more than last year	12%	3%	10%	9%	0%
Didn't sell last year	0%	0%	0%	21%	0%
Ref	12%	10%	11%	13%	17%
Don’t Know	14%	12%	27%	25%	31%
# Respondents	*33*	*39*	*31*	*29*	*23*

Table 5-38
Annual Energy Efficient Appliance Sales Compared to Last Year, Outside California

Response	Refrigerator	Dishwasher	Clothes washer	Gas Water Heater	Room AC
Much less than last year	<1%	0%	0%	0%	<1%
Somewhat less than last year	5%	5%	9%	0%	8%
Same as last year	23%	49%	27%	33%	38%
Somewhat more than last year or	46%	27%	46%	18%	27%
Much more than last year	17%	12%	14%	6%	14%
Didn't sell last year	0%	0%	0%	7%	1%
Ref	0%	0%	0%	16%	0%
Don't Know	8%	8%	5%	20%	13%
# Respondents	*56*	*49*	*55*	*43*	*25*

Most retailers, in state and out of state, report that it takes about one week to receive an order for either a standard or energy efficient appliance.

Mystery Shopping Survey

As reported in Section 5.1.3, approximately 40% of the units presented to mystery shoppers were high efficiency.

Conclusion

Store managers report that approximately half of the appliances on their floors are high-efficiency models. This figure is higher than the closest proximate figure from the mystery shopping survey, which shows that about one-quarter of the units *shown* by salespeople to mystery shoppers were high efficiency. In either case, a reasonably significant share of the appliances displayed and presented to customers appear to be high efficiency units. The percentage of models displayed and sold that are high efficiency is reported to have increased both in- and out-of-state. Out-of-state store managers appear to report increases somewhat more often. In both cases, increases are reported most often for dishwashers and clothes washers.

5.1.8 Rebate Program Coverage

While not an indicator of market effects, we have collected information on the prevalence of rebates from a variety of sources in order to better characterize the market and to identify other possible explanations of customer behavior. We drew upon questions in the customers survey and in the mystery shoppers survey to address this issue. In the customer survey, we asked whether the customer received a rebate, from whom, and the approximate amount. In the mystery shopper survey, we asked shoppers to indicate for each appliance they were shown if a rebate was available, from whom, the amount, and whether it was an instant or mail-in rebate.

Customers

Table 5-39 presents a breakdown by appliance of rebates reportedly received by customers for the purchase of their appliance. The rebates may be for efficient or standard appliances.

Table 5-39
Receive Rebate for Appliance

Response	Refrigerator	Dishwasher	Clothes Washer	Air Conditioner	Gas Water Heater
Yes	32%	18%	27%	14%	9%
No	64%	77%	66%	83%	83%
Ref	2%	0	2%	0%	0%
Don't Know	2%	5%	5%	3%	8%
# Respondents	248	186	254	66	102

As one can see, rebates were available for approximately 20 percent of all appliances. Rebates were available most frequently for refrigerators, followed by clothes washers, dishwashers, air conditioners, and gas water heaters.

As shown in Table 5-40, most of the rebates are from manufacturers, followed by the retail stores, and utilities. This is an important finding in light of the fact that, while rebates from utilities are certainly for efficient units, the rebates from the retail stores and manufacturers may be for both efficient *and* standard units. Thus, the objective of increasing the market share of efficient appliances may be thwarted by other incentives for units that are not considered to be energy efficient.

Table 5-40
Source Of Rebate for Appliance

Response	Refrigerator	Dishwasher	Clothes Washer	Air Conditioner	Gas Water Heater
Rebate from local utility	22%	17%	28%	21%	67%
Rebate from retail store	37%	31%	31%	36%	0%
Rebate from manufacturer	48%	48%	37%	43%	0%
Other	0%	2%	5%	0%	0%
Don't know	3%	7%	1%	0%	33%
# Respondents	80	38	61	7	3

Mystery Shopping Survey

In some cases, there was more than one rebate. Tables 5-41 through 5-44 provide the amount, the provider, and the type of rebate for the first and the second rebate, if any. Rebates were available for clothes washers, dishwashers, and refrigerators. However, in contrast to what

customers reported (albeit a small fraction), rebates for room air conditioners and gas water heaters were not found to be available by the mystery shoppers.

Mystery shoppers found that utilities were the chief source of the first rebates for refrigerators and dishwashers, followed by manufacturers and retailers. As noted above, customers reported that most of their rebates came from manufactures. This discrepancy may be due to the fact that some of the customers interviewed purchased their appliances as long as two years ago and may as a result miss-remember such details. The average size of the first rebate ranged from $81 for refrigerators to $50 for dishwashers.

Table 5-41
Amount of First Appliance Rebate

Appliance	N	Min	Max	Mean
Air Conditioner	0	-	-	-
Clothes Washer	49	$20	$200	$66
Dishwasher	45	$20	$200	$50
Gas Water Heater	0	-	-	-
Refrigerator	27	$20	$250	$81

Table 5-42
Appliance Rebate Provider and Type for First Rebate

	Manufacturer			Utility			Retailer		
Appliance	*All*	Mail-in	Instant	All	Mail-in	Instant	*All*	Mail-in	Instant
Clothes Washer	*48%*	93%	7%	*34%*	89%	11%	*18%*	80%	20%
Dishwasher	*17%*	100%	0%	*81%*	97%	3%	*2%*	100%	0%
Refrigerator	*28%*	100%	0%	*56%*	89%	11%	*16%*	60%	40%

Table 5-43
Second Appliance Rebate

	N	Min	Max	Mean
Air Conditioner	0	-	-	-
Clothes Washer	12	$30	$125	$62
Dishwasher	6	$30	$100	$52
Gas Water Heater	0	-	-	-
Refrigerator	6	$50	$100	$79

Table 5-44
Appliance Rebate Provider and Type for Second Rebate

Appliance	Manufacturer			Utility			Retailer			ENERGY STAR®			Local Water Co.		
	All	Mail-in	Instant	All	Mail-in	Instant	All	Mail-in	Instant	All	Mail-in	Instant	All	Mail-in	Instant
Clothes Washer	42%	60%	40%	33%	100%	0%	0%	0%	0%	8%	100%	0%	17%	100%	0%
Dish-washer	33%	100%	0%	17%	100%	0%	33%	50%	50%	0%	0%	0%	17%	100%	0%
Refrig-erator	43%	67%	33%	29%	100%	0%	29%	0%	100%	0%	0%	0%	0%	0%	0%

From Table 5-44, it is interesting to note that ENERGY STAR® rebates show up as a second rebate for clothes washers.

Store Manager Survey

Finally, store managers were asked (unaided) whether they were aware of any California energy efficiency programs that focus on residential lighting and appliances. Approximately 70% were able to mention at least one utility-specific or statewide programs. Five percent mentioned the California Residential Lighting and Appliance Program specifically.

Conclusions

Rebates are available from a variety of sources for both efficient and standard units. This presents a challenge that traditional utility rebate programs have faced for years. In some cases, utility rebates for efficient units are added to manufacturers and retailers, while in others, these market actors may use their own rebates to promote other non-high efficiency units, thereby competing against the efficient models.

5.2 BASELINE LIGHTING INDICATOR RESULTS

5.2.1 Customer Purchase of Efficient Lighting Products and Customer Knowledge of Efficient Lighting Products

Information on purchase and knowledge of efficient lighting products is drawn from several questions included in the customer survey effort. The questions that bear on this indicator are:

- Whether the customer thinks he or she purchased an efficient lighting product
- Whether customers actually purchased efficient lighting products
- How he or she knew it was more efficient than comparable units
- Customers' estimates of the incremental costs of efficient lighting products

- Customers' estimates of the annual cost savings of efficient lighting products

Customer Results

As shown in Table 5-45, only 21% of respondents believe they purchased a high-efficiency lighting product while 72% indicate that they did not. There appears to be little ambiguity about this question with only 4% claiming not to know. While we were not able to verify, using the using documentation provided by customers, the actual efficiency of the lighting products purchased, we know from past studies that customers dramatically over-report efficiency levels.[8]

Table 5-45
Percent of Customers Who Stated They Purchased High-Efficiency Lighting Products

Response	All California	Out of State
Yes	21%	17%
No	72%	80%
Refused	4%	<1%
Don't Know	2%	3%
# Respondents	*734*	*252*

Customers who thought they purchased high-efficiency were also asked how they knew the unit they purchased was high-efficiency. As shown in Table 5-46, the most common means by which self-reported purchasers claimed to determine that the unit purchased was high efficiency were point-of-purchase materials (32%), friends or family (14%), mass media advertising (14%), and the sales person (11%). The ENERGY STAR® label was only mentioned 6% of the time.

[8] McElroy, Kathleen and Kent Van Liere. "CBEE baseline Study on Public Awareness and Attitudes Toward Energy Efficiency." Submitted to the California Board for Energy Efficiency and the Pacific Gas and Electric Company, 1999.

Table 5-46
Means by Which Self-Reported High-Efficiency Purchasers Determined Unit Was High Efficiency, In-State (multiples accepted)

Response	Hardwired Fixture	CFL	Torchiere	All
Point of purchase materials	34%	36%	21%	32%
Friends or family	6%	22%	15%	14%
Mass media advertising	8%	18%	19%	14%
Sales person	19%	3%	7%	11%
Consumer reports	8%	7%	12%	8.3%
Department of Energy Guide Label	8%	0%	0%	3%
ENERGY STAR® label	13%	0%	1%	6%
Other	34%	16%	30%	27%
Don't know	3%	5%	0%	3%
# Respondents	69	58	36	163

For those customers who stated that they did not purchase a high-efficiency unit, we asked if they were aware that there were a range of efficiency levels available on the market. Responses are shown in Table 5-47. Nearly one-third of those who reported they did not purchase high-efficiency units state that they are aware that a range of efficiencies exist.

Table 5-47
Awareness That Range of Efficiencies Available Among Those That Report They Did Not Purchase An Energy-Efficient Unit

Aware of Differences in Efficiency Among Units?	In-State	Out-of-State
Yes	32%	28%
No	67%	69%
Refused	0%	0%
Don't Know	1%	3%

In Table 5-48, we present the means by which those who report they didn't purchase high-efficiency, but were aware of high-efficiency, found out about high-efficiency. The results are similar to the responses of those who stated they did purchase high-efficiency units except that a much larger percentage cite mass media advertising and friends and family. Conversely, fewer cite ENERGY STAR®. Given that both purchasers and non-purchasers of efficient lighting products often mis-report the actual efficiency of their purchases, little credence should be given to the differences in the two sets of results.

Table 5-48
Means By Which Those Who Report They Didn't Purchase High-Efficiency, But Were Aware of High-Efficiency, Found Out About High-Efficiency

Response	All California	Out of State
In-store point of purchase materials	22%	27%
Friends or family	17%	13%
Advertising on television, on the Intern	39%	47%
Sales person	5%	1%
Consumer reports	1%	5%
ENERGY STAR® label	<1%	0%
Previous experience	13%	10%
Bill stuffer	5%	6%
Other	<1%	7%
Refused	1%	0%
Don't know	10%	8%
# Respondents	*239*	*83*

Customer knowledge regarding lighting products was also investigated on two key points: 1) expected incremental costs associated with the energy efficient version of the equipment, and 2) expected annual savings associated with the energy efficient version of the equipment. While firm estimates on the costs and savings associated with hardwired fixtures and torchieres are not readily available, it is fairly well established that the incremental cost of CFLs range from $10 to $30. Based on metering studies, CFLs save approximately 55 kWh per year on average. A reasonable payback estimate for the CFL technologies would be in the 2 to 4 year range.

Customers both in California and out of state consistently overestimated the payback for the lighting technologies. Over 70% of the respondents provided estimated incremental costs and savings that result in a payback of one year or less. Over 50% of the responds would have the payback at under half a year. Very few, about 5% placed the payback at over 5 years for the lighting technologies.

Conclusion

The conclusions for lighting are essentially the same as for appliances. Customers are extremely unknowledgeable about the relative efficiency of the unit that they purchased and ***customer self-reports are extremely unreliable as indicators of lighting efficiency purchase levels*** (both of which were found to be true in previous studies as well). ***Customers are also very unknowledgeable about the costs and savings of high-efficiency units in ways that actually result in overly optimistic payback estimates***.

The good news from these results is that there is considerable room for improvement in customer knowledge levels about whether they are purchasing a high-efficiency unit from interventions

targeted at sales staff and by increasing the penetration and awareness of ENERGY STAR®-qualifying lighting products. Increasing customer knowledge of payback periods, however, may be counter productive.

5.2.2 Customer Use or Understanding of Payback and Lifecycle Costs

Information for this indicator can be drawn from several questions included in the customer survey effort. The questions that bear on this indicator are:

- Aided scoring of importance of lighting product attributes
- Reasons mentioned for purchasing an energy-efficient lighting product
- Main reasons for not purchasing an energy-efficient lighting product

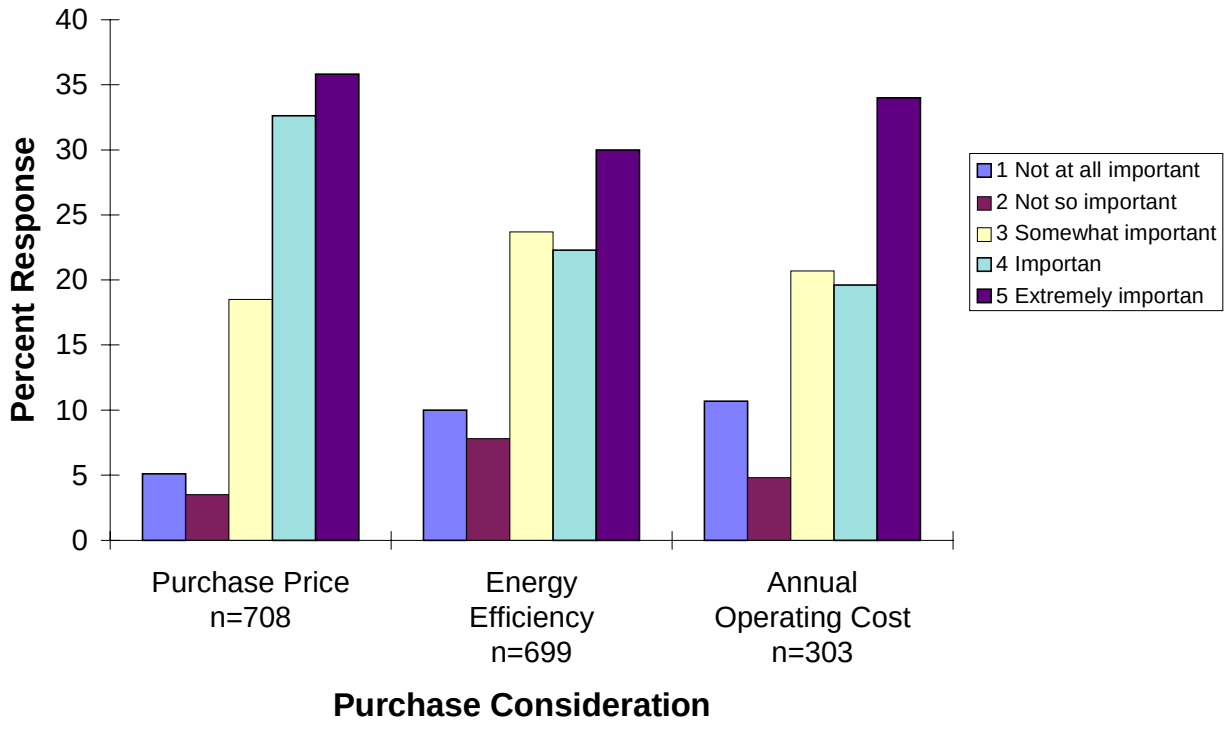
Customers were also asked to rate, on an *aided* response basis, the importance of various attributes that they take into account when purchasing a lighting product. These results for nine aided attributes are shown in Table 5-49. For the aided scoring, reliability and price are important for all three lighting technologies. For CFLs, reliability, bulb life, price, and energy efficiency are most important. Operating costs, only addressed in the questionnaire for CFLs, was only moderately important. For hardwired fixtures and torchieres, safety, quality of light, reliability, and appearance are most important.

Table 5-49
Mean Importance of Lighting Attributes (Based on 1 to 10 scale, where 1 is "not at all important" and 10 is "extremely important")

Attribute	Region	Fluorescent Lamp	Hard Wired	Torchiere
Brand	In-State	4.6	3.7	4.3
	Out-of-State	4.7	4.4	4.2
Features and	In-State	5.8	6.9	7.0
appearance	*Out-of-State*	5.3	6.6	6.9
Purchase price	In-State	7.3	7.3	7.8
	Out-of-State	7.8	7.7	8.1
Energy efficiency	In-State	7.2	6.3	6.6
	Out-of-State	7.1	6.8	7.4
Appearance	In-State	5.3	8.8	8.1
	Out-of-State	5.0	8.5	8.1
Reliability	In-State	8.0	8.1	8.2
	Out-of-State	8.0	8.6	8.9
Safety	In-State	-	8.6	8.7
	Out-of-State	-	9.1	9.0
Quality of light	In-State	-	8.4	8.3
	Out-of-State	-	8.4	8.9
Operating cost	In-State	6.9	-	-
	Out-of-State	6.7	-	-
Bulb life	In-State	7.8	-	-
	Out-of-State	7.6	-	-
Color of light	In-State	6.7	-	-
	Out-of-State	5.8	-	-
Sample Size	In-State	325	202	207
	Out-of-State	129	77	46

The distribution of responses on the aided rating of lighting product attributes is shown for three of the attributes across lighting products (in-state) in Figure 5-2. As shown in the figure, 35% said price and annual operating cost were extremely important, while 30% indicated that energy efficiency was extremely important.

Figure 5-2
Importance of Price, Energy Efficiency, and Annual Operating Costs (In-State)



Another indication of the extent to which customers considered and used payback or lifecycle costs in their lighting choices comes from customers' stated reasons for purchasing efficient lighting products. Those customers who stated they purchased an efficient lighting product[9] (see Table 5-44 above) were asked, on an open-ended basis, why they purchased an energy-efficient unit. Responses are shown in Table 5-50. For the 21% of in-state respondents that believe they did purchase a high-efficiency unit, 45% said the reason they did so was that the energy and cost savings were worth the extra first cost. The next most important reason cited was that "the product works better or is of higher quality" (21%) followed by "Other benefits make the purchase worthwhile" (18%). In addition, 8% and 7% of in-state and out-of-state respondents said that they purchased a high-efficiency unit because the incremental purchase price was small.

[9] Note that discussed in Section 5.1.1, we believe the percentage of customers that said they bought a high-efficiency unit is over-reported.

Table 5-50
Reasons for Purchasing an Efficient Lighting Product (open-ended, multiples accepted)

Response	All California	Out of State
The extra cost for efficient unit was minimal	8%	7%
Higher efficiency came along with unit I wanted anyway for other reasons	6%	2%
Energy savings were worth the extra cost	33%	27%
Cost savings were worth the extra cost	12%	27%
It was the right thing to do	8%	5%
Other benefits make purchase worthwhile	18%	2%
Product works better/is higher quality	21%	17%
I like to have new, high-tech products	7%	7%
Salesperson convinced me it was the best	1%	0%
Friends/family suggested I purchase high-efficiency unit	1%	0%
Other	11%	5%
Don't know	4%	15%
# Respondents	*163*	*41*

Those customers who stated they didn't purchase an efficient lighting product[10] were asked, on an open-ended basis, why they did not purchase an energy-efficient unit. Responses are shown in Table 5-51. Of the 72% of in-state respondents that said they did not purchase a high-efficiency unit, 16% said that they couldn't "Find the type or size that I want." Another 13% said the reason was that the high-efficiency units cost too much (e.g., high first cost) followed by another 12% who said that they "Don't know enough about the product." Importantly, only 2% said that the high-efficiency unit wouldn't save enough energy to make it worthwhile (implying they considered both operating cost savings and first cost increment in their decision).

[10] Note that as discussed under Section 5.1.1, we believe the percentage of customers that said they *did not buy* a high-efficiency unit is *under*-reported.

Table 5-51
Reasons for Not Purchasing an Efficient Lighting Product (open-ended, multiples accepted)

Response	All California	Out of State
Costs too much to purchase	13%	20%
Won't save enough energy to make purchase worthwhile	2%	2%
Can't find the type/style/size I want	16%	8%
Can't find the brand I want	1%	1%
Don't like to try new high-tech products	1%	1%
Moving/selling my home	1%	0%
Don't know enough about product	12%	17%
Other priorities more important	9%	8%
Standard product is better	5%	5%
Uncertain that savings will occur	1%	1%
Didn't have enough information	5%	2%
Did not think about energy efficiency	10%	14%
Other	1%	4%
Refused	1%	0%
Don't know	10%	7%
# Respondents	*505*	*192*

Conclusions

The information presented above indicates that, on an *aided* basis, operating costs are considered only somewhat important by those purchasing screw-in light bulbs. Also, on an *aided* basis, energy efficiency is stated to be a somewhat or extremely important factor by the majority of purchasers. However, the likely over-reporting that accompanies measurement of the importance of energy efficiency on an aided basis limits the usefulness of these questions as baseline indicators. In addition, of the 21% of those customers who *think they purchased high-efficiency units,* 45% claim, on an *unaided* basis, that the did so because the energy or cost savings justified the decision. Thus, among the general population of purchasers of lighting products, customers use of operating costs and payback appears to be limited.

5.2.3 Knowledge, Awareness and Behavior of Sales Staff with Respect to Efficient Lighting Products - Customers' In-Store Experience

The in-store experience is how the customer experiences the in-store advertising, the floor stock, and the sale staff. Data were available from the customer surveys, mystery shops, and retail store managers. From the customer survey, we drew on questions that addressed:

- Whether the customer talked with the sales person

- Whether the customer asked the sales person about energy efficiency
- Whether the sales person mentioned energy efficiency to the customer
- The extent to which the sales person emphasized energy efficiency
- What the sales person said about energy efficiency
- How confident the customer was regarding the energy efficiency information provided by the sales person

From the retail store manager survey, we drew on questions that addressed:

- The training of sales staff in general
- The training of sales staff with respect to energy efficiency
- Reasons for not training sales staff in energy efficiency
- Who provides training on energy efficiency
- How often does training on energy efficiency take place
- How effective is the training with respect to the knowledge and motivation of the sale staff sales
- If they received training from the Program, what was the quality of the training
- Whether the store has specific overall goals for energy efficient lighting products
- Whether the sales staff have specific goals for energy efficient lighting products
- The extent to which the sales staff routinely recommends energy efficient lighting products to customers
- Any reasons for not routinely recommending energy efficient lighting products to customers

From the mystery shopper survey, we drew on questions that addressed:

- The number of lighting products shown to a mystery shopper and whether they were described by the sales person as being energy efficient and whether they were ENERGY STAR® qualifying
- How knowledgeable the sales person was regarding energy efficiency, the ENERGY STAR® Program, utility rebate programs, manufacturer rebate programs, and store rebate programs.
- The extent to which the sales person mentioned energy efficiency in their sales pitch
- If the sales person discussed energy efficiency, what did he/she say

The results of each survey will be discussed, followed by an integration of data from all three surveys into conclusions regarding the knowledge, awareness and behavior of sales staff with respect to efficient lighting products.

Customers

Of all the purchased lighting products purchased by customers in this study, only 19.5% talked with a sales person. Of these, 15% asked the sales person about energy efficiency and 82% did not ask. Of those who did not ask, 25% of the customers encountered a sales person who mentioned energy efficiency. Put another way, of the 19.5% who talked with a sales person, 20.5% encountered a sales person who *voluntarily* mentioned energy efficiency. Overall, of 19.5% who talked with a sales person, in 35.5 % of the cases a discussion took place about energy efficiency initiated either by the customer or the sales person**.**

As shown in Table 5-52, of the 35.5% who discussed energy efficiency with a sales person, 50% of the sales people in California said it would lower the customers' utility bills compared to 40% for the out-of-state group. Another 6% discussed comparative information and only 5% discussed environmental. Neither of these last two issues were discussed at all by sale people in the out-of-state group.

Table 5-52
What Sales Person Said About Energy Efficient Lighting

Response	All California	Out of State
Said that it would save money	50%	40%
Discussed comparative information	6%	0%
Discussed environmental benefits	5%	0%
Other	21%	0%
Refused	1%	0%
Don't know	8%	20%
# Respondents	*36*	*5*

As one can see from Table 5-53, of those who discussed energy efficiency with a sales person, 50% said the sales person emphasized energy efficiency a great deal. An additional 39% indicated that the sale staff emphasized energy efficiency some.

Table 5-53
Extent To Which Sales Person Emphasized Energy Efficiency

Response	All California	Out of State
Very little	*11.0%*	*21.4%*
Some	*39.0%*	*57.1%*
A great deal	*50.0%*	*21.4*
# Respondents	*36*	*14*

Finally, as shown in Table 5-54, of those customer who discussed energy efficiency with the sales person, 76% stated that they were *very confident* or *mostly confident* that the information provided by the sales person was accurate.

Table 5-54
Confidence in the Accuracy of the Information Provided By Sales Staff

Response	All California	Out of State
1 Not at all confident	*11.0%*	*21.4%*
2 Not so confident	*6.0%*	*0.0%*
3 Some what confident	*17.0%*	*35.5%*
4 Mostly confident	*31.0%*	*7.1%*
5 Very confident	*35.0%*	*21.4%*
Don't know	*0.7%*	*0.0%*
# Respondents	*36*	*14*

Retailers

Information on appliance retailers was obtained from two sources: the mystery shops in California, and interviews with California and non-California appliance retailers. The results relevant to the in-store experience indicators are presented below.

Mystery Shopping Survey

The mystery shop results are broken down by "sales staff interaction" and "sales staff knowledge."

Sales Staff Interactions: Recall from the Section 4 that mystery shoppers were instructed to look for two different lighting products at each store they visited. When approached by a salesperson, the mystery shopper was to explain that he/she was shopping for these two lighting products. Mystery shoppers were further instructed to look for three varieties of each of the two lighting products. Inevitably, salespeople would ask mystery shoppers about the types of features they desired in each of the products. Depending on which two products the mystery shopper was looking for, he/she was directed to indicate interest in:

- A basic floor lamp (nothing too fancy) that would direct light upward toward the ceiling
- A basic (no fan) hard-wired ceiling fixture for the bathroom
- A 100 watt screw-in light for a table lamp (75 or 60 watts also acceptable)

As the salesperson began showing the three selections per product, the mystery shopper was instructed to pay particular attention to whether the salesperson mentioned specific aspects of the

product, such as "energy use," "energy efficiency," "rebates," "lifecycle costs," etc. and what, exactly, the salesperson chooses to say about such attributes. The mystery shopper was also noting whether the ENERGY STAR® label was on the lighting product itself or its packaging.

If "energy use" or "energy efficiency" was not mentioned for any of the three product varieties, the mystery shopper was to ask "Do all three use the same amount of electricity?" or "Are all three equally energy efficient?" In addition, if the ENERGY STAR® label was on the label or packaging and the salesperson did not discuss it, the mystery shopper was instructed to ask "What does the ENERGY STAR® label mean?" If, after raising the energy efficiency issue, the salesperson offers to show more products, mystery shoppers were instructed to shop for a maximum of two additional lighting products.

Table 5-55 presents the results of what lighting equipment, on average, the shoppers were shown and its efficiency characteristics. As one can see, each mystery shopper was initially shown approximately 3.3 units on average with about .54 units on average being voluntarily described by the sales person as energy efficient (i.e., 16% of the units shown). Approximately .38 units (or 12%) on average were ENERGY STAR®-qualifying, an outcome that may in part be due to the possibility that there is a lag in getting ENERGY STAR® labels and other promotional materials into the stores. In addition, unlike appliances, the ENERGY STAR® label is not usually on a hardwired fixture or a torchiere but on the packing box which is not always visible since they are sometimes stored under the counter or in the backroom storage area.

Table 5-55
Product Exposure

	Hardwired Fixtures	Torchieres	Lamps
Units initially shown (average)	4	3	3
Energy efficient units (average)	0.51	0.52	0.59
ENERGY STAR® units (average)	0.40	0.56	0.19
Energy efficient units (average when prompted)	0.27	0.70	0.51
Energy efficient units (average of additional units shown)	2.14	0.89	1.87
ENERGY STAR® units (average of additional units shown)	0.66	0.23	1.38
Energy Efficiency Mentioned in Sales Pitch [1]	12%	10%	10%

[1] Results shown as percent reporting salesperson mentioned energy efficiency in his/her sales pitch "a great deal" (coded "4" on a four point scale, where "1" indicates "not at all" and "4" indicates "a great deal").

Approximately 18% of the shoppers were shown additional units (usually, two additional units). Of these, the number of units that were described as energy efficient rose to 1.6 with the average

number of these additional units that were ENERGY STAR® qualifying also rising to .76. These patterns are what one might expect given the series of prompts provided by the shoppers. Consistent with these results is that, on average, only 11 percent of the sales persons mentioned energy efficiency a great deal in their sales pitch. Of those who mentioned energy efficiency, lower utility bills, annual operating costs, and equipment reliability were most frequently mentioned.

Salesperson Knowledge: Mystery shoppers were instructed to evaluate the extent to which salespeople were knowledgeable about energy efficiency, the ENERGY STAR® Program, and various rebate programs. Table 5-56 presents the results of this assessment. In general, mystery shoppers judged sales people to know very little about energy efficiency and the various programs.

Table 5-56
Sales Person Knowledge [1]

	Hard-wired Fixtures	Torchieres	Screw-in Bulbs
Knowledge of Energy Efficiency [1]	14%	17%	8%
Knowledge of ENERGY STAR® Program [1]	5%	5%	4%
Knowledge of Utility Rebate Program [1]	5%	10%	2%
Knowledge of Manufacturer Rebate Program [2]	0%	24%	32%
Knowledge of Retailer Rebate Program [2]	0%	24%	32%
Salesperson Mentioned in Discussion of Energy Efficiency: [3]			
Annual operating costs	17%	17%	18%
Payback period	4%	3%	5%
Lifecycle costs	3%	10%	10%
Lifecycle savings	2%	9%	9%
Utility rebates	1%	6%	0%
Lower utility bills	37%	39%	22%
Equipment reliability	15%	14%	13%

[1] Results shown as percent reporting salesperson as "very knowledgeable" (coded "4" on a four point scale, where "1" indicates "not at all knowledgeable" and "4" indicates "very knowledgeable").

[2] Percent calculated only if manufacturer/retailer rebate programs were mentioned by salesperson.

[3] Results shown as percent of all mystery shops.

Finally, if the sales person failed to mention energy efficiency at all in their sales pitch, shoppers were instructed to ask: "Do you think it is worth it to buy energy efficient lighting?" About two thirds of the sales people were asked this direct question. About 10% of the salespeople offered responses that were somewhat indifferent, and another 10% reported that they "did not know" or

did not have an opinion as to whether it would be worth it to buy energy efficient lighting. About half of the salespeople offered a positive response, as in "Yes it would be worth it to purchase energy efficient lighting because . . . Some examples of positive responses include:

- "The salesperson said that energy efficient lighting costs about the same in the long run, after 5 years they're equal in price."
- "The salesperson stated that you would save electricity cost on the ENERGY STAR® models but there were none available in the type of light I was looking for."
- "The salesperson said that they are as bright as halogen, not as hot and it pays with the electricity savings."
- "The salesperson said that he/she would buy florescent because is more energy efficient than incandescent."

However, about 30% offered responses that were either negative or inaccurate, such as:

- "[the salesperson] indicated that the quality of light (visual aesthetics) from more energy efficient models was poor enough to rule out that type as a purchase option."
- "[the salesperson] said only if I were buying lighting for an entire apartment building would I realize the savings."
- "[the salesperson] told me 'I wouldn't buy fluorescent, I would buy incandescent. I don't like fluorescent.'"
- "No, not really." and "It doesn't really matter."
- "They all use the same amount of energy." and "They are all the same, it did not make a difference."
- "When I asked this question the response was 'What does energy efficient mean?'"

Store Manager Survey

We have seen the customer and the mystery shopper perspective on the in-store experience. Now, we will provide the perspective of the store manager to see if they are consistent or not. The general conclusion, thus far, is that the sales force are not particularly well trained or motivated with respect to energy efficient lighting products.

First, 52% of the store managers indicate that their staff receives specialized product training. More to the point, 51% indicate that their sales staff receives training specifically on the benefits of energy efficient lighting products. Table 5-57 presents the various sources of training. Interestingly, most of the training is provided by manufacturers, followed by department manager or supervisor, and internal staff.

Table 5-57
Sources of Training

Sources	All California	Out Of State
Department manager of supervisor	32%	36%
Internal training staff	24%	20%
Utility representative	1%	0%
ENERGY STAR® representative	0%	0%
California Residential Lighting and Appliance Program	0%	0%
Manufacturer	53%	83%
Other SPECIFY	22%	5%
# Respondents	30	40

* Numbers do not sum to 100 percent due to multiple responses

Training provided by the department managers or supervisors takes place mostly on a monthly basis (52%) but they will also conduct training on an as-needed basis (26%). Training provided by internal training staff takes place mostly on a monthly basis (40%) and on an as-needed basis (40%). Training provided by manufacturers is never done on an as-needed basis but is spread out in roughly equal portions on monthly, quarterly, six-month, and annual bases. In general, there appears to be a fair amount of training, but considerably less than observed for the appliance sales force.

Also, the quality of this training is judged to be high. High is defined as a score of 7 or above on a ten-point scale. Tables 5-58 through 5-60 indicate that, as a result of the training, the sales staff is more knowledgeable (65%), more motivated (50%), and that sales of efficient lighting products have increased as a result (36%).

Table 5-58
How Much More Knowledgeable As A Result of Training

Response	All California	Out of State
1 No More Knowledgeable	0%	0%
2	0%	0%
3	0%	0%
4	8%	3%
5	14%	16%
6	14%	14%
7	22%	9%
8	25%	40%
9	2%	9%
10 Much More Knowledgeable	16%	9%
# Respondents	*30*	*40*

Table 5-59
How Much More Motivated As A Result of Training

Response	All California	Out of State
1 No More Motivated	8%	3%
3	4%	3%
4	9%	7%
5	5%	13%
6	22%	8%
7	21%	12%
8	20%	35%
9	3%	5%
10 Much More Motivated	6%	16%
Don't Know	2%	0%
# Respondents	*30*	*40*

Table 5-60
Extent To Which Training Has Increased Sales of Efficient Lighting Products

Response	All California	Out of State
1 No Increase	8%	4%
3	4%	6%
4	16%	0%
5	11%	16%
6	8%	12%
7	25%	10%
8	6%	26%
9	1%	5%
10 A Significant Increase	4%	18%
Ref	0%	2%
Don't Know	17%	3%
# Respondents	*30*	*40*

With respect to sales goals, however, only 12% indicate that they have specific overall sales goals for energy efficient lighting products. In addition, only 5% indicate that their sales staff have specific overall sales goals for energy efficient lighting products. Note that both of these numbers are much lower than for appliances. In light of the high ratings for quality of the sales staff training, it is interesting to note that only 32% of the managers indicated that their sales staff almost always recommend energy efficient lighting products to customers as shown in Table 5-61.

Table 5-61
Extent To Which Sales Staff Recommend Energy Efficient Lighting Products

Response	All California	Out of State
1 Never Recommend	6%	7%
2	1%	6%
3	4%	12%
4	9%	11%
5	13%	25%
6	15%	6%
7	13%	11%
8	9%	12%
9	6%	0%
10 Always Recommend	4%	3%
Ref	19%	0%
Don't Know	3%	7%
# Respondents	*55*	*50*

Conclusions

Mystery shoppers provide a low estimate of the extent to which lighting sales staff are knowledgeable about and motivated to sell energy efficient lighting products. Their perspective is valuable since they were trained to observe systematically the POP materials, engage sales staff in a discussions of energy efficiency and ENERGY STAR®. The judgment of customers may be colored by the passage of time and the desire to provide answers that are socially acceptable. The perceptions of store managers may of course be accurate in terms of frequency and source of training but perhaps self serving in their evaluation of the effectiveness of the training. Moreover, it may be that the effectiveness of the training is also diminished in the current robust economy by staff turnover. As a result, even though there may be fair amount of high quality training about energy efficiency, the chances of encountering a well informed and motivated person may be small due to high rates of staff turnover. In the main, we find the reports of the mystery shoppers to be less biased and more current than either of the two other perspectives. This is not to say that these other two perspectives are without any value but that the in-store experience is better captured by the mystery shoppers.

Thus, taking all the data into account along with our estimation of its accuracy and reliability, we conclude that the sales force is even less well trained and nor as highly motivated to sell energy efficient lighting products that those who sell appliances. While this finding supports the program design that emphasizes training of the sales force, staff turnover poses a similar threat the Program training. Other ways of educating the customer should be explored such as TV, radio, or the Internet.

5.2.4 Customer Awareness of ENERGY STAR®/Efficient Lighting Products

The awareness of energy efficient lighting products in general and ENERGY STAR® in particular are critical links in the program model described in Section 3. Data were available from the customer surveys and the mystery shops. From the customer survey, we drew on questions that addressed:

- awareness of energy efficient lighting products
- sources of information regarding energy efficient lighting products
- the presence of the ENERGY STAR® label on the efficient lighting products they examined and on the one the efficient lighting product they eventually purchased
- the influence of the ENERGY STAR® label on their decision to purchase the efficient lighting products

From the mystery shopper survey we drew on questions that addressed how knowledgeable the sales person was regarding energy efficiency, the ENERGY STAR® Program, utility rebate programs, manufacturer rebate programs, and store rebate programs.

From the store manager survey, we drew on two questions. One addressed the awareness of the ENERGY STAR® Program while the other asked store managers who were aware to assess the effectiveness of the ENERGY STAR® Program.

Customers

When in-state customers who stated that they purchased an energy efficient lighting product were asked an *unaided* question about how they found out about energy efficient lighting products, the most often mentioned source was point-of-purchase (POP) materials (31%). The next most often mentioned was the television and the Internet (14%). The ENERGY STAR® label was ranked sixth (6%), followed by the Energy Guide Label (4%). It is worth noting that the Program is focused on POP materials and will be expanding its message onto the Internet.

Past studies and some limited primary data from this study strongly indicate that customers mis-report to a *large degree* their purchases of energy efficient equipment. Thus, the 6% awareness is very likely a very liberal estimate. Those who did not mention the ENERGY STAR® label in response to this unaided question were asked directly if the ENERGY STAR® label was on the efficient lighting product they claimed they purchased. Thirty-three percent of the in-state respondents said "yes". In addition, the in-state respondents reported that the percent of all the lighting products they looked at that had the ENERGY STAR® label was 35 percent. Both the 33 percent and the 35 percent seem to be clear cases of over-reporting and argue for taking the unaided responses as the best estimate of ENERGY STAR® awareness.

Those customers, who indicated that the ENERGY STAR® label was on the energy efficient lighting product that they purchased, were asked how influential the ENERGY STAR® label was in their decision to purchase an efficient lighting product. Fifty-nine percent indicated that the label was influential or extremely influential.

Of those in-state customers who stated they did not purchase an energy efficient lighting product, 32% indicated that they were aware that there were differences in energy efficiency among the various lighting products. Overall, only 6% of all respondents who either purchased or were at least aware of efficient lighting product mentioned ENERGY STAR® on an unaided basis. Other sources of information reported were advertising on television/Internet (39%), POP materials (22%), and friends or family (17%).

Retailer Surveys

Mystery Shopping Survey

It was reported earlier in Table 5-55 that the sales staffs' knowledge of energy efficiency, the ENERGY STAR® Program, utility rebate programs, manufacturer rebate programs, and store rebate programs was relatively low. In addition, we reported in Section 5.2.3 that 12% of the lighting products shown to mystery shoppers were ENERGY STAR® units.

Store Manager Survey

Forty percent of the in-state store managers indicated that they are aware of the ENERGY STAR® Program compared to only 22% for the out-of-state group. When those who are aware were asked to rate the effectiveness, 25% of the in-state respondents rate it at an 8 or above on a 10-point scale, compared to 28% for the out-of-state group.

Conclusions

Awareness of the ENERGY STAR® Program is only moderately high among retail store managers who consider it to be an only moderately effective program. However, according to the mystery shopper data, awareness among the sales staff is even lower, both for energy efficiency in general and for the ENERGY STAR® Program in particular. Customer awareness that there are a range of efficiency levels available is fairly low at 32% among those who did not purchase an energy efficient lighting product. However, unaided customer awareness of the ENERGY STAR® Program of 6 percent is reasonably close to the percent of cases in which mystery shoppers reported that retail sales staff were very knowledgeable about the ENERGY STAR® Program (i.e., 5 percent). Thus, while managers moderately well informed regarding the ENERGY STAR® Program, their sales staff and the customers they serve are far less aware.

5.2.5 Satisfaction

Satisfaction with energy efficient equipment was measured using two indicators: 1) willingness of those *who purchased an energy efficient lighting product* to purchase another energy efficient lighting product in the future and 2) telling friends and neighbors about their efficient lighting product. The second indicator is related to an observability factor, i.e., the more observable a technology, the more likely that the technology will diffuse throughout the society[11].

Two questions on the customer survey were drawn on to serve as the indicator:

- whether those who claim to have purchased an energy efficient lighting product will purchase another some time in the future
- whether those who claim to have purchased an energy efficient lighting product have told friends and neighbors about the efficient lighting product

Customer

Table 5-62 presents the likelihood that a customer who purchased an energy efficient lighting product will purchase one in the future. Eighty-one percent indicate that they are very likely or somewhat likely to purchase one in the future.

[11] Rogers, Everett. *Diffusion of Innovations*. New York: THE FREE PRESS, 1995.

Table 5-62
Purchase an Efficient Lighting Product in the Future

Likelihood	Percent
Very Likely	43%
Somewhat Likely	38%
Somewhat Unlikely	8%
Very Unlikely	9%
Don't Know	2%

Finally, of those who claim to have purchased an energy efficient lighting product, nearly 32% have told their friends and neighbors about it.

Conclusion

Given that customers' predictions about their future purchase behavior are notoriously poor, the 81 percent should be heavily discounted. However, even a heavily discounted number coupled with the extent to which customers appear to be sharing information with their friends and neighbors argues for at least a modicum of satisfaction. This suggests that for those who purchased efficient lighting products, attributes such as reliability, quality of light, and appearance are no longer problematic.

5.2.6 Types and Frequency of Advertising Regarding Energy Efficient Lighting Products

Information for this indicator was drawn from several questions included in the customer, retailer, and the mystery shopper surveys.

Customer Observations

The questions that bear on this indicator found in the customer survey are:

- Whether lighting advertising or information materials were noticed at the store
- A description of the advertising or information materials noticed at the store
- Whether the message of the materials was understood
- The content of the main message of the materials

Twenty-one percent of the in-state respondents said that they noticed some form of display in the store compared to 19% out-of-state). Nearly 9 out of 10 of the respondents who noticed display material could identify what they saw (91% in-state, 86% out-of-state). Similarly, almost all respondents who saw display materials said that they understood their message (93% in-state, 88% out-of-state). Table 5-63 shows that in their unaided response regarding the content of the display material messages, under half of the respondents said that the material had something to

do with energy efficiency or operating cost, while about two-thirds of the respondents claimed that the message was in regards to other product attributers.

Table 5-63
Display Material Message Noticed (of those who noticed and understood any message)

Noticed Message	All California	Out of State
Related to energy efficiency or operating cost	34%	50%
Non energy or operating cost product attributes	74%	55%

Thus, approximately 7 percent (0.21 x 0.34) of California lighting customers report noticing display information related to energy efficiency or operating cost.

Retail Surveys

Mystery Shopper Survey

The questions that bear on this indicator found in the mystery shopper survey are:

- Whether energy-efficiency-related point-of-purchase materials are on display in the store
- The kinds of energy-efficiency-related point-of-purchase materials displayed
- What organizational sponsor provided the energy-efficiency-related point-of-purchase materials displayed
- Whether the point-of-purchase materials were easy to see
- Whether the point-of-purchase materials were easy to understand
- Whether the point-of-purchase materials were nicely displayed

Only 28% of the mystery shoppers found energy efficiency related point of purchase materials on display in the store. Thirty-three percent of the stores used banners, flyers, posters and stickers, i.e., no form of POP material dominates. Seventeen percent of the stores had POP material sponsored by manufacturers, 17% sponsored by ENERGY STAR® and 3% had materials sponsored by a utility.

Table 5-64 shows the effectiveness of the display materials as experienced by the mystery shoppers.

Table 5-64
Effectiveness of Displayed POP Materials

Effectiveness	Percent
Easy to see	38%
Easy to understand	29%
Nicely displayed	27%

Store Manager Survey

The questions that bear on this indicator found in the retailer survey are:

- Whether the store uses and media advertising to promote energy efficient lighting products
- The type of media advertising used to promote energy efficient lighting products
- Whether media advertising used to promote energy efficient lighting products is effective
- Whether the store uses any in-store advertising to promote energy efficient lighting products
- The types of in-store advertising to promote energy efficient lighting products
- How often in-store advertising to promote energy efficient lighting products are used
- Whether the store uses any in-store advertising to promote energy efficient lighting products
- Whether in-store advertising to promote energy efficient lighting products is effective
- Awareness of incentives used by California utilities to retail stores for selling certain energy efficient lighting products
- How effective the California utilities in-store incentives have been in increasing the demand for energy efficient lighting products

Slightly more than one third of the stores reported that they use some form of media advertising to promote energy efficient lighting products (35% in-state, 51% out-of-state). As shown in Table 5-65 most of the focus is on newspaper advertising.

Table 5-65
Reported Advertising Media Used to Promote Energy Efficient Lighting Products (for the 35% in California and 51% outside California that use media advertising for EE Lighting Products)

Response	All California	Out of State
Newspaper	65%	46%
Radio	6%	22%
Internet	0%	9%
Press Releases	0%	9%
Signs/Billboards	5%	8%
Other	41%	34%
# Respondents	20	27

Table 5-66 shows that most retailers are in the middle regarding the whether media advertising has been effective in increasing sales of energy efficient lighting products. Only 5% of California retailers believe that media advertising is very effective.

Table 5-66
Extent to Which Store Managers Believe Media Advertising Has Been Effective in Increasing Sales of Energy Efficient Lighting Products

Response	All California	Out of State
1 Not At All Effective		
2		
3	5%	4%
4	6%	10%
5	32%	24%
6	20%	12%
7	18%	15%
8	14%	10%
9	0%	4%
10 Very Effective	5%	16%
Ref	0%	4%
# Respondents	*20*	*27*

Slightly more than 40% of the stores report that they use some form of in-store advertising to promote energy efficient lighting products, with nearly twice as many out-of-state retailers using such materials (42% in-state, 79% out-of-state). As shown in Table 5-67 a mixture of approaches are used. Manufactures' product literature is the most common source type in California. Retailers claim to use the in-store materials at least monthly. Much of it is used daily.

Table 5-67
Types of Store Advertising/Promotion for Energy Efficient Lighting Products

Response	All California	Out of State
Point of purchase rebate coupons	14%	0%
Mail in rebates	6%	0%
Residential Lighting & Appliance Program point-of-purchase	33%	na
Manufacturer's product literature	45%	29%
ENERGY STAR® label and literature	17%	0%
Other SPECIFY	31%	68%
# Respondents	*27*	*40*

As shown in Table 5-68, most retailers believe that in-store promotional materials are reasonably effective at increasing sales of energy efficient lighting products (66% rate it as a 7 or higher).

Table 5-68
Extent to Which Store Managers Believe In-Store Promotional Material Has Been Effective in Increasing Sales of Energy Efficient Lighting Products

Response	All California	Out of State
1	2%	0%
2	0%	9%
3	0%	3%
4	5%	3%
5	12%	20%
6	15%	17%
7	36%	10%
8	25%	18%
9	0%	8%
10	5%	13%
# Respondents	*27*	*40*

Thirty percent of the retailers are aware of manufacturer rebates or buy-downs and of these nearly 60% think they are reasonably effective.

Conclusion

A little more than 40% of the retailers claim to use in-store display materials. However mystery shoppers said that they saw the material only about 28% of the time and that the material was not particularly easy to see or understand. Combining the percentage reporting materials were easy to see (38%) with the percent of stores with material (42%) it appears that customers on average see energy efficiency display material about 16% of the time. This corresponds reasonably well with the customer survey data where 21% of the California customers say they saw any point of purchase material, with 34% of that material being related to energy efficiency, yielding 7% of the customers seeing energy efficiency display materials. Considering that retailers believe that energy efficiency display materials increase the sale of energy efficient lighting products, program efforts to increase the presence and visibility of the display materials appear to be appropriate.

5.2.7 Number of Efficient Lighting Models on Sales Floor

Information for this indicator can be drawn from several questions included in the retailer survey and the mystery shopping survey.

Retail Observations

The questions that bear on this indicator found in the retail survey are:

- The source for lighting products

- How many models are on display
- What percentage of models are energy efficient
- Whether there has been a shortage of energy efficient lighting products in the last 12 months
- The number of models on display that are energy efficient compared last year
- How the sales of energy efficient lighting products have changed compared last year
- The average lead time required to receive an energy efficient lighting product

Store Manager Survey

Most retailers get their lighting products directly from manufacturers. Table 5-69 shows that under 10% come from independent distributors.

Table 5-69
Source from Which Retailers Obtain Lighting Shipments

Lighting Technology	Direct from Manufacturer	From Manufacturer Rep	Independent Distributor	Your Own Company Distribution Center
Hard Wired Fixture	34%	16%	9%	42%
Fluorescent Light	45%	16%	13%	26%
Torchiere	36%	14%	0%	50%

On average, retailers display more fluorescent lights (58) than either hardwired fixtures (48) or torchieres (12). Table 5-70 shows the average number of lighting products displayed on a store's floor.

Table 5-70
Average Number of Lighting Products Displayed

Lighting Technology	Models Displayed	Responses
Hard Wired Fixture	48	34
Fluorescent Light	58	57
Torchiere	12	83

Stocking practices vary among retailers. Some claim to display all energy efficient lighting products and some claim to display none. Table 5-71 shows the *average* percent of lighting products displayed that are claimed to be energy efficient. As one can see in the table, there is little variation across lighting types and, based on the large standard deviations, stocking practices are not uniform.

Table 5-71
Store Managers' Reported Percent of Lighting Products Displayed that are Energy Efficient

Lighting Technology	Mean Percent Energy Efficient	Standard Deviation	*# Respondents*
Hard Wired Fixture	17%	22%	92
Fluorescent Light	19%	23%	97
Torchiere	17%	28%	82

About 17% of retailers report that they have experienced shortages in energy efficient torchieres in the last 12 months. For CFLs and hardwired fixtures, only 10 percent of the retailers report shortages.

Table 5-72 shows the change in the number of energy efficient model numbers on display. Forty-four percent of retailers reported that they have the same number of energy efficient lighting products on display this year compared to last. However, more retailers added energy efficient lighting products this year (44%) than removed energy efficient lighting products from display (4%).

Table 5-72
Number of Different Energy Efficient Lighting Models on Display Compared To Last Year

Response	All California	Out of State
Much less then last year	3%	3%
Some what less than last year	1%	2%
Same as last year	44%	44%
Some what more than last year	36%	37%
Much more than last year	8%	12%
Didn't sell last year	2%	1%
Refused	2%	0%
Don't know	4%	1%
# Responses	130	109

Tables 5-73 and 5-74 show the change in the percent of sales of energy efficient models on display. In and out of California, sales are reported to be slightly higher than they were last year. The increase appears to be larger outside California. In particular, sales of CFLs are reported to be up in both markets.

Table 5-73
Annual Energy Efficient Lighting Sales Compared to Last Year, California

Response	Hardwired Fixtures	Screw-In CFLs	Torchieres
Much less than last year	0%	0%	0%
Somewhat less than last year	5%	12%	6%
Same as last year	17%	12%	35%
Somewhat more than last year	33%	34%	19%
Much more than last year	6%	11%	10%
Didn't sell last year	0%	0%	3%
Ref	24%	20%	22%
Don't Know	14%	11%	4%
# Respondents	*47*	*52*	*35*

Table 5-74
Annual Energy Efficient Lighting Sales Compared to Last Year, Outside California

Response	Hardwired Fixtures	Screw-In CFLs	Torchieres
Much less than last year	2%	0%	0%
Somewhat less than last year	0%	3%	0%
Same as last year	36%	24%	28%
Somewhat more than last year	41%	40%	48%
Much more than last year	19%	32%	13%
Didn't sell last year	0%	0%	11%
Ref	2%	2%	0%
Don't Know	0%	0%	0%
# Respondents	*46*	*44*	*19*

Most retailers, in state and out of state, report that it takes about 1 week to receive an order for either a standard or energy efficient lighting product.

Mystery Shopping Survey

As reported in Section 5.2.3, approximately 16% of the lighting units presented to mystery shoppers were high efficiency.

In addition, mystery shoppers were also instructed to estimate the extent of floor stock or shelf space dedicated to ENERGY STAR® lighting products. The results of this data collection effort are summarized below:

- On average, mystery shoppers counted approximately 12 torchieres displayed at each retail store. Only one of these twelve fixtures, however was found to have the ENERGY STAR® label or a compact fluorescent light bulb installed, or 7% of all torchieres on display.
- Mystery shoppers observed about 21 hard-wired fixtures per store on average. Two of these fixtures were found to display the ENERGY STAR® label or compact fluorescent light bulb installed, or 9% of all hard-wired fixtures on display.
- On average, each store was found to dedicate approximately 91 linear feet of shelf space to screw-in bulbs. The approximate shelf space dedicated to screw-in CFLs was observed to be just under five linear feet, or about 5% of all shelf space.

Conclusion

Store managers report that approximately 17% to 19% of the lighting products on their floors are high-efficiency models. This figure is somewhat higher than the figures from the mystery shopping survey, which shows that about 7% of all torchieres on display, 9% of hard-wired fixtures on display, and 5% of light bulbs on display are energy efficient. However, mystery shoppers also reported that approximately 16% of all lighting products *shown* by salespeople to mystery shoppers were high efficiency. In any case, it seems clear that a relatively small share of the lighting products displayed and presented to customers are high efficiency units. However, the percentage of models displayed and sold that are high efficiency is reported to have increased both in- (39%) and out-of-state (60%). In both cases, increases are reported most often for screw-in CFLs. If this trend continues, then the chances of a customer being exposed to high efficiency lighting products will increase.

5.2.8 Rebate Program Coverage

While not an indicator of market effects, we have collected information on the prevalence of rebates from a variety of sources in order to better characterize the market and to identify other possible explanations of customer behavior. We drew upon questions in the customers survey and in the mystery shoppers survey to address this issue. In the customer survey, we asked whether the customer received a rebate, from whom, and the approximate amount. In the mystery shopper survey, we asked shoppers to judge the extent to which the sales person was knowledgeable about utility, manufacturer, or store rebate programs.

Customers

Table 5-75 presents a breakdown of lighting products for which customers reported to have received a rebate. Note that the rebates may be for efficient or standard lighting products.

Table 5-75
Receive Rebate for Lighting Product

Response	Hardwired Fixture	Light Bulb	Torchiere
Yes	1%	2%	1%
No	97%	83%	97%
Ref	1%	12%	4%
Don't Know	1%	3%	2%
# Respondents	199	315	203

As one can see, rebates were available for only approximately 1.4 percent of all lighting products. Rebates were available most frequently for light bulbs, although only 1 percentage point more than hardwired fixtures and torchieres.

As shown in Table 5-76, most of the rebates for hardwired fixtures and light bulbs are from manufacturers, with utilities providing most of the rebates for torchieres. This is an important finding in light of the fact that, while rebates from utilities are certainly for efficient units, the rebates from the retail stores and manufacturers may be for both efficient *and* standard units. Thus, the objective of increasing the market share of efficient hardwired fixtures and CFLs may be thwarted by other incentives for units that are not considered to be energy efficient.

Table 5-76
Source Of Rebate for Lighting Product

Response	Hardwired Fixture	CFL	Torchiere
Rebate from local utility	16%	0%	73%
Rebate from retail store	17%	39%	9%
Rebate from manufacturer	50%	61%	17%
Refused	16%	0%	0%
# Respondents	6	5	4

Mystery Shopping Survey

Mystery shoppers were instructed to evaluate the extent to which sales people were knowledgeable about various rebate programs. Table 5-77 presents the results of this assessment.

Table 5-77
Sales Person Knowledge of Rebate Programs by Lighting Product

	Hard-wired Fixtures	Torchieres	Screw-in Bulbs
Knowledge of Utility Rebate Program [1]	5%	10%	2%
Knowledge of Manufacturer Rebate Program [2]	0%	24%	32%
Knowledge of Retailer Rebate Program [2]	0%	24%	32%

[1] Results shown as percent reporting salesperson as "very knowledgeable" (coded "4" on a four point scale, where "1" indicates "not at all knowledgeable" and "4" indicates "very knowledgeable").

[2] Percent calculated only if manufacturer/retailer rebate programs were mentioned by salesperson.

As one can see, the mystery shoppers' assessment of how much sales staff know about utility, manufacturer, or retailer rebate programs is rather low.

Store Manager Survey

Finally, store managers were asked, on an unaided basis, to name any California energy efficiency programs that focused on residential lighting and appliances. Forty-six percent were able to mention at least one utility-specific or statewide programs. Note that 6% were able to name the Program specifically.

Conclusions

In general, very few rebates are available from any source. However, because these rebates are for both efficient and standard units, this presents a challenge that traditional utility rebate programs have faced for years. In some cases, utility rebates for efficient units are added to manufacturers and retailers, while in others, these market actors may use their own rebates to promote other non-high efficiency units, thereby competing against the efficient models. Because so few rebates are available, the problem remains small and perhaps manageable, as long cooperative relationships can be arranged with manufacturers and retailers.

5.3 CUSTOMER ATTITUDES AND INTERNAL CONSISTENCY

In this subsection, we present customer attitudes toward energy efficiency. In addition, for appliances, we present the consistency among customers' *claims* regarding the efficiency of the appliance they purchased, the *actual* efficiency of the appliance they purchased, and their *attitudes* toward energy efficiency. For lighting, we present the consistency between customers' *claims* regarding the efficiency of the lighting product they purchased and their *attitudes* toward energy efficiency.

5.3.1 Attitudes

All customers, both in-state and out-of-state, were asked eight questions regarding energy efficiency. These eight items were taken from a prior study[12] in which 11 items were used. In this prior study, a factor analysis was conducted which revealed five factors. Only those items that loaded heavily on one of these five factors were used in the this Study. The results, presented in Table 5-78, customers attitudes are already fairly positive.

Table 5-78
Attitudes Toward Energy Efficiency

Items[13]	All California			Out of State		
	Mean	Std Dev	N	Mean	Std Dev	N
Not concerned about energy use in home	3.6	3.2	955	3.6	3.1	331
Home energy use small, does not matter	3.0	2.8	955	3.1	2.8	332
Too busy to make energy improvements	3.3	2.8	997	3.5	2.9	331
Scarce energy supply major problem	6.9	3.0	983	7.1	2.9	333
Conservation important, ignore cost	8.3	2.3	1001	8.4	2.2	332
Conservation not power plants	6.6	2.9	983	6.9	2.9	326
Conservation does not cost comfort	8.1	2.4	997	8.1	2.3	330
I should save energy to preserve environment	7.9	2.4	996	8.2	2.1	330

These results are consistent with those presented in the *CBEE Baseline Study on Public Awareness and Attitudes Toward Energy Efficiency*[14]

5.3.2 Internal Consistency Among Customer Attitudes, Claimed Efficiency of Equipment Purchased, and Actual Efficiency of Equipment Purchased

Based on the survey results for California respondents, there is no consistency between customer's expressed values, beliefs in whether they purchased high efficiency appliance and whether a high efficiency appliance was actually purchased.

For this analysis, we used the following definitions high efficiency appliances:

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[12] McElroy, Kathleen and Kent Van Liere. "CBEE baseline Study on Public Awareness and Attitudes Toward Energy Efficiency." Submitted to the California Board for Energy Efficiency and the Pacific Gas and Electric Company, 1999.

[13] Note that, because of the wording for the first three items, the lower the score the more positive the attitude. For the remaining five items, the higher the score the more positive the attitude.

[14] McElroy, Kathleen and Kent Van Liere. "CBEE Baseline Study on Public Awareness and Attitudes Toward Energy Efficiency." Prepared for the Pacific Gas & Electric Company and the California Board for Energy Efficiency, 1999.

- High efficiency for refrigerators was set at the program minimum of 20% above standards.
- For the other appliances, high efficiency units were identified by the model numbers listed in ACEEE's guide, *The Most Energy Efficient Appliances 1999*.

Note: Appliances without model numbers or model numbers for which the efficiency could not be determined were excluded from the analysis.

Of the 856 respondents, 52% (445) claimed to have purchased a high efficiency unit. Of the 856 customers, 214 were able to provide the necessary documentation that enabled us to verify whether they purchased standard or efficient units. Table 5-79 shows that very few *claimed* purchases of high efficiency appliances were actually *verified* using the above criteria.

Table 5-79
Verified In-State Purchases of High Efficiency Appliances

Appliance	Frequency
Clothes Washer	3
Dish Washer	0
Refrigerator	12
Water Heater	1
Room AC	1
Total	17

Table 5-80 shows that customers purchased high efficiency appliances in approximately the same proportions, independent of whether they said that they purchased high efficiency appliance. Clearly, customers do not know the efficiency of the appliances they purchased. These results are reasonably consistent with the results presented in an earlier study.[15]

Table 5-80
Percent of Customers Correctly Claiming to Have Purchased a High Efficiency Appliance

Said they Bought EE Appliance	Actually Bought High Efficiency Appliance	*Total Responses*
Yes	9%	109
No	7%	64
Don't Know	5%	41

A value score was set using the mean of the value from questions A3_1 through A3_8 (The responses to questions. (The responses from questions A3_1 through A3_3 were reversed for scale directional consistency.) Respondents with a mean value score of greater than 7 are

[15] McElroy, Kathleen and Kent Van Liere. "CBEE baseline Study on Public Awareness and Attitudes Toward Energy Efficiency." Submitted to the California Board for Energy Efficiency and the Pacific Gas and Electric Company, 1999.

considered inclined toward environmental values. Tables 5-81 and 5-82 show that respondents' values played a small role in whether they said they purchased energy efficient appliances or lighting products. There is no statistically significant correlation between environmental values and what they said they bought.

Table 5-81
Expressed Values and What People Said They Bought, Appliances

Said they Bought EE Appliance	Not Inclined Toward Environmental Values	Inclined Toward Environmental Values
YES	42%	58%
NO	31%	21%
DK	28%	21%
# of Respondents	260	561

Table 5-82
Expressed Values and What People Said They Bought, Lighting

Said they Bought EE Lighting	Not Inclined Toward Environmental Values	Inclined Toward Environmental Values
YES	19%	25%
NO	76%	73%
DK	5%	1%
# of Respondents	231	478

A similar result was obtained when we examined the relationship between the relative importance of price and energy efficiency priories (aided questions QA2_3 and QA2_4) and the efficiency of the appliance reported by the customer. Again, from Tables 5-83 and 5-84, one can see that there was no statistically significant correlation between these priorities and whether the purchase of an energy efficient appliance or lighting product was claimed.

Table 5-83
Priorities in Relation to Claimed Energy Efficient Appliance Purchase

Said They Bought EE Appliance	Importance of Price Over Energy Efficiency	Importance of Price Same As Energy Efficiency	Importance of Energy Efficiency Over Price
YES	45%	54%	63%
NO	29%	25%	17%
DK	26%	21%	21%
# of Respondents	338	236	248

Table 5-84
Priorities in Relation to Claimed Energy Efficient Lighting Purchase

Said They Bought EE Lighting Product	Importance of Price Over Energy Efficiency	Importance of Price Same As Energy Efficiency	Importance of Energy Efficiency Over Price
YES	17%	22%	33%
NO	78%	75%	67%
DK	4%	3%	0%
# of Respondents	269	220	209

Table 5-85 and 5-86 show the priorities expressed in the aided questions QA2_3 and QA2_4 compared to the values expressed in questions A3_1 through A3_8. Again there is no correlation.

Table 5-85
Priorities in Relation To Values, Appliances

	Importance of Price Over Energy Efficiency	Importance of Price Same As Energy Efficiency	Importance of Energy Efficiency Over Price
Not Inclined Toward Environmental Values	38%	28%	27%
Inclined Toward Environmental Values	62%	72%	73%
# of Respondents	340	237	248

Table 5-86
Priorities in Relation To Values, Lighting

	Importance of Price Over Energy Efficiency	Importance of Price Same As Energy Efficiency	Importance of Energy Efficiency Over Price
Not Inclined Toward Environmental Values	46%	25%	23%
Inclined Toward Environmental Values	54%	75%	77%
# of Respondents	269	220	209

Finally, Tables 5-87 and 5-88 show how respondents priorities and values affected actual efficiency of appliance purchases. Clearly, those respondents who would be expected to have purchased higher efficiency products based on their survey responses showed a higher propensity to purchase high efficiency appliances then those who wouldn't seem to consider energy efficiency, in itself, an important consideration. However, of the 15% of the people who said that energy efficiency was more important than price and purchased high efficiency appliances, only 60% know they purchased high efficiency. Likewise, of the 10% of the people who appeared inclined toward environmental values and purchased high efficiency appliances, only 54% know they purchased high efficiency.

Table 5-87
Relationship Between the Value Placed on Price and Efficiency and Actual Efficiency of Appliance Purchased

Priorities and Values	Purchased High Efficiency Appliance
Importance of Price Over Energy Efficiency	3%
Importance of Price Same As Energy Efficiency	6%
Importance of Energy Efficiency Over Price	15%

Table 5-88
Relationship Between the Value Placed on the Environment and Actual Efficiency of Appliance Purchased

Priorities and Values	Purchased High Efficiency Appliance
Not Inclined Toward Environmental Values	3%
Inclined Toward Environmental Values	10%

Table 5-89 explores the reasons for not purchasing energy efficient appliances given by those participants who either were inclined toward environmental values or indicated that energy efficiency was a higher priority than price. Over half the concerns expressed (57%) could be

addressed by proactively providing customers with more information about efficient appliances. This is, of course, already a critical component of the Program.

Table 5-89
Reasons for Not Buying Energy Efficient Appliance For Respondents Inclined Toward Environmental Values or Consider Energy Efficiency a High Priority

Reasons for Not Buying Energy Efficient Appliance	Percent
Cost of purchase	26%
Lack of information or availability	29%
Didn't think about energy efficiency or don't know	28%
Other	16%
# of Respondents	110

From a program design perspective, it would appear that if people actually purchased the efficiency levels that they thought they were purchasing, the percent of high efficiency appliance sold would go up. The following elements are required.

- Around the time of purchase, customers must be reminded about benefits of energy savings and the environment.
- Customers must be directed toward **actual** energy efficient appliances.

Focused marketing of the ENERGY STAR® Label would be extremely effective in both regards. A trained sales force would augment those marketing efforts. The objective would be to bring people's actions in line with their values.

It will not be necessary to educate people about complex concepts such as payback or net present value to accomplish the objective. From the estimates of cost and saving, people already think the technologies are cost effective. Thus, more information in this regard would not help high efficiency sales efforts.

The message should be simple and stress the following three key elements:

- products with the ENERGY STAR® Label save energy,
- products with ENERGY STAR® Label are good for the environment, and
- products with the ENERGY STAR® Label save money.

5.4 METHODOLOGICAL RECOMMENDATIONS

Based on our experience in Phase I, we have four recommendations regarding the methods to be used in future phases of this evaluation.

5.4.1 Customer Data Collection in Phase III

While no formal decision has yet been made regarding customer data collection in Phase III, it is our opinion that the customer data collection should be postponed until Phase IV. The rationale for this recommendation is that, assuming customer data are collected in October/December of 2000, the PY2000 Program will have only 8 to 10 months to affect customer behavior, making the detection of any market effects unlikely. Whether customer data is collected in Phase III or Phase IV, a formal analysis of the costs of customer data collection should be conducted before finalizing the budget. The cost analysis should include an assessment of the lower expected incidence rates resulting from screening for customers who purchased targeted equipment within the last four to six months rather than within the last two years, as was the case in Phase I.

5.4.2 Non-Response Bias

Customer response rates in this and similar studies over the last several years have been low, creating the *possibility* of a non-response bias. That is, those customers who chose to respond may be systematically different than those who chose not to respond. To determine the existence and magnitude of any bias requires that additional data be collected from those customers who *initially* refused to participate in the survey. We recommend increasing the customer data collection budget for those Phases for which it is decided that customer data will be collected.

5.4.3 Shelf-Space/Floor Stock Tracking Study

In this study, we used mystery shoppers to address what we felt were the most important indicators. However, the mystery shopping approach does not lend itself to conducting a rigorous study of shelf-space and floor stock for lighting products. If tracking shelf space and floor stock is considered to be valuable as a near-to-mid-term indicator, we recommend allocating more resources for a separate shelf-space/floor-stock tracking study *or* more formally incorporating into this statewide evaluation study other tracking activities conducted by the Implementation Contractor or individual utilities.

5.4.4 Technologies Studied

If it is very likely that gas water heaters will not be included in the PY2000 and PY2001 Program, then we recommend dropping them from future data collection efforts. In addition, in the absence of increased resources for the statewide study, consideration should be given to dropping other technologies based on their relative importance. This would allow more sample points to be devoted to the remaining technologies and reduce the data collection costs.

6 MARKET CHARACTERIZATION

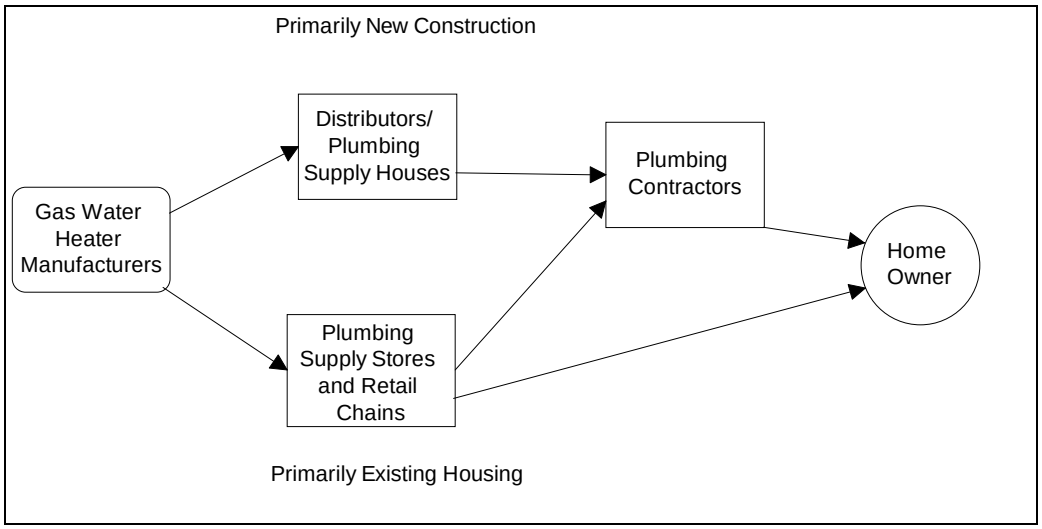
In this section we provide an overview of the markets for gas water heaters, residential appliances (refrigerators, dishwashers, and clothes washers), room air conditioners, and residential lighting technologies (bulbs, fixtures, and torchieres).

6.1 MARKET CHARACTERIZATION FOR APPLIANCES

6.1.1 Gas Water Heaters

Water heaters are distributed through two primary distribution channels as shown in Figure 6-1. The upper path in the figure is based on a more traditional model of wholesale distribution in which the manufacturers' products are handled by distributors (also called plumbing supply houses in this market), who in turn sell them to plumbing contractors or builders (in the case of new construction). Some manufacturers own their own distributors. This path serves primarily the new construction market (70% to 90% of distributor sales are for new housing).[1]

Figure 6-1
Residential Gas Water Heater Product Distribution Channels



The lower path relies on a retail distribution channel in which the manufacturer sells directly to a retailer who, in turn, supplies water heaters to home owners or plumbing contractors. **This is the primary distribution channel for the existing homes market**. The retailer also may provide or arrange for installation services. There are two general categories of retailers in this channel—traditional plumbing supply stores and large retail chains (such as "do-it-yourself" stores).

[1] Regional Economic Research (RER). 1998. *Residential Market Effects Study*, prepared for Southern California Gas Company and San Diego Gas and Electric Company.

In the existing homes market, the final customer is the home owner—either the occupant or owner who rents the single- or multi-family residence.

Five manufacturers dominate the water heater market as shown in Table 6-1. The distribution of gas water heaters is done by a relatively small number of firms serving a limited geographic area.[2]

Table 6-1
National Water Heater Production
by Manufacturer, 1998[3]

Manufacturer	Market Share/Size
State Industries	34%
Rheem Manufacturing	22%
Southcorp	16%
A.O. Smith	15%
Bradford-White	13%
Total Units Manufactured in U.S.	8,833,654

6.1.2 Residential Appliances

Figure 6-2 shows the distribution channels for major residential appliances in the existing homes market.[4] Major residential appliances can flow to the home owner through one of three different routes. The upper path is the traditional channel through an appliance distributor or wholesaler. Some manufacturers are vertically integrated with their own distributors.

The other two pathways do not include a typical distributor or wholesaler. In the case of large retailers, many have direct relationships with a manufacturer. For smaller retailers, many are members of aggregate buyer groups, which provide increased pricing leverage with the manufacturer. The channels vary some depending on the appliance. In particular, the channels in the clothes washer market have been considerably consolidated so that distributors play almost no role.[5]

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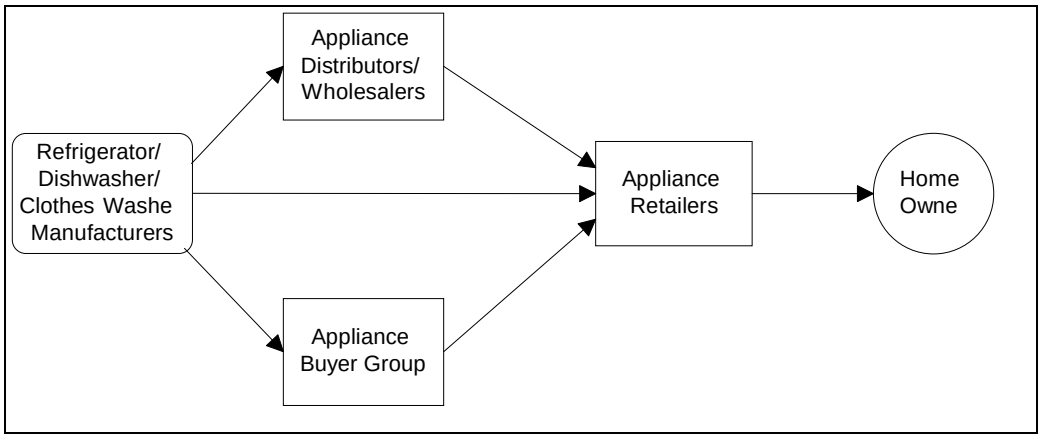
[2] RER. 1999. *Efficiency Market Share Needs Assessment and Feasibility Scoping Study*. Prepared for California Board for Energy Efficiency/San Diego Gas and Electric and Southern California Gas.

[3] *Appliance*, September, 1999.

[4] Note that this diagram excludes the channel that would be used in the case of new homes for refrigerators and dishwashers.

[5] RER. 1999. *Efficiency Market Share Needs Assessment and Feasibility Scoping Study*. Prepared for California Board for Energy Efficiency/San Diego Gas and Electric and Southern California Gas.

Figure 6-2
Major Residential Appliance Products Distribution Channels



Tables 6-2 through 6-4 present the 1998 market shares of residential refrigerator, dishwasher, and clothes washer manufacturers. General Electric, Whirlpool, Electrolux (Frigidaire), and Maytag are major producers of all three appliances. In the past two decades, production has been consolidated among a shrinking number of major manufacturers. The market share captured by the top three producers of each product range from 78% to 93%.

Table 6-2
National Refrigerator Production
by Manufacturer, 1998[6]

Manufacturer	Market Share/Size
General Electric	33%
Whirlpool	25%
Electrolux (Frigidaire)	20%
Maytag (Admiral)	11%
Goodman (Amana)	8%
Other	3%
Total Units Manufactured in U.S.	8,773,500

[6] *Appliance*, September, 1999.

Table 6-3
National Dishwasher Production
by Manufacturer, 1998[7]

Manufacturer	Market Share/Size
General Electric	38%
Whirlpool	39%
Maytag	16%
Electrolux (Frigidaire)	7%
Other	-
Total Units Manufactured in U.S.	5,144,100

Table 6-4
National Clothes Washer Production
by Manufacturer, 1998[8]

Manufacturer	Market Share/Size
Whirlpool	53%
Maytag	21%
General Electric	15%
Electrolux (Frigidaire)	7%
Goodman (Speed Queen)	4%
Total Units Manufactured in U.S.	7,023,950

6.1.3 Room Air Conditioners

Unlike central air conditioners, the distribution channels for room air conditioners are similar to those for major residential appliances (see Figure 6-2), often involving the same actors. There is one difference, however, in that some air conditioner manufacturers (such as Goodman and United Technologies' Carrier[9]) produce both central and room air conditioners, and they often distribute both product lines through the same channels.

[7] *Appliance*, September, 1999.

[8] *Appliance*, September, 1999.

[9] *Appliance Manufacturer*, May 1998.

Figure 6-3 displays the distribution channels for room air conditioners. As noted, it is very similar to the figure presented earlier for large residential appliances. It includes, however, a pathway that includes HVAC dealers and contractors.

Figure 6-3
Residential Room Air Conditioner Distribution Channels

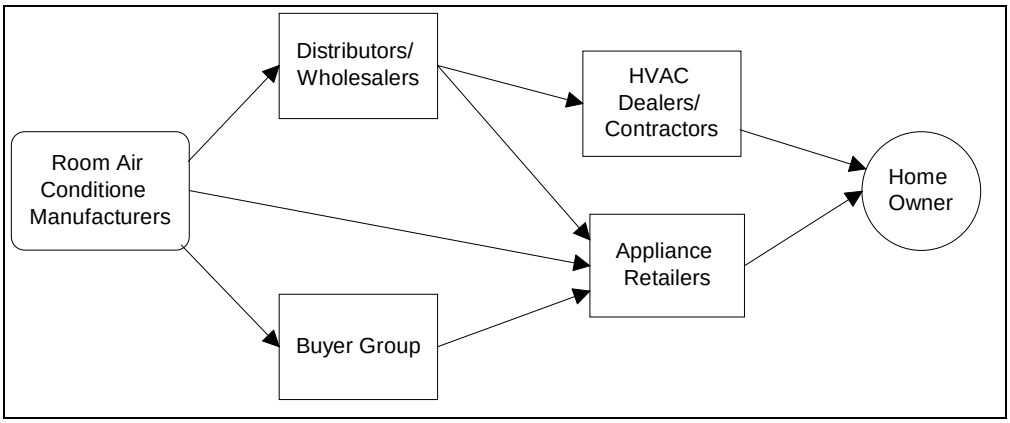


Table 6-5 shows the market shares of room air conditioners held by different producers in 1998. The list includes some of the producers of other major residential appliances (e.g., Electrolux and Whirlpool). Room air conditioner production is less concentrated than it is for the other appliances, with the top three producers representing only 64% of the total. Production is also characterized by the presence of a large number of firms with between 2% and 7% of the market and several foreign manufacturers. As noted earlier, the producers also include some that provide central air conditioners to the residential (and commercial) market as well.

Table 6-5
National Room Air Conditioner Production
by Manufacturer, 1998[10]

Manufacturer	Market Share/Size
Fedders	25%
Electrolux (Frigidaire)	21%
Whirlpool	18%
Goodman (Amana)	7%
LG Electronics (Goldstar)	7%
Matsushita	6%
Sharp	4%
Friedrich	3%
Carrier	3%
Sanyo	2%
Other	3%
Total Units Manufactured in U.S.	4,403,400

6.2 APPLIANCE WHOLESALERS/DISTRIBUTORS

According to Bodner[11] the major appliance chains buy directly from the manufacturers and the small independent stores purchase from the manufacturers through buyer groups. Wholesale distributors are not a major part of the distribution chain. Middlemen do not play a major role between manufacturers and retailers in either the appliance or lighting markets.

In an attempt to corroborate the view of Bodner, we called a random sample of wholesalers/distributors in the SDG&E service territory. Of 66 businesses listed as appliance wholesalers/distributors, we attempted to call 20 and actually contacted 10 firms. Only three of the firms claimed to sell appliances for resale but two of these firms also sold to individuals. Only one of the firms appeared to be a true wholesale distributor. The firm sold room air conditioners to contractors. These results, although based on a small sample, are consistent with Bodner's views.

[10] *Appliance*, September, 1999.

[11] Telephone interview with Lee Bodner of D&R, September, 1999. D&R is involved in the development of a database of Energy Star retailers as part of the national Energy Star effort.

6.3 APPLIANCE RETAILERS

Based on the analysis of D&B data and subsequent interviews described in Section 4, we estimated the population of appliance retailers that sell one of the five appliances. The number of retail stores that sell each appliance is presented in the Table 6-6.

Table 6-6
Estimated Population[12] of Appliance Retailers (in program area)

Parameter	Store Segment	
	Low-Volume (Non-major chain)	High-Volume (Major Chain)
Initial Estimated Population (Based on initial D&B classification)	1185	378
Percent Sample, Sell Clothes Washers	65%	84%
Percent Sample, Sell Refrigerators	65%	89%
Percent Sample, Sell Dish Washers	58%	89%
Percent Sample, Sell Gas Water Heaters	19%	43%
Percent Sample, Sell Room Air Conditioners	27%	51%
Estimated Population, Sell Clothes Washers	770	318
Estimated Population, Sell Refrigerators	770	336
Estimated Population, Sell Dish Washers	687	336
Estimated Population, Sell Gas Water Heaters	225	163
Estimated Population, Sell Room Air Conditioners	320	193

6.4 CUSTOMERS

This section presents an overview of the households in the program catchment area. These households represent the end users in the appliance market. The program service territories contain approximately 9.3 million single metered residential households (see Table 4-1 in Section 4). Interviews with a randomly selected sample of households provided information on what percentage of customers purchased any of the five appliances (refrigerators, dishwashers, clothes washers, gas water heaters, or room air conditioners) within the last two years. These interviews also revealed the kind of stores in which these products were purchased. In Table 6-7,

[12] Note that the population was defined, for the purposes of this study, to include the following SICs: 5722-0000 Household appliance stores; 5722-0201 Air conditioning room units, self-contained; and 5722-0202 Electric household appliances, major. Thus, this frame focused mostly on white goods (since those are the priority technologies for the non-lighting portion of this Study). Gas water heaters and room air conditioners can also be purchased at hardware stores, which were not included in the appliance frame. Thus, the total number of stores shown for gas water heaters and room air conditioners, is the total number within the frame as defined by the SIC codes above, not the entire population of all stores from which these technologies could be purchased (i.e., hardware stores are not included).

we present estimates of the percentage of households that purchased each appliance within the last year.

Table 6-7
Percent of Customers Who Annually Purchase One of the Five Appliances

Appliances	Purchased Annually
Refrigerator	7.6%
Dishwasher	4.4%
Clothes Washer	6.9%
Room Air Conditioner	1.8%
Gas Water Heater	2.7%

Using these percentages along with the household data for the program catchment area (again, Table 4-1 in Section 4), we estimate the total number of units purchased annually. These estimates are presented in Table 6-8.

Table 6-8
Estimated Number of Units Purchased Annually in Program Area

Appliance	Units
Refrigerator	710,120
Dishwasher	411,122
Clothes Washer	644,715
Room Air Conditioner	168,186
Gas Water Heater	252,280

Those who purchased also were asked from what kind of store they acquired their appliances. Table 6-9 presents these results.

Table 6-9
Breakdown of Appliance Purchases by Store Type (purchases within the last Two Years)

Type of Store	Refrigerator (Percent)	Dishwasher (Percent)	Clothes Washer (Percent)	Room A/C (Percent)	Gas Water Heater (Percent)
Hardware Store	2%	1%	1%	18%	31%
Discount Retail Store	12%	12%	12%	25%	13%
Department Store	39%	36%	49%	26%	24%
Appliance Store	38%	44%	31%	22%	11%
Other	8%	6%	8%	9%	21%

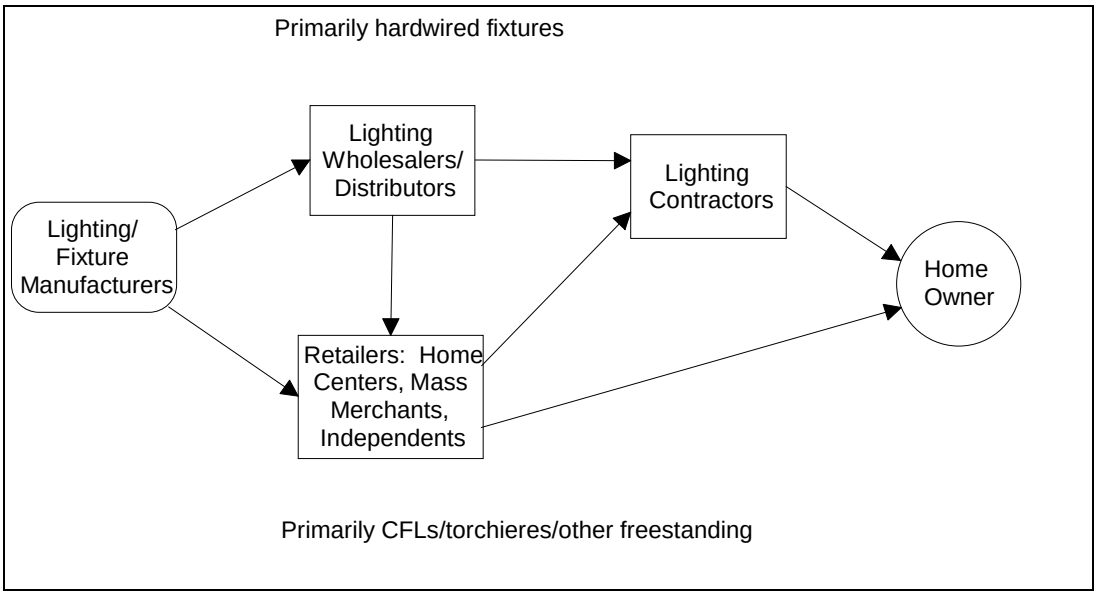
As one can see, most refrigerators, dishwashers, and clotheswashers are purchased in department and appliance stores. Room air conditioners are bought across a rather even distribution of hardware, discount retail, department, and appliance stores. As expected, gas water heaters are purchased mostly in hardware stores, although a significant share of purchases are made in other store types as well.

6.5 MARKET CHARACTERIZATION FOR LIGHTING

The lighting industry distribution system evolved after World War II from a system in which manufacturers sold mostly through hardware stores to one where manufacturers sold through a wide range of retail outlets.[13] The current distribution channels differ primarily depending on whether the product is hard-wired or freestanding (replaceable by CFLs or torchieres). Most hardwired lighting products are installed when the home is built or remodeled/renovated and usually by a construction contractor. However, end users replace some existing fixtures and install new ones over the life of a home. Freestanding lighting equipment, on the other hand, is generally purchased exclusively by the home owner/occupant. The market distribution channels for the targeted lighting products are illustrated in Figure 6-4.

[13] *Business Economics*, Oct 1996

Figure 6-4
Targeted Residential Lighting Products Distribution Channels



6.5.1 Target Manufacturer Market

There are a large number of manufacturers in the U.S. lighting market. In 1996, there were about 250 manufacturers of residential luminaires and 59 manufacturers of compact fluorescents.[14] The market of targeted manufacturers consists of those manufacturers that are participating in the Statewide Residential Lighting and Appliances Program. In Table 6-10, we summarize the number of manufacturers that are currently participating, as well as the number that were sent and responded to an RFP for participation prepared by the Implementation Contractor as part of their third-party implementation of the statewide program.

Table 6-10
Number of Participating Manufacturers in 1999 Statewide Lighting Program

Product	~Number of Manufacturers Receiving the RFP	~Number of Manufacturers Responding	~Number of Manufacturers Selected
Light Bulbs	60	25	5
Hardwired Fixtures/Torchieres	40	15	3

[14] RER. 1999. *Efficiency Market Share Needs Assessment and Feasibility Scoping Study*. Prepared for California Board for Energy Efficiency/San Diego Gas and Electric and Southern California Gas.

6.5.2 Wholesaler/Distributor Market

No intervention strategies are directed at the wholesale/distributor segment of the market. This is because the wholesale/distributor segment of the residential lighting market is not an important leverage point. Retailers generally obtain their product supplies directly from manufacturers or their representatives. Lighting wholesalers and distributors sell less than 10 percent of their product to retail stores.[15]

Hard-wired lighting equipment is sold primarily through electric wholesale stores, which sell mostly to electrical contractors, as well as to some smaller lighting retailers. These firms typically get their products directly from the manufacturer and consider themselves to be product distributors. This channel is relevant primarily to the new home construction market or remodeling/renovations.

Freestanding lighting products, however, are usually purchased by the home owner at one of many types of retail outlets, which get their products either directly from the manufacturer or from a wholesaler that services smaller retailers.[16] These retail outlets are either one of the giant home center chains, mass merchant chains, or independents.

Wholesale distributors appear to have a minor role in the CFL lighting market. According to Rosenberg (1999), most CFLs are sold through the large discount chains and are purchased directly from manufacturers. Most of the remaining CFLs are sold though Cooperative Chains like Ace Hardware and True Value Hardware. These organizations buy from manufacturers and provide their own warehousing. This appears to be true for hard wired fixtures sold retail; hard wired fixtures sold to contractors may be sold though electrical supply wholesalers.

To corroborate these findings, screening interviews were conducted with a small random sample of wholesalers/distributors in the SDG&E territory. Of the 91 businesses listed in D&B, we attempted to call 20, eventually contacting 12 firms. Only six of the firms claimed to sell lighting products for resale. However, of these six, all also sold to *individuals*. Thus, none of the 12 companies contacted were pure wholesale lighting distributors, consistent with the conclusion that retailers purchase most of their lighting products directly from manufacturers.

6.5.3 Target Lighting Retailer Market

As discussed in Section 4, we conducted an analysis of the population of *targeted* retailers in the based on the D&B database supplemented by a database provided by ECOS Consulting (which is part of the RHA implementation team for the Statewide Residential Lighting and Appliance Program). The target market of retailers for fixtures and torchieres consists of hardware/home

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15 XENERGY, Inc. 1998. *PG&E and SDG&E Commercial Lighting Market Effects Study*, Prepared for Pacific Gas and Electric Company and San Diego Gas and Electric.

16 RER. 1999. *Efficiency Market Share Needs Assessment and Feasibility Scoping Study*. Prepared for California Board for Energy Efficiency/San Diego Gas and Electric and Southern California Gas.

improvement and lighting specialty stores. Note that the targeted market does not currently include grocery stores, drug stores, or discount stores (e.g., Kmart). Based on the analysis of D&B data and subsequent interviews, as described in Section 4, we estimated the population of *targeted* lighting retailers that sell each of the three lighting products. As shown in the Table 6-11, widely varying percentages of the stores identified through the combined D&B/ECOS database currently sell the baseline products of interest (14 percent to 82 percent depending on the product and segment). The estimated population of *targeted* retail stores in the program area that sell each lighting product is presented in the table below.

Table 6-11
Estimated Population of *Targeted* Retailers that Sell Lighting Equipment (in Program area)

Parameter	Store Segment	
	Low-Volume (Non-Major Chain)	High-Volume (Major Chain)
Initial Estimated Population (Based on D&B Search)	2127	543
Percent Sample that Sell Hardwired Fixtures	36%	67%
Percent Sample that Sell CFLs	55%	82%
Percent Sample that Sell Torchieres	14%	59%
Estimated *Target* Population that Sell Hardwired Fixtures	766	364
Estimated *Target* Population that Sell CFLs	1170	445
Estimated *Target* Population that Sell Torchieres	298	320

6.5.4 Customer Purchases of Targeted Products

This section presents an analysis of the number of targeted products purchased annually in the program area. As noted previously, there are approximately 9.3 million residential households in the program area. Interviews with a randomly selected sample of households provided information on what percentage of customers purchased any of three lighting products (hardwired fixtures, torchieres, or light bulbs) within the last two years. These interviews also revealed the kind of stores in which these lighting products were purchased. The percent purchasing each lighting product is shown in Table 6-12.

Table 6-12
Percent of Customers Who Annually Purchase One of the Three Lighting Products

Lighting Products	Purchased Annually
Hardwired Fixtures	7.4%
Torchieres	6.6%
Light Bulbs	34.5%

Those customers that reported purchasing each of the lighting products in the last two years were asked to report the number of each product purchased. The mean responses are presented in Table 6-13.

Table 6-13
Mean Number of Lighting Products Purchased Annually

Lighting Products	Mean Number of Product Purchased Annually
Hardwired Fixtures	3.4
Torchieres	1.7
Light Bulbs	16.8

From the data above, we can now produce an estimate of the total number of baseline lighting products purchased by residential customers in the program catchment area annually. The total estimated annual product purchases are shown in Table 6-14.

Table 6-14
Estimated Number of Units Purchased Annually in Program Area

Lighting Products	Units
Hardwired Fixtures	2,281,729
Torchieres	1,048,362
Light Bulbs	59,313,738

Finally, those who purchased lighting products also were asked to provide the store type from which their purchases were made. This information is provided in Table 6-15. As can be seen in the table, hard-wired fixtures and torchieres have a more similar store type distribution than do light bulbs. Hardware stores are an important source of all of the lighting products as are discount stores. Department stores are more important with respect to torchieres than other lighting products. As expected, lighting specialty stores are important for hard wired fixture and torchiere purchases but not for light bulbs. The light bulb "other" store category is comprised primarily of drug stores and grocery stores.

Table 6-15
Breakdown of Lighting Purchases by Store Type

Type of Store	Light Bulbs	Hardwired Fixtures	Torchieres
Hardware Store	25%	45%	32%
Discount Retail Store	31%	19%	34%
Department Store	7%	8%	14%
Lighting Specialty Store	1%	14%	11%
Appliance Store	1%	6%	2%
Other	35%	8%	7%

7 PRODUCT DESCRIPTIONS

In this section we provide comprehensive descriptions of the full range of targeted residential lighting and appliance products available to retail customer/end-users in California.

7.1 APPROACH

Our approach to this task involved a comprehensive review of the products targeted through the program – i.e., those that meet criteria established through the ENERGY STAR® initiative. This review was accomplished mainly through an analysis of the information contained on the ENERGY STAR®-qualifying product web pages, the California Energy Commission (CEC) Appliance Efficiency Databases, as well as a number of other secondary research sources[1]. For example, we compared products listed in the ENERGY STAR® on-line product list to the products listed in the CEC appliance efficiency databases (as applicable) to:

- determine the absolute number of unique appliances available in the current market,
- develop a list of manufacturers (and their various brands) that produce models that would qualify for the ENERGY STAR® label, and
- estimate the percent of all available appliances that would qualify for the ENERGY STAR® label[2].

In addition, we assessed the extent to which the full range of qualified products are being promoted to California consumers through a series of mystery shopper visits, retailer interviews, and a consumer survey, as presented in other sections and appendices of this report.

7.2 RESULTS

7.2.1 Program Overview

The Statewide Residential Lighting and Appliances Market Transformation Programs are designed to promote the transformation of the market for residential lighting and appliances through the mitigation of various market barriers affecting the consumer adoption of high-efficiency technologies. The programs respond to an objective of the California Board for Energy Efficiency (CBEE) to establish statewide programs that focus on achieving the goals of market

[1] For a complete list of sources used to complete this review, see Appendix H.

[2] This is not an estimate of market share, since these data were not weighted by actual shipment data or sales volume. Rather, this tells us about the absolute number of qualifying brands that could potentially be available to California consumers.

transformation. The programs target manufacturers, distributors, retailers, consumers, and other actors in California markets for energy efficient residential lighting and appliances.

The overall scope of the program has been defined as follows:

- **Geographic Coverage** – The programs will encompass the service territories of the four sponsoring utilities – SDG&E, PG&E, SCE, and SCG. Some of the activities associated with the programs focus on manufacturers and, thus, will benefit California residential ratepayers more or less uniformly. However, other activities (e.g., retailer training or local marketing) have a fairly strong location-specific effects.

- **Program Elements** – For lighting, the program addresses targeted information and market facilitation, high efficiency torchieres, and improved lighting fixtures. For appliances, the program covers targeted information and market facilitation, and ENERGY STAR® appliance incentives.

- **Technologies Covered** – For the 1999 program year at least, the programs are required to cover the following technologies:
  - Lighting – screw-in lamps, hard-wired interior and exterior lighting fixtures, and torchieres
  - Appliances – refrigerators, clothes washers, room air conditioners, and dishwashers

  Where available, ENERGY STAR® efficiency levels were specified as the base efficiencies required for inclusion in the 1999 programs (see discussion below). Additional technologies may be added for program years 2000 and 2001 (i.e., emerging technologies, other ENERGY STAR® products such as TVs and VCRs).

- **Intervention Strategies** – The intervention strategies designed for the 1999 program year were subject to the parameters already developed by the sponsoring utilities. Table 7-1 provides of summary of both the statewide and utility-specific intervention strategies for 1999. The specific details of the program design for program years 2000 and 2001 are still being determined and documented.

Table 7-1
Intervention Strategies for 1999 Program Year

Technology	Statewide Intervention Strategy	Utility-Specific Intervention Strategy
Screw-in Lamps	Upstream and midstream strategies Retailer instant rebate or manufacturer buy-down (not both)	Instant rebate/buy-down ($2-$7)
Hard-wired Lighting Fixtures	Upstream and midstream strategies Retailer instant rebate or manufacturer buy-down (not both)	Instant rebate/buy-down ($7-$10)
Torchieres	Upstream and midstream strategies Retailer instant rebate or manufacturer buy-down (not both)	Instant rebate/buy-down ($19)
Refrigerators	In-store marketing	Mail-in rebates (varies, PG&E and SCE only)
Clothes Washers	In-store marketing	Mail-in rebates ($50-$100)
Room Air Conditioners	In-store marketing	Mail-in rebates ($50, PG&E and SCE only)
Dishwashers	In-store marketing	Mail-in rebates ($30-$50)

- **Market Barriers Addressed –** As stated in the Scope of Work for the implementation of the statewide program, the general purpose of the programs is to "improve the availability, promotion, and sales of energy-efficient residential lighting and appliances by inducing sustained changes in the behavior of market participants." Bringing about such changes will require the mitigation of a variety of market barriers, including:
  - performance uncertainty,
  - information or search costs,
  - hassle or transaction costs,
  - asymmetric information or opportunism,
  - bounded rationality,
  - organizational practices or customs,
  - service or product unavailability,
  - access to or understanding or financing, and
  - hidden costs.

- **Duration** – It is the intention of the sponsoring utilities that the Statewide Residential Lighting and Appliances Market Transformation Programs continue through 2001.

7.2.2 ENERGY STAR® Overview

As mentioned above, where available, ENERGY STAR® efficiency levels are specified as the base efficiencies for products promoted through the programs. ENERGY STAR® is a voluntary partnership among the U.S. Department of Energy, the U.S. Environmental Protection Agency, product manufacturers, local utilities, and retailers. The program is designed to prevent pollution by helping consumers buy products that use less energy. The ENERGY STAR® label and other activities raise awareness about the environmental and economic benefits of energy efficient products and help consumers easily identify them when shopping.

ENERGY STAR® labels can currently be found on the following products:

- Household Appliances
- Residential Lighting Fixtures
- Heating and Cooling Products
- Home Electronics
- Office Equipment
- Transformers
- New Homes
- Building Materials (windows, insulation, roof products)
- Exit Signs

The Federal government defines minimum standards for energy consumption for many consumer products such as major appliances. In order for one of these products to receive an ENERGY STAR® rating, it must exceed the minimum Federal standards by a certain amount, which varies from product to product.

For other products where there are no minimum energy use standards (such as office equipment), products which qualify for the ENERGY STAR® label have special features which enable them to use less energy than similar products.

ENERGY STAR® products that are covered under the Statewide Residential Lighting and Appliances Market Transformation Program are described in the following sections. These products include:

- Refrigerators
- Clothes washers

- Dishwashers
- Room air conditioners
- Gas water heaters (PY2000)
- Hard-wired interior and exterior lighting fixtures
- Torchieres
- Compact fluorescent screw-in light bulbs (CFLs)

Where applicable, ENERGY STAR® information is compared with similar information available through the California Energy Commission (CEC) Appliance Efficiency Database. This comparison offers a good starting place for describing the full range of products available in the market and promoted through the programs.

7.2.3 Energy Star® Refrigerators

According to the ENERGY STAR® on-line product list[3], there are currently over 200 different refrigerator models that qualify for the ENERGY STAR® label. Manufacturers currently producing some of the more common qualifying refrigerators include: Whirlpool, Amana, Maytag, General Electric, and Frigidaire. These five manufacturers produce 13 qualifying refrigerator brands (Table 7-2).

According to the California Energy Commission's (CEC) Appliance Efficiency Database, there are approximately 505 refrigerator models would qualify for the ENERGY STAR® label. This is over twice as many models as included in the ENERGY STAR® on-line product list.

These qualifying models represent only about 17% of all refrigerators included in the CEC Appliance Efficiency Database. That is, the 505 qualifying models are a subset of the 2,939 refrigerator models certified by the CEC as meeting the current efficiency standards.

[3] http://www.energystar.gov

Table 7-2
Qualifying and Non-Qualifying Refrigerators

Manufacturer	Brand	Qualifying Models		Non-Qualifying Models
		EPA ENERGY STAR® Product List	*CEC Appliance Efficiency Database*	
Whirlpool	Kenmore	59	86	251
	Kitchen Aid	36	78	98
	Whirlpool	22	68	181
	Roper	10	16	102
Amana	Amana	34	50	222
	Modern Maid	1	1	15
Maytag	Maytag	22	94	115
	Jenn-Air	17	41	30
	Magic Chef	5	6	114
General Electric	GE	11	20	280
	Hotpoint	3	15	127
	RCA	2	6	62
Frigidaire	Frigidaire	1	4	218
	Other	0	20	619
	Total Models	223	505	2,434

Source: EPA ENERGY STAR® website and CEC Appliance Efficiency Database (May 1999).

Table 7-3 shows that most of the qualifying refrigerators fall within the Tier 1 or Tier 2 efficiency parameters established for the Statewide Residential Lighting and Appliances Market Transformation Program. Only about 11% of the models included in the ENERGY STAR® on-line product list fall within the Tier 3 efficiency bin (i.e., consume at least 30% less than standard efficiency refrigerators[4]).

Although the CEC Appliance Efficiency Database lists *more* models that would qualify for the program than those included in the ENERGY STAR® on-line product list, the *percentage* of models falling in the Tier 1, 2 and 3 efficiency bins is fairly consistent between the CEC Appliance Efficiency Database and the ENERGY STAR® on-line product list.

4 "Standard efficiency refrigerators," in this context, represents refrigerators that consume energy at a level that is equal to the federal or local standards.

Table 7-3
Qualifying Refrigerator Efficiency Levels

	ENERGY STAR® Product List	CEC Appliance Efficiency Database
Tier 1 Models *(ENERGY STAR®, or 20% lower than current standard)*	92 (41%)	211 (42%)
Tier 2 Models *(25-29.9% lower than current standard)*	107 (48%)	213 (42%)
Tier 3 Models *(At least 30% lower than current standard)*	24 (11%)	81 (16%)
Total Qualifying Models	223	505
Non-Qualifying Models	N/A	Approx. 2,500

Source: EPA ENERGY STAR® website and CEC Appliance Efficiency Database (May 1999).

7.2.4 ENERGY STAR® Clothes Washers

The Statewide Residential Lighting and Appliances Market Transformation Programs use the ENERGY STAR® efficiency requirements *(Energy Factor > 2.50)* as its baseline for qualifying clothes washers in the Tier 1 efficiency level. In addition, the program establishes a Tier 2 efficiency level, which requires that clothes washers meet ENERGY STAR® qualifications and have Remaining Moisture Content (RMC) less than 50%.

There are two designs of clothes washers that qualify for the ENERGY STAR® label – top-loading and front-loading:

- Front-loading ENERGY STAR® models, such as horizontal-axis or tumble-action machines, and
- Top-loading ENERGY STAR® models specially designed to control water temperature and water consumption.

According to the ENERGY STAR® on-line product list, there are 32 qualifying models associated with 14 unique brand names (Table 7-4). These models are listed with Energy Factors ranging from 2.51 to 4.03.

The CEC Appliance Efficiency Database contains data on 499 clothes washer models, however only 21 of these models (or 4%) are listed with Energy Factors greater than 2.50. Most of these models are identified in the CEC database as front-loading horizontal-axis washing machines.

Table 7-4
Qualifying and Non-Qualifying Clothes Washers

Manufacturer	Brand	Qualifying Models		Non-Qualifying Models
		ENERGY STAR® Product List	*CEC Appliance Efficiency Database*	
Maytag	Maytag	5	1	79
Frigidaire	Frigidaire	5	4	20
	Gibson	1	2	16
Miele	Miele	4	4	0
Asko	Asko	4	7	1
Whirlpool	Kenmore	3	0	52
	Whirlpool	1	0	73
General Electric	GE	2	0	65
Creda	Creda	2	1	0
Staber	System 2000	1	2	0
Kirkland	Kirkland	1	0	0
Inglis (Canada)	Inglis	1	0	0
Equator	Equator	1	0	0
Bosch	Bosch	1	0	0
	Other	0	0	172
	Total Models	32	21	478

Source: EPA ENERGY STAR® website and CEC Appliance Efficiency Database (May 1999).

As mentioned above, clothes washers meeting the Tier 2 efficiency parameters must meet ENERGY STAR® qualifications *(Energy Factor > 2.50)* and have RMC less than 50%. While information on the RMC was not provided in the ENERGY STAR® on-line product list, the CEC Appliance Efficiency Database is set up to track the RMC percentage. All of the 21 qualifying clothes washer models listed in the CEC Appliance Efficiency Database appear to have RMC percentages less than 50% except for the Saber brand clothes washers (55%). The RMC percentages are entered in the CEC database as zero for all other non-qualifying clothes washers.

7.2.5 ENERGY STAR® Dishwashers

According to the ENERGY STAR® website, dishwashers must exceed minimum federal standards by at least 13% in order to qualify for the ENERGY STAR® label. The Statewide Residential Lighting and Appliances Market Transformation Programs use the ENERGY STAR® efficiency requirements to categorize dishwashers as Tier 1 or Tier 2 efficiency. In addition to qualifying for the ENERGY STAR® label, Tier 1 efficiency requires that the Energy Factor be greater than or equal to .52 and less than .58, and Tier 2 efficiency requires that the Energy Factor is greater than or equal to .58.

According to the ENERGY STAR® on-line product list, a total of 185 dishwasher models qualify for the ENERGY STAR® label (Table 7-5). These models area associated with 21 unique brands. The CEC Appliance Efficiency Database captures data on a total of 582 dishwashers, the majority of which would not qualify for the ENERGY STAR® label. About 24% (or 138 models) appear to qualify for the ENERGY STAR® label based on the Energy Factor value.

Table 7-5 shows that the number of qualifying models listed in the ES on-line product list is greater than the number listed in the CEC Appliance Efficiency Database (185 v. 138). In addition, there is a bit of a discrepancy between the models listed in the ES on-line product list and those listed in the CEC Appliance Efficiency Database in terms of the qualifying efficiency levels (Table 7-6). Basically, the ES on-line product list contains a greater percentage of the more efficient dishwashers:

- Of the 185 qualifying models listed in the ENERGY STAR® product list, 35% (or 64) fall within the Tier 1 efficiency requirements and 65% (or 121) fall within the Tier 2 efficiency requirements.
- Of the 138 qualifying dishwashers listed in the CEC Appliance Efficiency Database, 41% (or 57) fall within the Tier 1 efficiency requirements and 59% (or 81) fall within the Tier 2 efficiency requirements.

Table 7-5
Qualifying and Non-Qualifying Dishwashers

Manufacturer	Brand	Qualifying Models		Non-Qualifying Models
		ENERGY STAR® Product List	*CEC Appliance Efficiency Database*	
Bosch	Bosch	35	4	0
General Electric	GE	30	26	100
Frigidaire	Frigidaire	15	27	28
	Gibson	12	11	1
	Tappan	9	9	10
	White-Westinghouse	8	12	2
	Kelvinator	8	9	0
	Roper	1	2	6
Miele	Miele	13	14	0
Maytag	Maytag	9	1	69
	Jenn-Air	4	1	12
Asko	Asko	8	0	0
Southcorp	Regency	6	2	1
n/a	Equator	6	0	0
Amana	Amana	5	0	7
Bonferraro	Bonferraro	4	4	0
Thermador	Thermador	4	0	2
Whirlpool	Kenmore	3	15	34
	Whirlpool	1	0	95
Monogram	Monogram	3	1	0
n/a	Fisher & Paykel	1	0	0
	Other	0	0	77
	Total Models	185	138	444

Table 7-6
Qualifying Dishwasher Efficiency Levels

	ENERGY STAR® Product List	CEC Appliance Efficiency Database
Tier 1 Models (ENERGY STAR®, 0.52 ≤ EF < 0.58)	64 (35%)	57 (41%)
Tier 2 Models (ENERGY STAR®, EF ≥ 0.58)	121 (65%)	81 (59%)
Total Qualifying Models	185	138
Non-Qualifying Models	N/A	444

Source: EPA ENERGY STAR® website and CEC Appliance Efficiency Database (May 1999).

7.2.6 ENERGY STAR® Room Air Conditioners

The Statewide Residential Lighting and Appliances Market Transformation Programs use the ENERGY STAR® efficiency requirements to qualify room air conditioners. ENERGY STAR® room air conditioners must exceed minimum federal standards for energy consumption by at least 15%.

The ENERGY STAR® on-line product list includes 81 qualifying room air conditioners. About two-thirds of these models (65%, or 53 of 81) are identified as exceeding the minimum federal standards by 15-20%. The remaining models (35%, or 28) exceed the minimum standards by more than 20%.

The ENERGY STAR® on-line product list also includes the Energy Efficiency Ratio (EER) for qualifying room air conditioners. While all of the qualifying models have EERs greater than 9.0, most have EERs between 10.0 and 10.5 (Table 7-7).

The CEC Appliance Efficiency Database also captures information on room air conditioner EERs. There are approximately 1,000 different models of room air conditioners included in the CEC database. Just less than half of these models (46%, or 467 of 1,006) are listed with EERs greater than 9.0, as shown in Table 2-8. Most of these 467 models have EERS greater than 9.0 but less than 10.0 (61%, or 284 of 467).

Table 7-7
Qualifying Room Air Conditioner Efficiency Levels

	ENERGY STAR® Product List	CEC Appliance Efficiency Database
9.0 < EER < 10.0	12 (15%)	284 (61%)
EER = 10.0	32 (39%)	76 (16%)
10.0 < EER ≤ 10.5	30 (37%)	37 (8%)
10.5 < EER	7 (9%)	70 (15%)
Total Qualifying Models	81	467
Non-Qualifying Models *(EER ≤ 9.0)*	0	539

Source: EPA ENERGY STAR® website and CEC Appliance Efficiency Database (May 1999).

There are 20 unique brands of dishwashers listed on the EPA ENERGY STAR® on-line product list. The CEC Appliance Efficiency Database captures data on 33 unique brands of dishwashers, 14 of which are listed with EERs greater than 9.0. A comparison of the ENERGY STAR® on-line product list and CEC Appliance Efficiency Database, according to room air conditioner brand, is shown in Table 7-8.

As shown, it would appear that many manufacturers produce a range of room air conditioners, some less than or equal to 9.0 EER, some greater than 9.0 EER. In addition, it appears that the CEC database contains a wider range of room air conditioner brands with EERs greater than 9.0 (i.e., 171 models in the "other" brands category). Some of the more common brands (manufacturers) listed in the CEC database but not on the ENERGY STAR® product list include: Goldstar (LG Electronics), Tadiran, Emerson Quiet Cool (Feeders, Keeprite International), Sanyo (Sanyo Fisher) and Fedders.

Table 7-8
Qualifying and Non-Qualifying Energy Efficient Room Air Conditioners

Manufacturer	Brand	Qualifying Models*		Non-Qualifying Models*
		ENERGY STAR® Product List	*CEC Appliance Efficiency Database*	
Friedrich	Friedrich	15	55	33
LG Electronics, Whirlpool	Kenmore	9	17	47
White-Westinghouse	White-Westinghouse	8	16	26
Whirlpool	Whirlpool	6	13	55
Frigidaire	Frigidaire	6	11	7
	Gibson	5	12	9
Amana	Amana	4	29	26
Heat Controller	Comfort Aire	4	2	18
LG Electronics, Sharp Electronics	General Electric	3	45	60
Carrier	Carrier	3	35	9
Sharp Electronics	Sharp	3	22	4
n/a	Crosley	3	0	0
Matsushita	Panasonic	2	7	0
	Quasar	2	5	0
n/a	Bryant	2	0	0
n/a	Signature 2000	2	0	0
Cold Point	Cold Point	1	27	2
n/a	Daewoo	1	0	0
n/a	Danby	1	0	0
n/a	Hampton Bay	1	0	0
	Other	0	171	243
	Total Models	81	467	539

Source: EPA ENERGY STAR® website and CEC Appliance Efficiency Database (May 1999).

* For lack of better information, qualifying models are defined as with EER greater than 9.0.

7.2.7 Gas Water Heaters

This study also included a market assessment for gas water heaters, although neither the Statewide Residential Lighting and Appliances Market Transformation Programs nor ENERGY

STAR® currently included gas water heaters in its lists of qualifying measures for the PY1999 program.

The ENERGY STAR® website describes most gas water heaters as having Energy Factor ratings within the 0.50 - 0.60 range. High-efficiency gas water heaters, the ENERGY STAR® website describes, might have Energy Factors ranging around 0.80.

This information can be used to get an indication of the relative range of gas water heater efficiency available on the market. The CEC Appliance Efficiency Database contains information on nearly 2,200 different gas water heaters. For 1,163 of these water heaters, the CEC database also contains information on the Energy Factor ratings. Most of these water heaters are listed with Energy Factor ratings of 0.50 to less than 0.60, as shown in Table 7-9.

Table 7-9
Gas Water Heater Efficiency Levels

	CEC Appliance Efficiency Database
EF < 0.50	23 (2%)
0.50 ≤ EF < 0.60	865 (74%)
0.60 ≤ EF < 0.70	242 (21%)
0.70 ≤ EF < 0.80	22 (2%)
0.80 ≤ EF	11 (1%)
Total Models *(EF non-missing)*	1,163
Other Models *(EF missing)*	995

Source: CEC Appliance Efficiency Database (May 1999).

There are currently five manufacturers producing 12 brands of gas water heaters that represent the majority of the gas water heaters in the CEC Appliance Efficiency Database (Table 7-10). None of these five manufacturers appear to be producing equipment that is rated with Energy Factors 0.80 or greater. In fact, there are only four manufacturers currently producing six unique brands (11 different models) of gas water heaters rated at 0.80 or greater.

Table 7-10
Gas Water Heater Manufacturers and Brands

Manufacturer	Brand	All Models	0.80 <= EF
A.O. Smith Water Products	A.O. Smith Water Products	196	0
American Water Heater Co.	American Water Heater Co.	146	0
	U.S. Craftsman	152	0
Bradford-White Corp.	Bradford-White	81	0
	Lochinvar	36	0
Rheem	Rheem	152	0
	Ruud	72	0
	Richmond	49	0
State Industries	Sears	97	0
	State	36	0
	Reliance	33	0
	Apollo	29	0
Controlled Energy Corp.	Aquastar	5	1
Glowcore Corp.	Glowcore	1	1
Targa Energy Company	Targa	2	2
Trianco-Heatmaker	Advantage 96	1	1
	Heatmaker	3	3
	Heatmaker 9600	3	3
Other	Miscellaneous	69	0
Total Models		1,163	11

Source: CEC Appliance Efficiency Database (May 1999).

7.2.8 Hard-Wired Interior Fixtures

The Statewide Residential Lighting and Appliances Market Transformation Programs are designed to promote a variety of ENERGY STAR®-labeled residential lighting technologies, including hard-wired indoor lighting fixtures. There are six different categories of hard-wired interior lighting listed in the on-line product lists for ENERGY STAR® Residential Lighting Fixtures:

- Architectural
- Ceiling-mounted and track lighting
- Cabinet lighting
- Recessed or "high hat" lights
- Chandeliers and suspended lights
- Sconces and wall-mounted lighting

Architectural – Many types of architectural light fixtures are found in family rooms and recreation rooms. These fixtures are commonly stocked in lighting stores and by electrical suppliers, and the use of T-8 fluorescent bulbs is recommended for these fixtures to provide the highest quality light with the least amount of energy use. Only one whole fixture is currently available with the ENERGY STAR® label – The Lumnec Cornice Lighting System (Decotex 2000 Corp.) – and it is designed for use over beds, draperies, doors and perimeter areas.

Ceiling-mounted and track lighting – Diffusers and track lighting are the most common of this lighting fixture category. These fixtures attach directly to the ceiling surface and are commonly used in entrance foyers, hallways, stairways, kitchens, basements, and garages. These products are typically available in home improvement and lighting stores, and from electrical suppliers. These fixtures can use either compact and linear fluorescent bulbs to reduce energy costs.

The on-line product list for ENERGY STAR®-labeled ceiling-mounted and track lighting contains approximately 340 different fixtures, produced by 14 different companies. By far, the most extensive product list is available from Lithonia Lighting, as shown below:

- Lithonia (221)
- Sea Gull (23)
- Progress (20)
- Simkar (18)
- Brownlee (16)
- Technical Consumer Products (16)

- Lights of America (9)
- Good Earth (8)
- Westerfield (4)
- Enertron (3)
- GFL Lighting (3)
- Ron Rezek (3)
- Catalina (1)
- Maxlight (1)

Cabinet Lighting – Cabinet lighting is designed to provide task or accent lighting for specific uses, most commonly integrated into bathroom lighting systems. Lighting stores and electrical suppliers stock bulbs, sockets and fixtures, and some cabinet/furniture manufacturers also offer built-in fixtures as an option. Compact fluorescent bulbs and small-diameter T-5 and other linear fluorescent bulbs fit most fixtures. Legion Lighting is by far the most common manufacturer of various furniture or cabinet-integrated lighting products, although there are three others included in the ENERGY STAR® on-line product list:

- Legion Lighting (26)
- Progress Lighting (2)
- SIR Industries/Yorkville Energy Saver (6)
- Thomas Industries (2)

Recessed or "High Hat" Lights – Recessed light fixtures are most commonly found as either troffers (with diffusing lens) or recessed circular downlights, wall-wash downlights or accent lights. Troffers are commonly used in kitchens and downlights and accent lights are commonly used in family rooms, living rooms, and recreation rooms. These fixtures can be purchased from home-improvement stores, lighting stores, and electrical suppliers. Linear and U-shaped fluorescent bulbs work well in troffers, and compact fluorescent bulbs are available for downlight applications.

Only three manufacturers (producing 24 different fixtures) are listed on the ENERGY STAR® on-line product list for recessed fixtures:

- Lithonia Lighting (15)
- Powerlux Corp. (6)
- Progress Lighting (3)

Chandeliers and Suspended Lights – Some of the more common types of suspended lighting fixtures include downlights, uplights, uplights/downlights, chandeliers, and ceiling fan light fixtures. Dining rooms and entrance hallways commonly use chandeliers, whereas ceiling fans can be found in almost any room in the house. Other styles of suspended fixtures can be found in kitchens and recreation rooms. Suspended light fixtures can be found in home-improvement stores, lighting stores, and from electrical suppliers. Some department stores stock a variety of suspended light fixtures as well. Some suspended light fixtures can use compact fluorescent bulbs, although not all.

Four manufacturers producing 19 suspended lighting fixtures are included on the ENERGY STAR® product list:

- Progress (11)
- Sea Gull (5)
- Ron Rezek (2)
- Catalina (1)

Sconces and Wall-mounted Lights – Common wall-mounted light fixtures include sconces, diffusers, vanity lights, and track lights. Wall-mounted fixtures can be used in any room in the house, sconces and diffusers are commonly used in hallways, bedrooms, and family rooms. Track lighting is commonly used in family rooms, recreation rooms, and sometimes kitchens. Vanity lights are found in bathrooms. These fixtures can be purchased from home-improvement stores, lighting stores, and electrical suppliers and can utilize either linear or compact fluorescent bulbs.

Six manufacturers producing 79 different wall-mounted fixtures are listed on the ENERGY STAR® on-line product list:

- Sea Gull (38)
- Brownlee (11)
- Ron Rezek (10)
- Enertron (9)
- Legion Lighting (6)
- Westerfield (5)

7.2.9 Hard-Wired Exterior Lighting

In addition to interior lighting fixtures, the Statewide Residential Lighting and Appliances Market Transformation Programs promote a variety of ENERGY STAR®-labeled exterior lighting products. The outdoor lighting section of the ENERGY STAR® website describes a number of different uses and features associated with hard-wired exterior lighting fixtures. These fixtures can utilize either fluorescent or high-intensity discharge lighting technology. There are seven manufacturers producing 70 different types of ENERGY STAR® hard-wired exterior lighting fixtures:

- Regent (23)
- Lights of America (19)
- Sea Gull (17)
- Brownlee Lighting (5)
- Enertron (3)
- Maxlight (2)
- Catalina (1)

7.2.10 Torchieres

The Statewide Residential Lighting and Appliances Market Transformation Programs also promote one of the most common fixtures in homes – torchieres. According to the ENERGY STAR® website, about 50 million halogen bulb torchiere lamps are in use across the U.S. ENERGY STAR®-labeled torchieres using compact fluorescent technology are promoted as solutions to the safety problem of halogen torchieres (which can get as hot as 1,100°F), and also offer the benefits of longer bulb life and lower operating costs.

The ENERGY STAR® website lists a total of 37 different ENERGY STAR® torchieres that can utilize compact fluorescent lighting technology. These 37 products are associated with 11 different manufacturers.

- American Lighting (6)
- Energy Federation (6)
- Good Earth Lighting (5)
- Lights of America (4)
- GFL Lighting (4)
- Adesso (4)
- Schumaker Lighting (3)
- Technical Consumer Products (2)
- Catalina (1)
- Emess (1)
- Maxlight (1)

7.2.11 Compact Fluorescent Screw-in Light Bulbs (CFLs)

When available, the Statewide Residential Lighting and Appliances Market Transformation Programs will promote ENERGY STAR®-labeled compact fluorescent screw-in light bulbs (CFLs). In the meantime, the PY1999 program uses the standards set forth by the individual utilities to qualify CFLs for promotion through the program.